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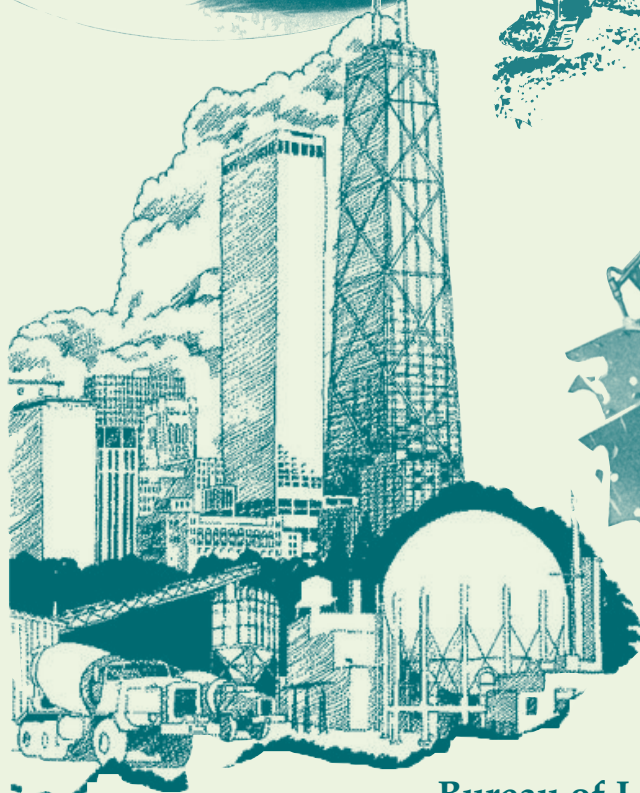
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RECOGNIZING AND PREVENTING HAZARDS IN THE CONSTRUCTION INDUSTRY



Bureau of Labor Education
The University of Maine

**RECOGNIZING AND PREVENTING HAZARDS
IN THE
CONSTRUCTION INDUSTRY**

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2007**

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“ . . . to assure as far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources . . .

Each employer:

- (1) shall furnish to each of [their] employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm . . .
- (2) shall comply with occupational safety and health standards promulgated under this Act.

Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders pursuant to this Act which are applicable to [their] own actions and conduct.”

— Occupational Safety and Health Act of 1970
Public Law 91-596, Sections (2)(b) and 5(a)(b)

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INTRODUCTION

By the nature of the work, the construction industry is very hazardous and dangerous. These dangers are multiplied still further when workers and supervisors employed in this industry are working at manufacturing sites such as pulp and paper mills. This handbook deals with the following hazards confronting workers and employers in construction, which have been identified by OSHA as priority areas for hazard recognition and prevention:

- fall hazards on the same level or from a higher to a lower one;
- being struck by or against any hazardous materials, equipment, or vehicles;
- getting caught on, caught in, or caught between objects such as vehicles, machines, equipment, or materials;
- contact hazards with electrical power sources.

This publication is not a comprehensive guide to the law or to all the kinds of hazards and risks associated with this industry. It is designed to supplement and complement other sources of information on occupational health and safety. Chapter I deals with approaches for recognizing and preventing hazards in construction. Chapter II provides an overview on the Occupational Safety and Health Act, and OSHA standards dealing with the hazard areas cited above. Chapter III focuses on attaining healthful and safe working environments through safety committee activities. A number of technical resources dealing with occupational health and safety in construction are contained in the appendices, including a listing of resources and a glossary of terms.

The topics in these chapters are covered through an easy-to-use question and answer format, and the index provides further access by listing all of the major subjects included in this book. The case study exercises at the end of each chapter are actual cases of work fatalities and injuries reported by OSHA and other organizations. Through group discussion or

individual analysis, these case exercises provide the reader with the opportunity to apply their own experience and knowledge on occupational health and safety, as well as what they have learned through this handbook.



CHAPTER I: RECOGNIZING AND PREVENTING CONSTRUCTION HAZARDS

The first step necessary for reducing accidents, injuries, and occupational diseases in construction is to establish an on the job program of hazard recognition and prevention. This action is effective for identifying and abating construction hazards involving falls, struck-by, getting caught, and electrocutions. This chapter discusses approaches for developing such a program on construction operations.

What's A Useful Approach For Recognizing Hazards On Construction Projects?

It's useful for construction workers to have a quick and easy way to identify hazards on the job. The following hazard recognition program can help do this.¹ Using this method, the next sections describe the previously cited four major hazard areas. Examples are provided for each area, along with actual cases of occupational accidents, injuries, and deaths that have resulted when proper practices and safeguards were not implemented. Through a hazard recognition program, workers and supervisors can survey their work environment and operation for both general and specific hazards that exist or could develop, and then take the necessary actions for protection.

1. Fall Hazards — There are two types of fall hazards: falls from a higher to a lower level, and falls on the same level. Examples and actual cases involving these hazards include:

Examples:

- a. locations where fixed as well as movable ladders are being used;
- b. fall hazards resulting from poor housekeeping practices, spilled fluids, lack of proper guardrails, lifelines, safety nets, and safety belts;

¹This approach is derived and adapted from the *Hazard Recognition Slide-Tape Program*, developed by the Labor Education and Research Service at Ohio State University.

- c. unguarded openings in floors, trenches, and other construction work areas;
- d. scaffolds and elevated platforms improperly erected, guarded, inspected, and/or maintained;
- e. loose fitting clothing or inadequate work shoes or boots which can cause a worker to trip;
- f. slippery work surfaces;
- g. situation where a worker can fall when trying to move a large awkward object on an elevated work area.



Actual cases:

- a. "Carpenters were setting trusses on the second floor of a house they were building. There was no guardrail or floor cover over the floor opening for the stairway. While placing a truss in position, one of the carpenters fell through the opening to the concrete basement below."²
- b. "A crew laying bricks on the upper floor of a three-story building built a six-foot platform spanning a gap between two scaffolds. The platform was correctly constructed of two 2" x 12" planks with standard guardrails; however, one of the planks was not scaffold grade lumber and also had extensive dry rot in the center. When a bricklayer stepped on the plank it disintegrated and he fell 30 feet to his death."³
- c. "A laborer was working on the third level of a tubular welded frame scaffold which was covered

²Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts26.html

³Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts27.html

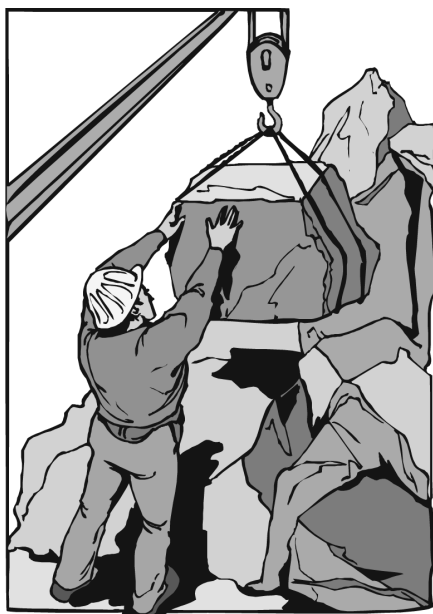
Also, according to OSHA's website "in 2004 there were 1,224 deaths in construction and 36% (441) were from falls."

with ice and snow. Planking on the scaffold was inadequate, there was no guardrail and no access ladder for the various scaffold levels. The worker slipped and fell head first approximately 20 feet to the pavement below.”⁴

2. Struck-by Hazards — These hazards occur where employees can be struck by objects, materials, equipment and/or vehicles. Often these types of hazards result from unsafe work practices, poor planning, or lack of training. The following are examples and actual cases pertaining to these hazards:

Examples:

- a. improperly guarded equipment, machinery, power tools or instruments;
- b. materials or equipment improperly stored or handled overhead;
- c. lifting, pulling, pushing, or carrying materials and/or equipment;
- d. work on or near conveyors, belts, hoists, and rollers used for moving stock/material;
- e. material loading, unloading, storage, and sorting;
- f. work with hand carts, power equipment, hand tools, gas cylinders, and cranes;
- g. exposure to passing vehicles.



⁴Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts29.html

Actual cases:

- a. "Four employees were working near pile driving equipment preparing to drive the first piling. Apparently the two clips on the eye of the hammer hoisting rope slipped, permitting the hammer which was still inside the lead to fall some 45 feet. The hammer struck a large timber on the ground breaking it. One end of the timber struck the employees, fatally injuring one man."⁵
- b. "Two employees were doing remodeling construction and were building a wall. One of the workers was killed when he was struck by a nail fired from a powder-actuated tool. The tool operator, while attempting to anchor plywood to a 2" x 4" stud, fired the tool. The nail penetrated the stud and the plywood partition prior to striking the victim."⁶
- c. "An employee was in the process of locating an underground water line. A trench had been dug approximately 4 feet deep along side a brick wall 7 feet high and 5 feet long. The brick wall collapsed onto the victim who was standing in the trench. The injuries were fatal."⁷

3. Getting Caught Hazards — The three common types of hazards found in this category include caught in, caught on, and caught between. Examples and actual cases are:

Examples:

- a. working surfaces and equipment where an employee can catch a limb in an unguarded opening;
- b. workplaces or sites where a worker can get "caught in" a cave-in, or a confined space;
- c. any fixed or moving projections pose a threat to workers in the form of "caught on" hazards, such as when a worker gets his or her hair, limb, or arti-

⁵Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts35.html

⁶Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts48.html

⁷Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts59.html

- cle of clothing caught on a moving part and dragged into a machine;
- d. employees confront “caught between” hazards resulting from operations where two objects move toward each other, or one object moves toward a stationary one;
 - e. conveyor belts, excavations, fuel tanks and other confined spaces, as well as moving vehicles of any kind may present a caught in, caught on, or caught between hazard.

Actual cases:

- a. “Construction workers were installing new fittings to the gang-edger waste conveyor. To move their equipment over the conveyor they placed a steel plate on top of it. A worker crossing over the conveyor fell into it, trapping his leg in the box link chain. The conveyor carried him forward, wedging his right leg under the steel plate. He suffered massive crush injuries to his leg.”⁸
- b. “The operator was exiting a rubber-tired front loader with the bucket still in the raised position, when his rain jacket caught on the arm-control lever. The snagged jacket caused him to slip, activating the bucket-arm control. He was trapped on the frame when the bucket dropped. He suffered serious injuries when crushed between the boom arms and the machine frame.”⁹
- c. “A driller/blaster was waiting in his rock drill cab for a call to move further up the road



⁸Source: Workers' Compensation Board / WorkSafe,
<http://www2.worksafebc.com/i/posters/1994/ha9410.html>

⁹Source: Workers' Compensation Board / WorkSafe,
<http://www2.worksafebc.com/i/posters/1993/ha9302D.html>

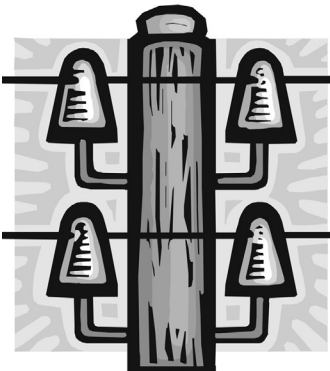
being constructed. He put the drill in rotation and left the cab to grease the hammer and centralizer on the drilling arm. He greased the fittings on one side of the hammer and walked around the 10 foot rotating drill steel and somehow caught his clothes on the end of the steel. He was found lying close to the drill steel end, the clothes torn from his upper body.”¹⁰

4. Electrocution Hazards — As one of the primary causes of death in the construction industry, these hazards deserve careful attention for hazard recognition. While workers are likely to be aware of overhead power lines, as the following examples and cases reveal, there are power line contact dangers that can be quite unexpected. Construction workers need to have specialized knowledge in this area, such as the minimum distance requirement for live-line work, and principles of arc generation.

Many electrical accidents are not the result of a worker’s direct contact with a power line. Often, these accidents are from indirect contact. For example, while using equipment or machinery, a worker may become distracted from touching a live wire with one of these objects. This can occur especially with a ladder or a moving vehicle.

General Examples:

Electrical hazards that can occur in both in-plant and outdoor construction projects include:



- a. Lack of Ground Fault Current Interrupter;
- b. Contact with power lines;
- c. Path to ground missing or discontinuous;
- d. Equipment not used in manner prescribed;
- e. Improper and unsafe electrical installation.

¹⁰Source: Workers’ Compensation Board/WorkSafe/WorkSafe,
<http://www2.worksafebc.com/i/posters/1992/fatal9203.html>

Actual Cases:

- a. "Two employees were installing aluminum siding on a farmhouse when it became necessary to remove a 36-foot high metal pole CB antenna. One employee stood on a metal pick board between two ladders and unfastened the antenna at the top of the house. The other employee, who was standing on the ground, took the antenna to lay it down in the yard. The antenna made electrical contact with a 7200-volt power transmission line 30 feet 10 inches from the house and 23 feet 9 inches above the ground. The employee handling the antenna received a fatal shock and the other employee a minor shock."¹¹
- b. "Employees were moving a steel canopy structure using a "boom crane" truck. The boom cable made contact with a 7200 volt electrical power distribution line electrocuting the operator of the crane; he was the foreman at the site," [who stepped in to operate the crane].¹²
- c. "A lineman was electrocuted while working on grounded de-energized lines. He was working from a defective basket on an articulated boom aerial lift when the basket contacted energized lines which ran beneath the de-energized lines. The defective basket permitted current to pass through a drain hole cut into the body of the basket, then through the employee, and to ground via the de-energized line."¹³

What Are OSHA's Recommendations Regarding Hazard Recognition and Prevention?

In this area OSHA recommends four important approaches which are useful for identifying and preventing construction hazards relating to falls, struck-by, getting caught, and electrocutions. These recommendations are contained in Appendix I.

¹¹Source: OSHA, http://www.osha.gov/OshDoc/data_FatalFacts/f-facts11.html

¹²Source: OSHA, http://www.osha.gov/OshDoc/data_FatalFacts/f-facts17.html

¹³Source: OSHA, http://www.osha.gov/OshDoc/data_FatalFacts/f-facts28.html

How Can Workers and Supervisors Document Specific Hazards Found In Their Worksite?

The hazard recognition approach can help employees and employers increase their awareness of actual or potential construction hazards. This increased awareness can then enable them to begin documenting hazards that are unique to their construction operation by surveying their worksite or workplace. After this is done, workers and supervisors can work to eliminate or reduce these hazards. One of the ways hazards can be documented is by periodically administering a survey questionnaire to all employees, both labor and management. The second part of Appendix I contains examples of questions which can be included in such a hazard recognition survey.

What Are Some Hazard Recognition and Prevention Issues Affecting Women in Construction?

With increasing numbers of women entering the construction trades, it is becoming clear that there are certain hazard recognition and prevention issues that disproportionately impact women workers. Since work routines and tasks often involve collaborative and joint work, increased risks for one group puts others at risk as well. For example, recent studies have documented the following specific hazards, which either directly or indirectly put women workers at special risk of falls, caught-in, struck-by, or electrocution accidents:

- The design of personal protective equipment (PPE), and personal protective clothing (PPC), for women should be based on female measurements. Union apprenticeship programs should provide tradeswomen with resources on where to find equipment and clothing that fits. Employers should make sure that all workers, of all sizes, have well-fitting PPE and PPC for safe and efficient performance.¹⁴
- Increasingly, women are moving into occupations once held exclusively by men, such as the construction trades. In such instances, physiological differences

¹⁴NIOSH: <http://www.cdc.gov/niosh/99-140.html>

between women and men can translate into occupational hazards, as when women operate equipment designed for male workers of larger stature.¹⁵

- In one study of work related deaths in construction from 1980 to 1992, women workers experienced higher rates of fatalities than men due to work related accidents involving motor vehicles, machinery, and falls, as well as higher rates of work related homicide.¹⁶
- Documented examples of hostile and exclusionary attitudes on the worksite towards female workers, including sexual harassment, shunning, threats of violence, and other forms of hostility, can result in women being excluded from important communications about hazards, and excluded from informal on-the-job training from more experienced coworkers. This creates an increasingly unsafe working environment regarding all of these hazards.
- In addition, women workers, who often face isolation at a job site, often feel pressured to “prove themselves” by undertaking tasks for which they have not received training.



Hazard recognition and prevention strategies need to reflect the need for equally shared information, as well as access to formal and informal training for both male and female workers. Part of this task involves efforts to build a supportive workplace culture emphasizing safety and equality for all, including tolerance, acceptance of diversity in the workforce, and respect for all coworkers.

¹⁵NIOSH: <http://www.cdc.gov/niosh/womrisk.html>

¹⁶National Center for Biotechnology Information (NCBI): <http://www.ncbi.nlm.nih.gov>

The Importance of Labor and Management Working Together on Health and Safety

As cited previously, OSHA states that it is the employer's responsibility to provide for a safe and healthy work environment for their employees. This may seem like a daunting task at times, and most contractors accept the responsibility. However it should be understood that even though there is a strong commitment by the employer, all health and safety issues are not always apparent. This is why both labor and management need to be always vigilant on recognizing potential hazards as they arise. For example, during a demolition or excavation project, areas of concern may arise during the performance of the job. Asbestos and/or lead paint may be found during the demolition stage. It is the employee's responsibility to notify the employer if there is a question about safety, and it is the employer's responsibility to investigate, and take the appropriate action to correct the safety problem. The employee can assume a hazard may exist and should take necessary precautions in preventing chronic (long term) affects to themselves or fellow employees until the issue of safety is resolved. This skepticism as to whether a job is being addressed safely or not, should be a part of an ongoing program of hazard recognition and abatement. Such a program can eliminate or at least reduce health and safety hazards for both employees and managers. Furthermore, the reduction or elimination of worksite accidents, injuries, and fatalities, not only protects employees, but also helps to reduce costs for the contractor in terms of OSHA fines and worker's compensation premiums. When a potential hazard is discovered it is in the best interest of everyone to abate the hazard as soon as possible. This action will serve to minimize detrimental health effects for employees in the present and/or future, and eliminate the costs associated with those chronic ailments for the employer.

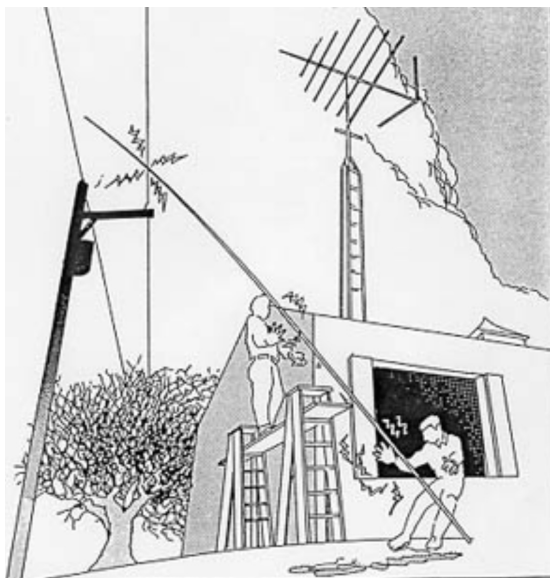
CHAPTER I: CASE STUDY DISCUSSION EXERCISES

Instructions: For each of the following case study exercises, please select a spokesperson who will be responsible for summarizing and reporting on your group's findings and recommendations:

CASE I

"Two employees were installing aluminum siding on a farmhouse when it became necessary to remove a 36-foot high metal pole CB antenna. One employee stood on a metal pick board between two ladders and unfastened the antenna at the top of the house. The other employee, who was standing on the ground, took the antenna to lay it down in the yard. The antenna made electrical contact with a 7200-volt power transmission line 30 feet 10 inches from the house and 23 feet 9 inches above the ground. The employee handling the antenna received a fatal shock and the other employee a minor shock."

1. How could the employees have been able to identify and abate this hazard?



ANSWER:

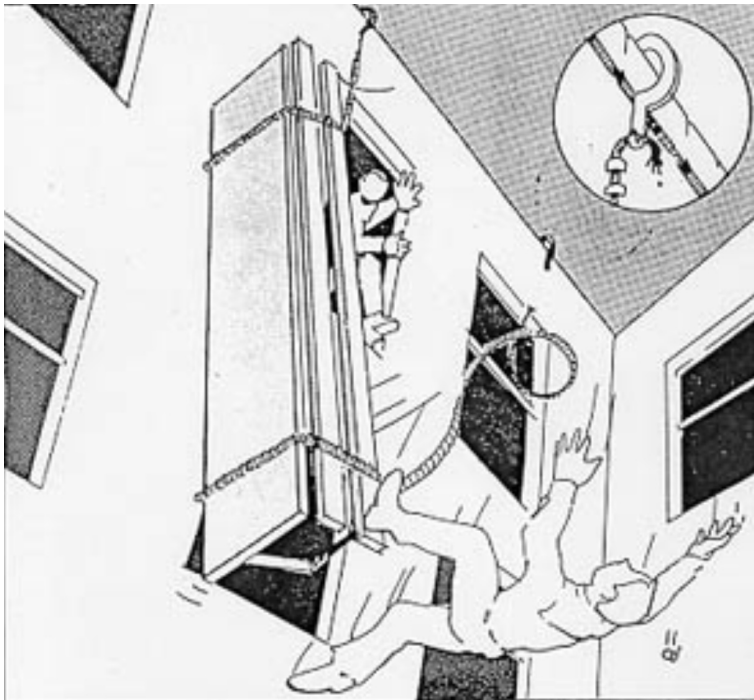
Before attempting to do the necessary work look for the presence of power lines and be extremely cautious when working near them. OSHA rules specify that employees need to be trained to recognize and avoid electrical hazards. Employers should not permit employees to work near any part of an electrical power circuit which might be contacted in the course of the work. When employees need to work around electrical circuits or power lines the employer must guard all electrical power circuits against accidental contact by insulating the circuit or de-energizing it or by other effective means that would protect the employee. This regulation can be found in 29 *CFR* 1926.416(a)(1)(3).¹⁷

¹⁷Source: For case study, photo, answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts11.html

CASE II

"Two laborers were working on a motorized two-point suspension scaffold 70 feet above ground level without safety belts, lanyards, or lifelines. Three wire rope clips forming an "eye" for connecting the wire rope to the C. hook failed and that end of the scaffold came down. One employee fell to the ground, and the second employee at the other end was catapulted through an open window where he was pulled to safety by an office worker. Two of the rope clips were still attached to the end of the rope after the accident. The inside tread of the third clip, which failed, was found to be stripped."

1. Can you identify the specific hazards in this case?
2. What preventative measures should be taken to avoid this problem in the future?
3. Whose responsibility is it to make sure this problem does not happen again?



ANSWERS:

“All wire ropes, fiber and synthetic ropes, slings, hangers, platforms, and other supporting parts must be inspected before use. Also, periodic inspections must be made while the scaffold is in use (29 CFR 1926.20(b)(2)). On suspension scaffolds each employee must be protected by an approved safety life belt attached to a lifeline. The lifeline must be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines that will safely suspend the employee in case of a fall. The lifeline must be appropriately adjusted as the work progresses (29 CFR 1926.451(g)(3)).”¹⁸

Applicable OSHA standards for construction include the following: 1926.451(f)(3) “Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.”

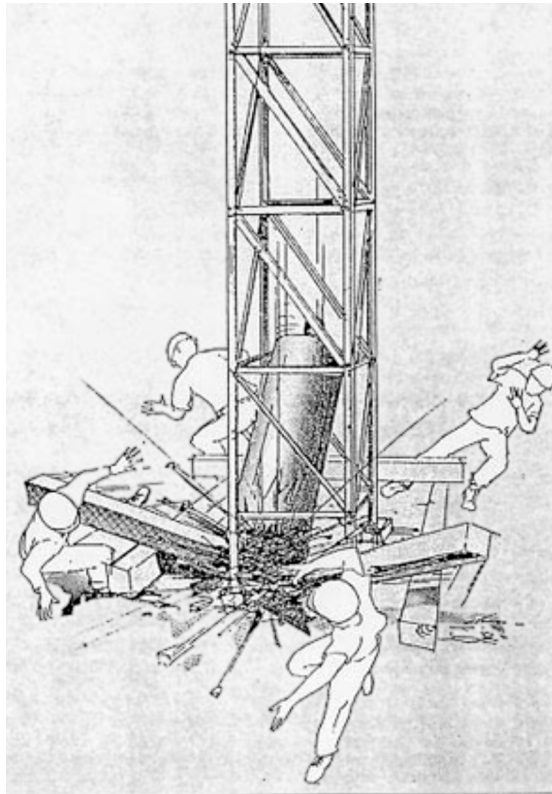
Under the general duty clause of the Occupational Safety and Health Act, as well as specific OSHA standards applicable to this work situation, management has the responsibility to make sure this problem does not happen again through training and enforcement. In addition, once the employees have been trained about the employer's safety rules, policies, and procedures, they are responsible for complying with them.

¹⁸Source: For case study, photo, answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts12.html

CASE III

"Four employees were working near pile driving equipment preparing to drive the first piling. Apparently the two clips on the eye of the hammer hoisting rope slipped, permitting the hammer which was still inside the lead to fall some 45 feet. The hammer struck a large timber on the ground breaking it. One end of the timber struck the employees."

1. Is there an identifiable hazard associated with this accident?
2. Whose responsibility is it to make sure this problem does not happen again?



ANSWER:

“A minimum of four wire rope clips must be used to form eyes in the ends of wire rope of the size used in accordance with 1926.251(c)(5) *re: Table H-20*.

The employer needs to instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his/her work environment to correct or eliminate any hazards or other exposure to illness or injury in accordance with 1926.21(b)(2).”¹⁹

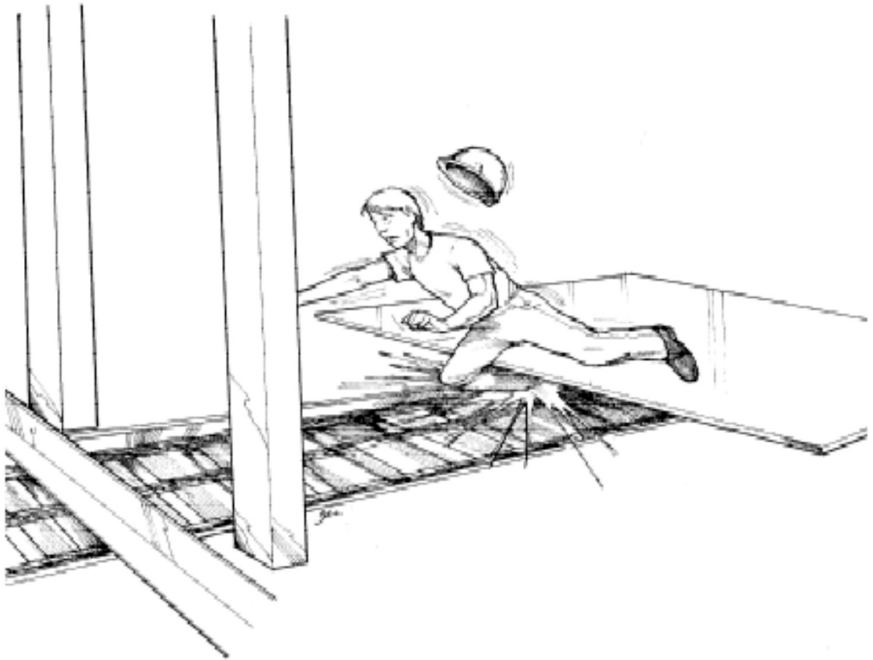


¹⁹Source: For case study, photo, answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts35.html

CASE IV

“Construction workers were installing new fittings to the gang-edger waste conveyor. To move their equipment over the conveyor they placed a steel plate on top of it. A worker crossing over the conveyor fell into it, trapping his leg in the box link chain. The conveyor carried him forward, wedging his right leg under the steel plate. He suffered massive crush injuries to his leg.”

1. Identify the hazard and how could it have been prevented?



ANSWER:

“Guard all nip points created by construction activity. Put up proper barricades to protect workers.”²⁰ In addition, employees and supervisors need to establish and follow proper procedures dealing with the lockout and tagging of electrical circuits. (Refer to OSHA Construction Standard 1926.417).

²⁰Source: For case study, photo, answer:
<http://www2.worksafebc.com/i/posters/1994/ha9410.html>

CASE V

First incident: “. . . a 35-year-old female flagger, was killed after a water truck driven by a co-worker ran over her. The work crew was re-paving an off-ramp and the water truck was backing over an area of uneven pavement. Apparently the experienced flagger, who had just recently taken a three-day refresher safety course, was directly behind the water truck as it was backing up. The driver felt a bump as the truck struck the woman but assumed it was caused by the uneven pavement. He then proceeded to pull forward running over the woman again. Witnesses to the incident tried to get the attention of both the driver and the woman but were unsuccessful. The woman received severe crush injuries and later died of her injuries. The back-up warning alarm (‘beeper’) was operational on the truck, although surrounding noise levels were high due to construction machinery and passing traffic.”²¹

Second Incident: “a 19-year-old female flagperson was checking a truck loaded with gravel on a paving operation. The loaded truck was waiting to back up to a gravel spreading machine. A supervisor driving a company pick-up truck pulled up beside the spreader and motioned the operator to join him in the pick-up truck. The flag woman, assuming she was being beckoned, walked toward the pick-up truck as well. In the meantime the loaded truck began to back-up. The flag woman, realizing she wasn’t needed in the pick-up truck, returned to her station. She walked directly into the path of the backing truck and was struck on her upper back and head. She proceeded to fall under the right rear tandem wheels receiving crushing injuries to her right leg and torso. These injuries were fatal.”²²

1. What were the factors and unsafe practices that contributed to these fatalities?

²¹J. Baron, T.L. Strome and L.H. Francescutti; “The construction flagperson: A target for injury”; *Occupational Medicine*, Vol. 48, No. 3, pp. 199-202, 1998. Case study citation in article: “Flag woman killed when truck backs over her”; *Canadian Occupational Health Safety News* 1994:17.

²²*Ibid.*; Alberta Labor Information Services. Case study citation in article: *Fatal Accident Investigation Reports*. Alberta, 1996.

ANSWERS:

“Factors that [contributed to] the fatality in the first incident . . . were vehicular traffic noise and a congested work zone created by non-total closure of the roadway. Noisy machinery is suspected to have drowned out the sound of the back-up alarm on the truck. It is possible that the flagger became too accustomed to the sound of the back-up beepers and simply ‘tuned it out’.

Inadequate safety precautions taken during construction vehicle movement is likely to have been a contributing factor for both cases. Safety standards demand that a flagperson and construction vehicle operator should remain in visual contact during vehicle movements. In both these cases this practice was not followed. Regardless, the driver should have been given an ‘all clear’ signal from another worker before he backed up. The backing area should be surveyed and backing discontinued if the driver loses sight of the flagperson at any time.”²³

These case incidences also point out the need for greater training for flaggers and other construction personnel to prevent flagperson injuries and fatalities, as well as improved enforcement and engineering controls.²⁴



²³Baron, Strome and Francescutti, *ibid.*; p. 200 (text modified slightly from original article).

²⁴*Ibid.*, p. 201-202.

CASE VI²⁵

“A 36-year-old construction worker died as a result of an 11-foot fall from an unguarded deck. The company she worked for was responsible for constructing a two-story building, and employed carpenters and laborers for this project. The company owner held safety meetings when warranted, but these meetings were not of a scheduled or structured format.

The victim had been employed and working at the site for four months. She was a skilled carpenter, with the ability to do fine-detailed work. At the time of the incident, she was applying wood-oil to a set of screen doors, when she was apparently attacked by stinging insects and attempted to escape from her work area. As she was backing away from the area, she tripped over building materials.

The victim fell approximately 11-feet, with her head and shoulders striking the ground consisting of rocky soil. She suffered a severe head injury, was taken to a local hospital trauma unit, and was pronounced dead two days later.”

1. What standards should have been followed for preventing this accident?

2. What can be done to prevent future accidents?



²⁵Source for case study and answers: NIOSH: NIOSH FACE Program, Missouri Case Report 94MO120 | CDC/NIOSH;
<http://www.cdc.gov/niosh/face/stateface/mo/94mo120.html> (The description of the incident has been modified from the original NIOSH case description. Source for illustration: OSHA at www.osha.gov).

ANSWERS:

The following NIOSH recommendations pertain to this case:

“RECOMMENDATION #1: Railing should be constructed on all open-sided floors, platforms, and runways when the height exceeds four feet.

DISCUSSION: As per 29 *Code of Federal Regulations (CFR) 1910.23(c)*, "Protection of open-sided floors, platforms, and runways." (1) Every open-sided floor or platform four feet or more above adjacent floor or ground level shall be guarded by a standard railing on all open sides except where there is entrance to a ramp, stairway, or fixed ladder.

As per 29 *CFR 1910.23(e)(1)*, "Railing, toe boards, and cover specifications." A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal from upper surface of top rail to floor, platform, runway, or ramp level.

The applicable OSHA standard for construction includes the following :

1926.501(b)(1) "Unprotected sides and edges. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems."

RECOMMENDATION #2: The employer should develop, implement and enforce a comprehensive safety program that includes, but is not limited to, training in hazard recognition and avoidance.

DISCUSSION: Employers should emphasize the safety of their employees by developing, implementing, and enforcing a comprehensive safety program. The safety program should include, but not be limited to, training workers to recognize potential workplace hazards and how to avoid them."²⁶

²⁶*Ibid.*

CHAPTER II: OCCUPATIONAL SAFETY AND HEALTH ACT

The Occupational Safety and Health Act (OSHA) was passed by Congress in 1970 to assure, so far as possible, safe and healthy working conditions for American workers. Under the act, the Occupational Safety and Health Administration (OSHA) was created within the Department of Labor to enforce this statute. OSHA is responsible for establishing and enforcing health and safety standards in order to achieve the goals of this legislation. The purpose of this chapter is to supply an overview on: the provisions of this law, information on the rights and responsibilities of employees and employers covered by this statute, and some of the key OSHA standards involving falls, struck-by, getting caught, and electrical hazards.

Who Is Covered by This Law?

Essentially, OSHA covers all employers and employees in the private sector within the 50 states, as well as territories and jurisdictions under U.S. authority. Some examples include labor and management employed in construction, manufacturing, business, ship/boat building and repair, agriculture, law, private educational and health care facilities, charitable organizations, labor organizations, and private relief agencies.



Who Is Not Covered By OSHA?

Those exempt from this law's coverage include: immediate family members employed on a farm that does not employ other employees; employment sectors regulated by other federal statute such as mining, certain truck and transportation sectors, and atomic energy; the self-employed; and public employees on the state and local levels of government including public education.

Who Is Responsible for Providing a Safe and Healthful Workplace?

The employer is responsible for providing a safe and healthful working environment. Specifically, OSHA stipulates that the employer “shall furnish to each of his/her employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm . . . Also, employers “shall comply with occupational safety and health standards promulgated under this Act.” The standards are established by the Secretary of Labor, after notice and public hearings.

What Do These Employer Responsibilities Include?

The first obligation is the “general duty” clause, designed to cover all hazards which don’t fall under a specific standard or regulation. OSHA may cite violations of this employer duty directly from the language of the act, where no published or promulgated standard exists. The “general duty” clause, also known as section 5(a)(1), only can be enforced when OSHA has determined: (1) that there is no standard, (2) that it is a recognized industry hazard, (3) that the employer has knowledge of the unsafe condition; or that the condition is of a nature that could cause death or serious physical harm. In the U.S. Supreme Court case involving *United Auto Workers v. General Dynamics*, the general duty clause of the Occupational Safety and Health Act, was upheld in the court’s decision.

The second obligation is compliance with existing federal occupational safety and health standards. These standards are detailed and technical, and cover nearly all aspects of the job environment with special standards for selected industries. Essentially, the legal responsibilities and rights of employers under OSHA are summarized in the following sections:

Employer Responsibilities

- Meet general duty responsibilities “to provide a workplace free from recognized hazards;”

- Comply with OSHA standards, rules and regulations;
- Be familiar with OSHA standards and make copies of these to employees upon request;
- “Evaluate workplace conditions, and minimize or eliminate potential hazards;”
- Provide employees with safe tools, equipment, and personal protective equipment, and make sure they are maintained and used properly;
- “Warn employees of potential hazards;”
- “Establish or update operating procedures and communicate them to employees;”
- “Provide medical examinations when required;”
- “Provide training required by OSHA standards” for this industry;
- Post and maintain records of work-related injuries and illnesses and make these available to employees and others upon request;
- “Cooperate with OSHA compliance officers;”
- Post OSHA’s “It’s the Law” poster (OSHA 3165);
- “Post OSHA citations and abatement notices at or near the worksite involved and abate cited violations within the prescribed period.”¹

Employer Rights

- “Seek advice and on-site consultation;
- Request and receive proper identification of OSHA compliance officers;
- Be advised by the compliance officer of the reason for the inspection;

¹Source: OSHA, U.S. Dept. of Labor, All About OSHA, Occupational Safety and Health Administration, OSHA 2056-08R, 2003, p. 4-5.

- Have an opening and closing conference with the compliance officer;
- Accompany the compliance officer on the inspection;
- File a notice of contest to dispute inspection results;
- Request an informal settlement agreement process after an inspection;
- Apply for a variance from a standard's requirements (when technical expertise and materials are not available and other means have been provided to protect employees);
- Take an active role in developing safety and health programs;
- Be assured of the confidentiality of trade secrets;
- Request assistance from NIOSH (National Institute for Occupational Safety and Health) for information on workplace toxic substances;
- Submit information to OSHA on the issuance, modification, or revocation of an OSHA standard and request a public hearing;"²

What Are the Responsibilities of Employees?

Each employee also is required to comply with all of the provisions and standards of the law which apply to their own actions and conduct. It is the employer's responsibility to make sure employees have been properly informed and educated about these responsibilities. Next, is a summary of general employee responsibilities under OSHA:

Employee Responsibilities:

- "Read the OSHA poster "It's The Law" at the job site;
- Comply with all applicable OSHA standards;

²*Ibid.*, p.5.

- Follow employer safety and health rules and regulations, and use prescribed protective equipment while engaged in work;
- Report hazardous conditions to the immediate supervisor;
- Report job-related injuries or illnesses to employer, and seek treatment immediately;
- Cooperate with the OSHA compliance officer conducting an inspection;
- Exercise rights under the OSH Act in a responsible manner.”³

What Rights Do Employees Have under OSHA?

In addition to the general right to a healthy and safe workplace or worksite, other specific employee rights under this law include the right to know about the hazards of their job, the right to complain to OSHA to have their workplace or worksite inspected, and the right to refuse to work under certain very limited circumstances. The next sections describe these rights in more detail.

Right-to-Know

OSHA’s Hazard Communication Standard requires all employers to inform employees about workplace or worksite chemical hazards, on the necessary precautions to be taken when working around these hazards, and emergency procedures that must be followed. When working in a pulp and/or paper mill as well as other industries, construction contractors need to obtain this information from the mill management in order to provide it to their employees and managers.



³*Ibid.*, p. 6.

Part 1910.1200 of the General Industry Standards, and Part 1926.59 of the Construction Industry Standards deal with Hazard Communication relating to chemicals. OSHA's recommendations for enabling employers to meet their hazard communication responsibilities are as follows:

- "Maintain a Material Safety Data Sheet (MSDS) for each chemical in the facility, [or worksite];
- Make this information accessible to employees at all times, in language or formats that are clearly understood by all affected personnel;
- Train employees on how to read and use the MSDS. Follow manufacturer's MSDS instructions for handling hazardous chemicals;
- Train employees about the risks of each hazardous chemical being used;
- Provide spill clean-up kits in areas where chemicals are stored;
- Have a written spill control plan;
- Train employees to clean up spills, protect themselves and properly dispose of used materials;
- Provide proper personal protective equipment and enforce its use;
- Store chemicals safely and securely."⁴

Right to Complain

If a workplace or site is unsafe or unhealthful, a number of corrective actions can be taken. First, where possible, the most expedient and fastest way to abate a hazard or correct a violation is to bring it to the attention of the employer. If this is not possible or has not worked, employees have the right

⁴OSHA, U.S. Dept. of Labor, Worker Safety Series: Construction (Pocket Guide) OSHA 3252-05N 2005, p. 10.

to complain to OSHA, and request an inspection or investigation. Employees can do this via the phone, mail, fax, email, or online. A complaint can be initiated by calling this federal agency at 1-800-321-OSHA(6742), or contacting the nearest regional, area, or state office of OSHA, or through an OSHA consultation office at www.osha.gov.⁵ Employees also have the right to have their name withheld from their employer if they file an OSHA complaint.

Right to Refuse

The federal OSHA law stipulates that workers have a right to refuse to do a job under certain very limited circumstances when they believe “a danger exists which could reasonably be expected to cause death or serious physical harm **immediately**.” In other words, a hazard must be both serious and imminent. For example, a boiler about to explode is clearly an “imminent danger.” On the other hand, a long-term exposure to toxic substances may not meet the “imminent danger” classification because there would normally be sufficient time to have such a hazard abated through regular OSHA inspection procedures.

When an “imminent danger” condition is discovered by an employee, he/she should act immediately by contacting a supervisor and union representative if a member of a union. If the condition or act is not corrected, and the worker then chooses to exercise their right to refuse in this “imminent danger” situation, it is very important that they tell their supervisor in front of a witness, that while they are refusing to work at that location or function which places their life in immediate imminent danger, they are willing to continue to work at another location or function that does not pose an imminent danger. Also, if an “imminent danger” situation is not remedied, the OSHA Area Office should be contacted. If the compliance officer determines an “imminent danger” exists, the official will attempt to have the employer abate the condition. Failing to accomplish such action, the OSHA official can then initiate legal action with the Secretary of Labor’s office.

⁵Occupational Safety and Health Administration, U.S. Dept. of Labor, All About OSHA, Occupational Safety and Health Administration, OSHA 3302-06N, 2006. p. 17.

Summary of Employee Rights

An employee covered by OSHA has the right to:

- “Review copies of applicable OSHA standards, rules, regulations, and requirements that the employer should have at the workplace;
- Request information that the employer [has] on safety and health hazards, precautions, and emergency procedures;
- Receive adequate training and information;
- Request an OSHA investigation if the employee believes hazardous conditions or violations of standards exist;
- Right to file a complaint [anonymously];
- Be advised of OSHA actions regarding a complaint and have an informal review of any decision not to inspect or issue a citation;
- Have an authorized employee representative accompany the compliance officer during an inspection;
- Respond to questions from the compliance officer;
- Observe any monitoring or measuring of hazardous materials or see any related monitoring or medical records;
- Review the Log and Summary of Work-Related Injuries and Illnesses (*OSHA 300 and 300A*) at a reasonable time and manner;
- Request a closing discussion following an inspection;
- Object to abatement period set in a citation issued to the employer;
- Participate in hearings conducted by the OSHA Review Commission;

- Be notified by the employer if they have applied for a variance, and to testify at a variance hearing and appeal the final decision;
- Submit information and comments to OSHA on the issuance, modification or revocation of OSHA standards, and request a public hearing.”⁶

What Do OSHA Standards Cover?

In addition to the general-duty clause, OSHA has established safety and health standards that cover virtually all conceivable aspects of the work environment. Examples include:

- control of ventilation, temperature, and noise levels;
- hazard communication;
- keeping the workplace clean and orderly;
- emergency exits, fire protection, sprinklers, and evacuation plans;
- confined spaces and excavations;
- medical and first-aid treatment;
- handling and storage of compressed gas, radiation, flammable materials, explosives, toxic materials, hazardous substances and wastes;
- personal protective equipment, and fall protection;
- training procedures;
- electrical standards;
- general working conditions (waste disposal, toilets, showers, dressing rooms, and food handling).

The standards also set limits for air contaminants, fumes, and exposure to toxic chemicals, including periodic testing

⁶OSHA, U.S. Dept. of Labor, All About OSHA, Occupational Safety and Health Administration, OSHA 2056-08R, 2003, p. 6.

and monitoring of certain substances like asbestos, dust, radiation, and carbon monoxide. When monitoring is required, employees have a right to observe the testing, and have access to the records that indicate exposure to toxic or harmful materials.

The requirements specified in OSHA standards go beyond the traditional use of safety glasses, steel-toed shoes, and ear plugs. For example, OSHA standards can require changes in work practices, the work environment, and machinery and not simply personal protective equipment. When the Occupational Safety and Health Act was passed and as it has evolved, it has been accepted that the solution to occupational health and safety is not layer after layer of personal protective equipment but basic changes in job environments, practices, and any other relevant factors.

How Are OSHA Standards Organized?

Because the standards are quite voluminous and technical, it is very important that labor and management know how they are organized, so they can use them effectively and promptly. Title 29 (Chapter XVII) of the Federal Register, has been designated for the Occupational Safety and Health Administration. Under Chapter XVII, various OSHA regulations are broken down into Parts. For example, Part 1926 contains standards for the construction industry. Part 1910 contains standards applicable for both general industry and construction.

What Are Some of the OSHA Standards That Apply to Hazards Involving Falls, Struck-By, Getting Caught, and Electrocutions?

Standards covering these hazards can be found in both 1910 General Industry Standards, and 1926 Construction Standards. Appendix II supplies an overview of OSHA Standards, that deal with these specific hazard areas. The standards cited in this appendix are based on a review of 50 OSHA investigations in which a fatality and/or injury occurred. The listing for each category indicates the OSHA standard that was cited.

Has OSHA promulgated or changed any standards under Subpart S Electrical Work that incorporates the NFPA 70E standards?

Yes. On February 14, 2007, OSHA issued a Final Rule on the General Industry Electrical Installation Standard found in *Subpart S of 29 CFR Part 1910.132(d)*. The update requirements specified in this Final Rule are largely based on the 2004 edition of the National Fire Protection Association's (NFPA) Electrical Safety Requirements for Employee Workplaces (NFPA 70E), and the 2002 edition of the National Electrical Code (NEC). This Final Rule of OSHA becomes effective on August 13, 2007. This Rule specifies new methods and requirements on the classification and installation of electrical equipment in Class I hazardous locations, ground-fault circuit interrupters, (GFCIs), and wiring for carnivals and comparable installations.

Because OSHA will adopt a more recent edition of NFPA 70E, those requirements will then become part of the OSHA standards under *CFR 29 1910 Subpart S — Electrical*. When there is no specific rule or standard in force, a national consensus standard can sometimes be used in the application of a general duty clause citation. Essentially, the consensus standard may serve as evidence that hazard recognition and a means of abatement are feasible. The “general duty clause,” Section 5(a)(1) of the OSH Act, is violated if an employer has failed to furnish a workplace that is free from recognized hazards that are likely to cause death or serious physical harm. The general duty clause is often cited when there is no standard that applies to a particular hazard involved.

More information on this final rule can be obtained by consulting OSHA's website at www.osha.gov and then type in 70E in the search box and press enter. Scroll down to the heading entitled **Federal Registers**, find 2007-02/14/2007—Electrical Standard; Final Rule ...7221. This will provide all the proposed changes to *29CFR Subpart S 1910.302 – 1910.308 and 1910.399*.

How Can OSHA Standards Be Obtained?

OSHA standards are grouped and published into four major areas: General Industry, Maritime, Construction, and Agriculture. OSHA offices and the U.S. Government Printing Office (www.gpo.gov/) can supply copies of these standards on a cost/purchase basis. Also, OSHA's standards and other information on occupational health and safety, can be accessed on the internet through OSHA's home page which is: www.osha.gov.

What About OSHA Investigations and Inspections?

Investigations

OSHA responds to complaints by conducting either on-site inspections or off-site investigations. Generally, complaints involving "low-priority" hazards that are filed by phone, fax, email, or online, are dealt with through OSHA's off-site, phone/fax investigation approach. The following summarizes OSHA's procedures when conducting this approach:

After receiving this type of a complaint, OSHA contacts the employer by phone, describes the alleged hazard, and confirms the contact with a follow-up letter or fax to the employer. Within five days, the employer must provide a written response that describes any problems and/or hazards found along with the corrective actions initiated or planned. If OSHA finds the employer's written response to be adequate in addressing and correcting the hazard, an inspection will not be conducted. OSHA also provides the employee or employee representative who filed the complaint with a copy of the employer's written response. If this individual does not find the employer's response and actions to be satisfactory for correcting the hazard, they have the legal right to request that an on-site OSHA inspection be conducted. Employees do not give up this inspection right if they are not satisfied with a phone/fax investigation.⁷

⁷OSHA, U.S. Dept. of Labor, All About OSHA, Occupational Safety and Health Administration, OSHA 2056-08R, 2003, p. 7, 22. This section is a summary of the detailed OSHA inspection procedures cited on these pages.

Inspections

Any of the following conditions will trigger an OSHA inspection:

- a written, signed complaint, from an employee or employee representative, claiming that an imminent danger exists, or that an OSHA violation exists that could cause serious harm or death;
- an inadequate response from an employer to a previous OSHA phone/fax investigation;
- an imminent danger situation or condition; (OSHA places a top priority on taking immediate and corrective actions in these complaints);
- an accident that results in the death of an employee or the hospitalization of three or more workers;
- a “planned or programmed inspection” in employment sectors with statistically high incidences of occupational hazards and related injuries;
- a follow-up or check-up inspection to OSHA inspections conducted previously.⁸



How Are OSHA Inspections Conducted?

An OSHA inspection consists of four parts. **First**, an OSHA compliance officer arrives at the workplace or site, where they present their credentials to a designated employer representative. **Next**, an opening conference is held where this official explains the purpose of the inspection and why it is being conducted. Also, at this meeting the employer and employees select their representative(s) to accompany the

⁸*Ibid.*, p. 22-23.

compliance officer during a walk around inspection. If one exists, the union picks this employee representative.

The **third** part is the inspection itself, which may involve only an inspection of a specific complaint or problem area, or it may involve an inspection of the entire facility or worksite. Work areas, processes and procedures, tools, equipment, machinery, and any other relevant factors are inspected for both hazards and violations. During this inspection, the compliance officer may consult with the employer and employee representatives, as well as other employees. This official also checks and monitors whether the employer has maintained records properly on work related injuries, deaths, and illnesses. Also, records are reviewed regarding employee exposure to dangerous substances and materials.

The **fourth** part consists of the closing conference where the compliance officer meets with the employer and employee representatives together or separately. At the conference(s) any unsafe conditions identified during the inspection are discussed, along with any “apparent violations” which may lead to an OSHA citation.⁹ In addition, both employers and employees are informed of their respective rights and responsibilities after the inspection.¹⁰

What is an OSHA Citation?

A citation is issued when an OSHA violation is found as a result of an inspection. The citation informs labor and management about the specific OSHA standards and regulations that have been violated. It identifies any hazardous conditions that need to be abated that are covered by the general duty clause of the law, the proposed time allowed for the violations and hazard(s) to be abated, and the proposed penalties to the employer.¹¹

⁹*Ibid.*, p. 25.

¹⁰*Ibid.*, p. 23-26 provide detailed information on the entire OSHA inspection process.

¹¹*Ibid.*, p. 25.

What are the addresses, phone, and fax numbers of the OSHA offices in Maine?

U.S. Department of Labor
 OSHA Augusta Area Office
 Federal Building, Room G-26
 40 Western Avenue
 Augusta, Maine 04330
 Phone: 626-9160
 Fax: 622-8213

U.S. Department of Labor
 OSHA Bangor District Office
 382 Harlow Street
 Bangor, Maine 04401
 Phone: 941-8177
 Fax: 941-8179

Can a Worker be Disciplined or Penalized for Filing an OSHA Complaint?

No. It is illegal for a worker to be disciplined or punished for filing an OSHA complaint. Although a copy of the complaint is supplied to the employer, the person complaining may have their name kept confidential. Even if an employer knows who has filed the complaint, the employee is given legal protection. *Section 11(c)(1)* of the law “prohibits any person from discharging or in any manner retaliating or discriminating against any employee because the employee has exercised their rights under the Act.”¹² If the employee notifies the OSHA office within thirty days of any act of discrimination, OSHA investigates the complaint, and if necessary, can go to federal district court to get appropriate relief including rehiring or reinstatement with back pay.

What Is OSHA’s Role Regarding Whistleblower Protections?

OSHA also is responsible for enforcing and administering 13 other statutes that provide whistleblower protections for workers employed in a variety of employment sectors. These include: airlines, trucking, nuclear, pipeline, environmental, corporations, and securities.¹³ For more information contact an OSHA office or go on the net at:



www.osha.gov/dep/oia/whistleblower.

¹²OSHA, U.S. Dept. of Labor, *All About OSHA, Occupational Safety and Health Administration*, OSHA 3302-06N, 2006. p. 16.

¹³*Ibid.*, p.17.

Can OSHA Ever Give Employers Advance Notice of an Inspection?

Yes, but only under special circumstances which include:

- “‘imminent danger’ situations which require immediate corrective action;
- inspections that must take place after regular business hours, or require special preparation;
- cases where OSHA must provide advance notice to assure that the employer and employee representative, or other personnel will be present; and
- situations in which OSHA determines that advance notice would produce a more thorough or effective inspection. Employers receiving advance notice of an inspection must inform their employees’ representative or arrange for OSHA to do so.”¹⁴

What About OSHA Standards Pertaining to the Needs of Women in the Construction Industry?

In 1999, the Advisory Committee on Occupational Safety and Health submitted a study to OSHA, concerning women in the construction industry. This report, entitled “Women in the Construction Workplace: Providing Equitable Safety and Health Protection,” concluded that “safety and health problems in construction create barriers to women entering and remaining in this field.”¹⁵ The study contained a number of specific recommendations regarding the needs of women construction workers, ranging from language on personal protective equipment and clothing (PPE and PPC), to training, workplace culture, sanitation, and general recommendations for how OSHA deals with safety and health issues. The study stated that:

¹⁴OSHA, U.S. Dept. of Labor, All About OSHA, Occupational Safety and Health Administration, OSHA 2056-08R, 2003, p. 21-22.

¹⁵U.S. Department of Labor, OSHA; Study and Recommendations by the Advisory Committee on Occupational Safety and Health regarding “Women in the Construction Workplace: Providing Equitable Safety and Health Protection.” Submitted to the Occupational Safety and Health Administration (OSHA), June 1999; p. 1. (<http://www.osha.gov/doc/acscsh/haswicformal.html>).

“OSHA standards on personal protective equipment for construction (29 CFR 1926, *Subpart E*) should be revised to conform with the General Industry Standard for PPE (29 CFR 1910.132) which specifies that the employer select PPE that properly fits each affected employee. As discussed in the preamble to the General Industry Standard, this provision was added in part to address concerns that PPE and PPC often did not adequately fit female employees. Similar consideration should be included in the Construction PPE standard to protect all construction employees.”¹⁶

Many of these specific concerns and recommendations are also summarized in a NIOSH publication, “Providing Safety and Health Protection for a Diverse Construction Workforce: Issues and Ideas.”¹⁷ Although OSHA has not yet issued further health and safety regulations in construction that specifically address the issues or needs of women workers, this issue is under discussion. It should also be noted, however, that developing such new regulatory language is a lengthy and complex process. Clearly, much work remains to be done in meeting the health and safety needs of an increasingly diverse construction workforce.



¹⁶*Ibid.*, p. 16.

¹⁷National Institute on Occupational Safety and Health (NIOSH); “Providing Safety and Health Protection for a Diverse Construction Workforce: Issues and Ideas.” (<http://www.cco.gov/niosh/99-140.html>).

NOTES

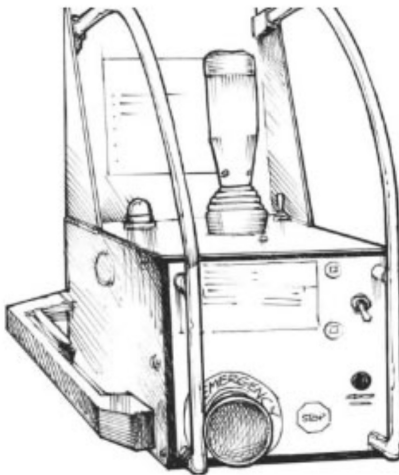
CHAPTER II: CASE STUDY DISCUSSION EXERCISES

Instructions: For each of the following case study exercises, please select a group spokesperson who will be responsible for summarizing and reporting on your group's findings and recommendations:

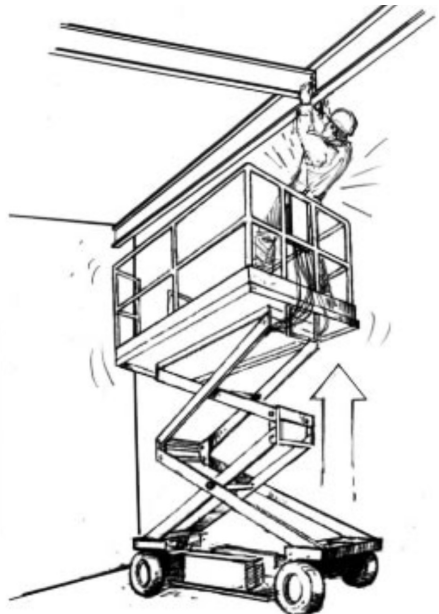
CASE I

"A worker on a self-propelled scissor lift was installing bolts to connect two large overhead steel beams. The platform controls were not protected against inadvertent operation. The worker inadvertently activated the lever for controlling elevation. The platform elevated. The worker was pushed firmly onto the control lever when he was **caught between** an overhead beam and the elevating platform's guardrail."

What OSHA standard applies?



Example of guarded controls



ANSWER:

OSHA would cite the general duty clause violation in this case. In ANSI standard A92.6-1999 the ANSI standard for self-propelled elevating work platforms (which the personnel lift is) it states in 4.6 Controls 4.6.1 Upper controls: "Upper controls shall be provided at the platform, and shall: Be protected against activation other than that initiated by the operator. Each set of operating controls of an elevating work platform must be provided with an emergency stop device. The emergency stop device must be within easy reach of the operator, and must be clearly labeled STOP and in red. Each elevating work platform must have a clearly marked overriding lowering control which, in an emergency, will enable a worker at the lower controls to stop and lower the platform."¹⁸

¹⁸http://www2.worksafebc.com/i/posters/2004//ib_scissorlift.htm

CASE II

Cassie is a carpenter apprentice who has just started a new job at a construction site. She is the only woman on the job site, and the only coworker she knows there has not been very friendly to her. On this job, he ignores her requests continually for information or help, and has become increasingly hostile towards her whenever she asks a question. She has decided to say as little as possible, not wanting to appear ignorant, incompetent or a “crybaby.”

However, this job involves working at heights of up to 25 feet, as well as using power equipment. Cassie has discovered that the PPE and PPC issued to her pose potential hazards. The gloves are so big that she can't grasp tools properly, the hammer that her coworker handed to her is too big for her hands, and the jacket issued to her is so large that the sleeves are constantly falling down over her hands. She worries that the sleeves could get **caught-in** the saw, but she doesn't want to get flak for not being able to do the job as well as her male coworkers.

What should she do?



ANSWER:

According to OSHA regulations, Cassie's employer is obligated to provide properly fitting PPE and PPC. Cassie could reference the OSHA Construction Standards for PPE (29 CFR 1926, *Subpart E*).¹⁹ Employers should be aware that it is their duty to make this available to their employees. It is Cassie's obligation to speak up and ask for properly fitting PPE and PPC.

Also, if she feels that she is having a problem with her coworker and cannot resolve the issue(s) with him directly, she can and should speak to her shop steward about the situation. It would be useful for all three of these individuals to meet and resolve any difficulties, and determine the actions needed for resolving the problem. However, if this problem is not resolved at this level, she can bring it to the attention of her supervisor. If the problem continues, and Cassie believes she is being treated differently or adversely because of her gender, she has the legal right to file an employment discrimination complaint with the Maine Human Rights Commission, or the Equal Employment Opportunity Commission.

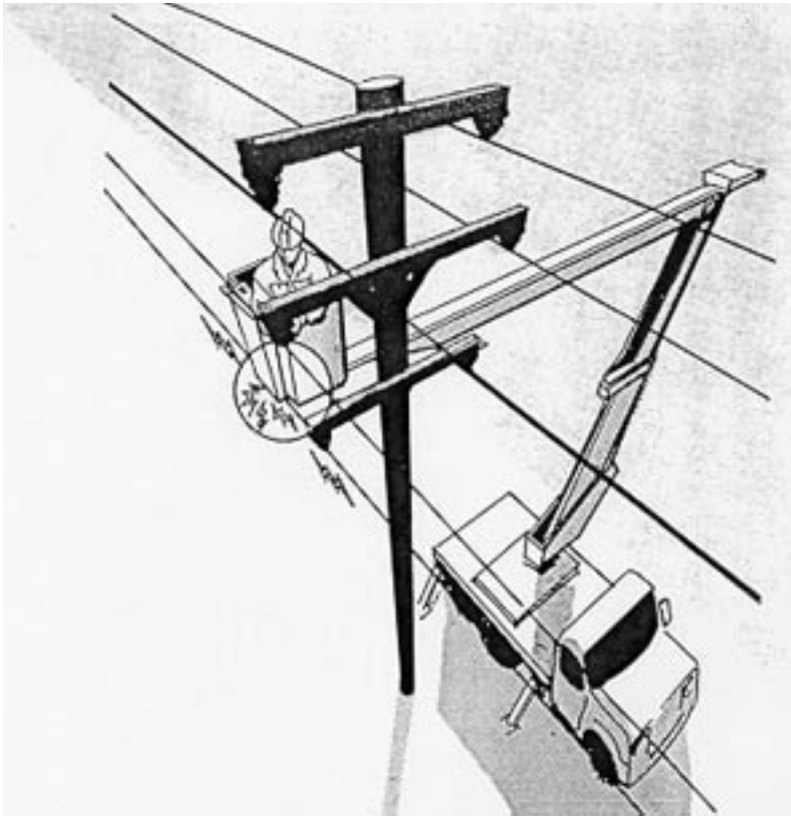
A proactive solution would involve providing periodic employer and employee training about health and safety developments, as well as the need to maintain a respectful and tolerant workplace culture for all workers. Isolation, poor communication, and hostility ultimately create safety risks for everyone.

¹⁹U.S. Department of Labor, OSHA; Study and Recommendations by the Advisory Committee on Occupational Safety and Health regarding "Women in the Construction Workplace: Providing Equitable Safety and Health Protection." Submitted to the Occupational Safety and Health Administration (OSHA), June 1999. p. 1. (<http://www.osha.gov/doc/acscsh/haswicformal.html>)

CASE III

"A lineman was shocked while working on grounded de-energized lines. He was working from a defective basket on an articulated boom aerial lift when the basket contacted energized lines, which ran beneath the de-energized lines. The defective basket permitted current to pass through a drain hole cut into the body of the basket, then through the employee, and to ground via the de-energized line."

What are the OSHA standards that apply?



ANSWER:

"29 CFR 1926.950(d)(1)(v) Guards or barriers must be erected as necessary to adjacent energized lines.

29 CFR 1926.950(b)(1) and 952(a)(1) Existing conditions of mechanical equipment, energized lines, equipment, conditions of poles, and location of circuits must be determined by an inspection or tested before starting work.

29 CFR 1926.21(b)(2) Employees must be instructed on how to recognize and avoid unsafe conditions and on regulations that apply to their work environment.

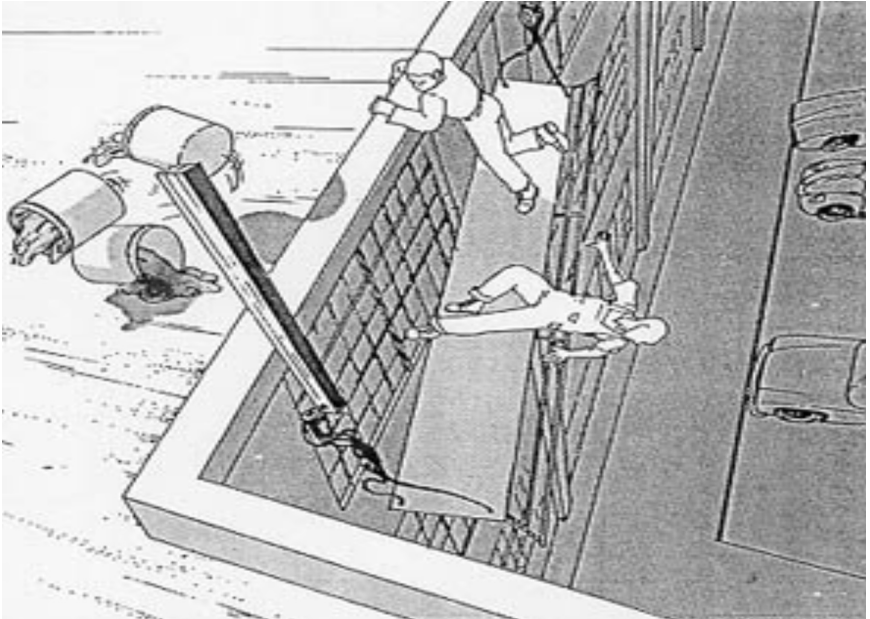
29 CFR 1926.453 *Aerial lifts (a)(2)* Aerial lifts may be 'field modified' for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1959 and this section to be at least as safe as the equipment was before modification."²⁰

²⁰Source for case study, photo, and answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts28.html and,
 OSHA, CFR 29, Part 1926.453 *Aerial lifts*, p. 300.

CASE IV

“Two employees were painting the exterior of a three-story building when one of the two outriggers on their two-point suspension scaffold failed. One painter safely climbed back onto the roof while the other **fell** approximately 35 feet. The outriggers were counterweighted with three 5-gallon buckets containing sand and were not secured to a structurally sound portion of the building. Neither painter was wearing an approved safety belt and lanyard attached to an independent lifeline.”

What are the OSHA regulation(s) that apply?



ANSWERS:

"29 CFR 1926.21(b)(1) Develop and maintain a safety and health program to provide guidance for safe operations.

1926.451(f)(3) Scaffold and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.

1926.454 Training requirements. [The whole section covers training topics specific to scaffolds and should be used].

1926.451(a)(2) Direct connections to roofs and floors, and counterweights to balance adjustable suspension scaffolds, shall be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 times the tipping moment imposed by the scaffold operating at the stall load, whichever is greater.

1926.451(d)(3)(ii) Counterweights shall be made of non-flowable material. Sand, gravel and similar materials that can be easily dislocated shall not be used as counterweights.

1926.451(d)(3)(iv) Counterweights shall be secured by mechanical means to the outrigger beams to prevent accidental displacement.

*1926.451(g)(1)(ii) Each employee on a single-point or two point adjustable suspension scaffold shall be protected by both a personal fall arrest system and a guardrail system."*²¹

²¹Source for case study, photo, and answer:

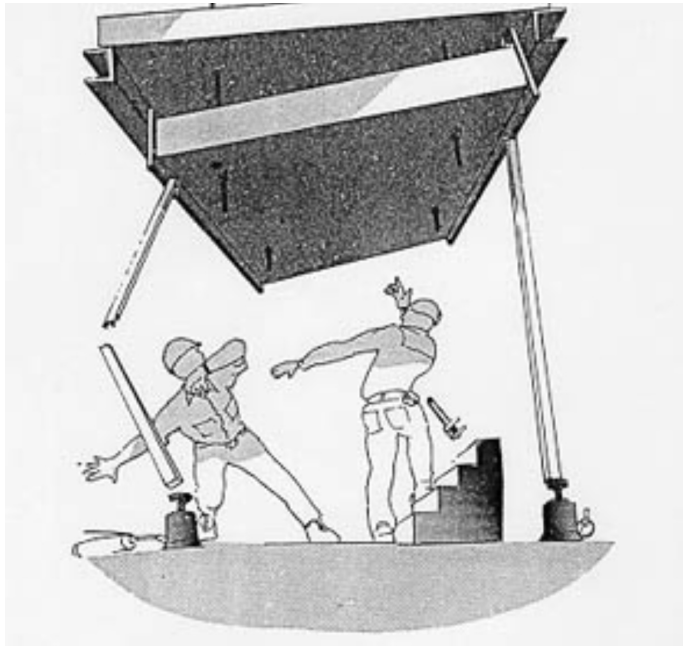
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts14.html

With the exception of 29 CFR 1926.20(b)(1), all the other applicable standards in this case have been updated and included.

CASE V

"Two employees were making final adjustments to a large machine in a new paper mill facility. They were using two hydraulic jacks and two 4" x 4" uprights under one end of the 6,000 lb. piece of equipment which was suspended by four $\frac{3}{4}$ " threaded rods. First, the employees would jack up one end of the piece about an inch. Then, one employee would climb a set of temporary steps to hand tighten the nuts on the threaded rods. Only two vertical timbers placed on the heads of the hydraulic jacks supported the 6,000 lb. piece of equipment. The timbers were set under a $\frac{5}{8}$ " side rail. No cribbing, blocking, shoring or other stabilizing methods were used to secure the load after it was raised. When the end of the piece was jacked up, it fell, **crushing** one employee and narrowly missing the other. There were no written procedures outlining the steps to be followed during installation of new equipment."

Cite the violations in OSHA standard(s) that contributed to this accident.



ANSWER:

"29 CFR 1926.21(b)(2) Employees were not trained in the proper inspection techniques for hydraulic jacks and a safe procedure was not used during the installation of the equipment.

29 CFR 1926.251(a)(1) Employees should inspect rigging equipment prior to each shift.

29 CFR 1926.305(d)(1)(i) After the load has been raised, it shall be cribbed, blocked, or otherwise secured at once.

29 CFR 1926.305(d)(1)(iv) Each jack shall be thoroughly inspected at times which depend upon the service conditions. Inspections shall be not less frequent than the following:

- (A) For constant or intermittent use at one locality, once every 6 months.*
- (B) For jacks sent out of shop for special work, when sent out and when returned."²²*

²²Source for case study, photo, and answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts10.html

CHAPTER III: ACHIEVING HEALTH AND SAFETY ON THE JOB

This chapter focuses on joint labor/management approaches for attaining and maintaining healthful and safe construction worksites through safety and health committee activities.

Labor-Management Health and Safety Committees

Joint labor-management committees often can serve as an efficient means for labor and management to work cooperatively in the abatement of job hazards, and the resolution of disputes over occupational health and safety. However, this joint committee approach only is useful when both sides are willing to make an honest and concerted effort to maintain safe and healthful working conditions and eliminate job hazards. The following recommendations are important criteria for determining the effectiveness of this type of an approach:

Important Organizational Factors

- In terms of representation, a labor-management safety committee should be comprised of an equal number of labor and management.
- The committee should be co-chaired by one member from labor and one from supervision.
- Meetings should be held at the call of either co-chair or at the request of any member. However, at least one meeting should be held every month to discuss health and safety conditions at the worksite.
- The purpose of this body should involve formulating and implementing an effective safety program throughout the worksite.
- Each member on the committee should have mobility within designated sections of the worksite to move around, observe, and interview workers and supervi-

sors about occupational safety and health problems. In addition, one employee committee member should have the right to observe and inspect the entire work-site.

- Follow-up meetings should be held in order to make sure that previously identified hazards and safety problems have been corrected, with written documentation of all activities completed.
- All committee members should be compensated for the time spent on all safety committee functions, including time spent at meetings, inspections, handling safety complaints, researching and disseminating information on occupational safety and health.



- The membership of a committee determines its effectiveness. It is very important to have members who are in a position to resolve safety hazards and problems as they arise. The committee also should reflect the diversity of employees in a workforce.

Safety and Health Committee Roles

Safety and health committees can play a number of effective and useful roles, which can include:

- Serving as the mechanism for coordinating a continual and active program on hazard recognition and monitoring; By meeting on a regular basis (at least monthly), committee members can implement strate-

gies for increasing employee/supervisor awareness of job hazards and how they can prevent them. Committee members can work with these groups on reviewing and recommending any needed changes dealing with safety inspections and abatement methods, and timetables for carrying them out.

- Educating labor and management about OSHA; Committee members can provide needed education to employees and supervisors about their rights and responsibilities under OSHA, its standards, and new developments in these areas.
- Recommending approaches on safety and health problems; By providing an avenue of communication between labor and management, as well as serving as an informational resource, safety committees can recommend solutions to health and safety problems.
- Preventing workplace hazards; Health and safety committees also can help to reduce accidents, injuries, and occupational disease by playing a role in preventing job hazards from occurring in the first place. By having access to information regarding employer health and safety records, hazard communication data, and workplace injury and illness reports, committee members are in an excellent position to identify problem areas, analyze alternatives, and recommend solutions.
- Achieving health and safety equity for all workers; A safety and health



committee should work to insure that all workers obtain equal access to information, support, resources, and training on occupational health and safety. This requires the active support of the union, committee, and the contractor for establishing a workplace environment that emphasizes tolerance, mutual support, and respect for all employees. Exclusionary actions, intolerance, harassment, or hostile behaviors endanger the safety of all workers. Because of this reality, such issues are a legitimate concern for a health and safety committee. Also, labor's motto "that an injury to one is an injury to all," is particularly applicable when it comes to equality and health and safety.

In addition to the roles just cited, committee members can enable health and safety to be an on-going priority at the worksite by taking the following actions:

- Conducting On-site Safety Reviews; At the start of each work day or shift, committee members can meet with construction crews to discuss the day's upcoming activities. This is a very useful time to stress the importance of planning and coordinating jobs that may be particularly hazardous — so that everyone is on the same page regarding what needs to be done and how it should be done in terms of health and safety.
- Administering Periodic Safety Checklists; Based on the work to be done and the hazards involved, administration of safety checklists to help employees and supervisors take the necessary actions for avoiding worksite injuries, illnesses, and fatalities. Appendix VI contains an example of such a checklist developed by OSHA.



Size of the Committee

The appropriate size of a committee depends upon such factors as the size of the employ-

ee workforce, the number and variety of health and safety problems which exist at the worksite, the number of shifts in which workers are employed, and the size of the work area. Essentially, the exact size of the committee should be based upon the number of individuals needed to deal with safety and health problems efficiently and promptly. While such a committee should be comprised of at least four members, excessively large committees should be avoided.¹

Selection of Committee Members

Committee members should be selected or elected based upon the following: 1) commitment to health and safety, 2) experience and knowledge in dealing with occupational safety and health problems, and 3) willingness to participate in training programs designed to broaden expertise in the field of occupational health and safety.² Along with these criteria, as cited previously the Committee needs to reflect the diverse backgrounds of employees in a particular workforce. Also, Committee members should serve under staggered term limits in order to insure greater participation and continuity.

Preparing Committee Members³

In order to operate efficiently and effectively, committee members need to be provided with the following basic information and resources:

- past and current records on job related accidents, injuries, and diseases on that worksite;
- material on OSHA, including the law itself, and all appropriate safety and health standards, digests, and pamphlets;
- worksite occupational health and safety problems identified by labor and management through the

¹Fowler, Robert, A Guidebook for Local Union Health and Safety Committees, Center for Labor Research and Education, Institute of Industrial Relations, University of California, Berkeley, p. 6.

²*Ibid.*

³Adapted and updated the previously cited source.

administration of a hazard recognition survey questionnaire;

- resources on occupational health and safety (refer to Appendix IV);
- a computer linked to the Internet in order to access current resources and contacts on occupational health and safety in construction;
- listing of the names, addresses, and phone numbers of occupational health and safety resource people including federal and state OSHA officials, physicians, attorneys, industrial hygienists, educators, and any other health and safety specialists who can provide resource information and assistance to committee members;
- information on available meeting and training opportunities for learning about trends and developments in the occupational health and safety field. Committee members should plan on attending at least one training program per year.

Using a “Worksite Systems” Approach:

The University of Maine/Bureau of Labor Education “Worksite Systems” approach is based on an organizational way of thinking. This approach looks at a worksite or work situation as a system of interacting and interdependent parts, within a larger environment or context. This can be thought of as a worksite system.

Each part or element of the worksite system, involving the contractor(s), union(s), employees, supervisors, and the physical environment (including weather and the construction site) — may potentially affect the functioning of the other parts. The worksite system is not a single snapshot or “still shot” at one point in time; rather, it is a constantly changing, dynamic process that is not entirely predictable.

Most workers and supervisors use such a dynamic “systems” approach to a large extent in their planning and thinking at work. For example, when dealing with hazardous sit-

uations or machinery, an employer and employees must be able to anticipate or project possible outcomes based on their decisions, and also must take into account the possible actions or behaviors of other workers and supervisors, as well as the physical conditions. Of equal importance, the employer must do a hazard analysis during each phase of the work, and communicate this hazard information to all employees and supervisors involved in the work.

Systems also involve inputs (e.g., labor, raw materials) and outputs (e.g., a completed physical structure or service), as well as some kind of work process which transforms the inputs into outputs. A worksite system has certain goals as well; such as completing a construction project without accidents and injuries, within time lines and budgets, while maintaining high quality.

Within a system such as a construction site, each part or element can be seen as playing a certain role or function within the system. When the parts mesh well together, the worksite system as a whole will tend to work smoothly. For example, the project or tasks are completed, deadlines are met, quality is attained, goals are fulfilled, occupational hazards are reduced or eliminated, and workers and supervisors leave at the end of their work day without encountering accidents or injuries. Unpredictable occurrences can be dealt with effectively.

On the other hand, if there is a problem with one or more of the pieces or elements, (a crucial part does not come in when promised, bad housekeeping creates a hazard, communications on health and safety practices are unclear, a key worker gets sick, or a machine malfunctions), the whole system may come to a grinding halt. This worksite systems model also highlights the importance of clear, complete information, and of effective communications. In other words, it is not only important to have the necessary labor, tools, materials, and technical plans; it's also critical to ensure that necessary information gets communicated effectively to all workers and supervisors.

This organizational systems approach to worksites can be very useful when applied to issues of health and safety in the construction industry. Experienced workers, supervisors,

and others who analyze both the “big picture” (the workplace system as a whole) AND the individual elements or parts, often use this perspective intuitively, because it works.

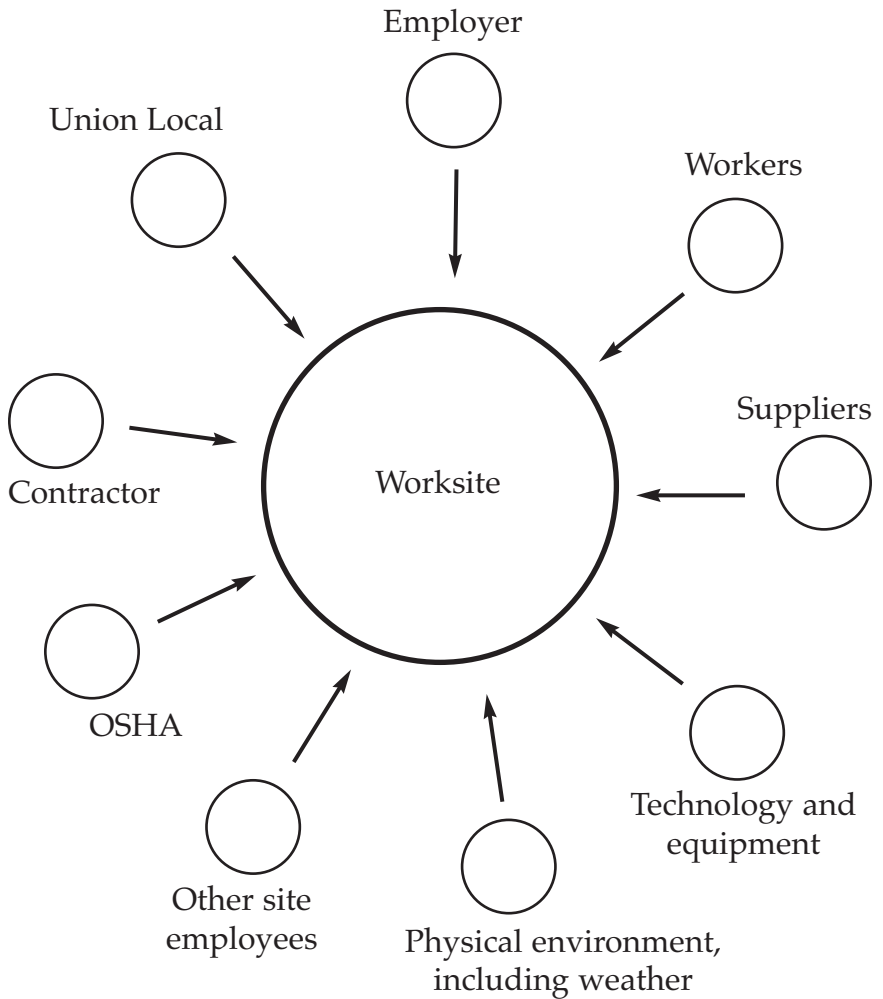
Two major advantages of the worksite system model are that a) it can be applied to any situation, and b) it can be used to analyze the potential for different possible outcomes over time. The combination of inexperienced workers and/or managers, old or malfunctioning equipment, poor communications, and hazardous weather conditions, may greatly increase the probability of serious workplace accidents occurring at a worksite.

One last element of a worksite is that it tends to develop its own workplace culture or set of beliefs, values and norms over time. Even identifiable occupational groups tend to develop their own subcultures, such as an emphasis on “toughness” or bravado. Whatever “rules” exist at any workplace, the informal culture may or may not support responsible health and safety practices. Any individual who begins work at a new site quickly learns about the informal values and expectations of behavior at the site.

To summarize, workers, supervisors, and contractors can apply this worksite systems approach to identify and prevent foreseeable hazards, as well as help to monitor unsafe or unhealthy working conditions. This approach can help to identify and maximize those factors and resources promoting safety and health within their work environment, and to minimize and/or correct those factors and conditions preventing the attainment of a safe and healthful worksite.

The next two pages show: 1) an illustration of some of the key elements in a worksite system, and 2) some of the factors promoting safety and health, which can be used in conducting a worksite systems analysis.

SOME KEY ELEMENTS IN A WORKSITE SYSTEM



FACTORS AFFECTING WORKSITE SAFETY⁴

Factors Promoting Safety:

<u>Workers</u> (1-10)	1) Skills & training
<u>Coworkers</u> (1-10)	2) Responsible attitudes (e.g., motivated towards prevention)
<u>Other site employees</u> (1-12)	3) Good safety habits & behaviors
	4) Active Awareness & vigilance
	5) Developing ability to anticipate or project events & processes, analyzing ongoing situations
	6) Asking for clear information
	7) Communicating concerns as they arise
	8) Watching out for other coworkers/employees
	9) Advocating for oneself & others, being assertive
	10) Detailed knowledge of job process
	11) May have detailed knowledge of specific job site

⁴This table was compiled by Valerie Carter, Research Associate, Bureau of Labor Education, through the utilization of the following references:

Daft, Richard L.; Organization Theory and Design (Fifth Ed.) Minneapolis/St. Paul: West Publishing Co., 1995.

Ford, Ramona L.; Work, Organization and Power: Introduction to Industrial Sociology. Needham Heights, MA: Allyn and Bacon, 1986.

Perrow, Charles; Complex Organizations: A Critical Essay (Third Ed.) New York: Random House, 1986.

Sauer, Beverly; "Fatal Grammar: The Rhetoric of Disasters," Technical Communication: Journal of the Society for Technical Communication, February 1994; vol. 41; n. 1, p. 154 – 5.

- 12) May be able to communicate knowledge of site if appropriate communication channels exist
- Supervisors** (13-15) 13) Supportive of workers' safety as highest priority
- 14) Actively advocating for interests of workers
- Contractor** (13-18) 15) Facilitating information flow and channels of communication
- 16) Providing clear information about physical plant, technology, and potential hazards
- Employer** (13, 14, 15-19) 17) Having a work environment as free of hazards as possible
- Union Local** (13-15, 18-22) 18) Demonstrating commitment to safety by supporting a safety-conscious workplace culture
- 19) Making safety highest priority
- OSHA/ Govt.** (20, 22-24) 20) Providing skill and safety training
- 21) Resisting speedups at expense of safety
- 22) Encouraging workers to advocate for themselves
- 23) Providing rules, regulations & safety standards
- 24) Providing legal protection and enforcement

NOTES

CHAPTER III: CASE STUDY DISCUSSION EXERCISES

Instructions: For each of the following case study exercises, please select a group spokesperson who will be responsible for summarizing and reporting on your group's findings and recommendations:

CASE I

"The owner of a landscaping company was killed when the unsecured, raised box of a dumping-trailer **collapsed**, trapping him between the trailer frame and the box. The victim was tightening a leaking hydraulic fitting underneath the raised box when the fitting became deformed and burst under pressure. When the hydraulic system lost its pressure, the box collapsed on top of the victim. An inspection of the damaged hydraulic fitting indicated that over tightening of the fitting caused it to become deformed and burst."

What could a safety and health committee have done about preventing such a tragedy from happening?



ANSWER:

The committee should educate employees and supervisors on utilizing the safety features that are incorporated into the design of equipment, and require both groups “to secure all parts of elevated equipment (block out) against inadvertent movement before servicing that equipment.” It would also be important for all employees to become trained in and “familiar with the mechanical requirements of servicing hydraulic equipment” and learn how to tighten hydraulic fittings.⁵

The applicable OSHA standards for construction include:

1926.600(a)(3)(i) “Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise.”

1926.601(b)(10) “Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.”

⁵Source for case study, photo, and answer:
<http://www2.worksafebc.com/i/posters/1998/fatal9809.html>

CASE II

“Employees were moving a steel canopy structure using a ‘boom crane’ truck. The boom cable made contact with a 7200 volt electrical power distribution line **electrocuting** the operator of the crane; He was the foreman at the site,” [who stepped in to operate the crane].

What role could a safety and health committee play that may have prevented this type of accident from happening?



ANSWER:

The company's safety committee should have developed and/or maintained a safety and health program that provides guidance for safe operations. Employers need to instruct all employees "on how to recognize and avoid unsafe conditions, which apply to the work and work areas." *29 CFR 1926.21(b)(2)*.

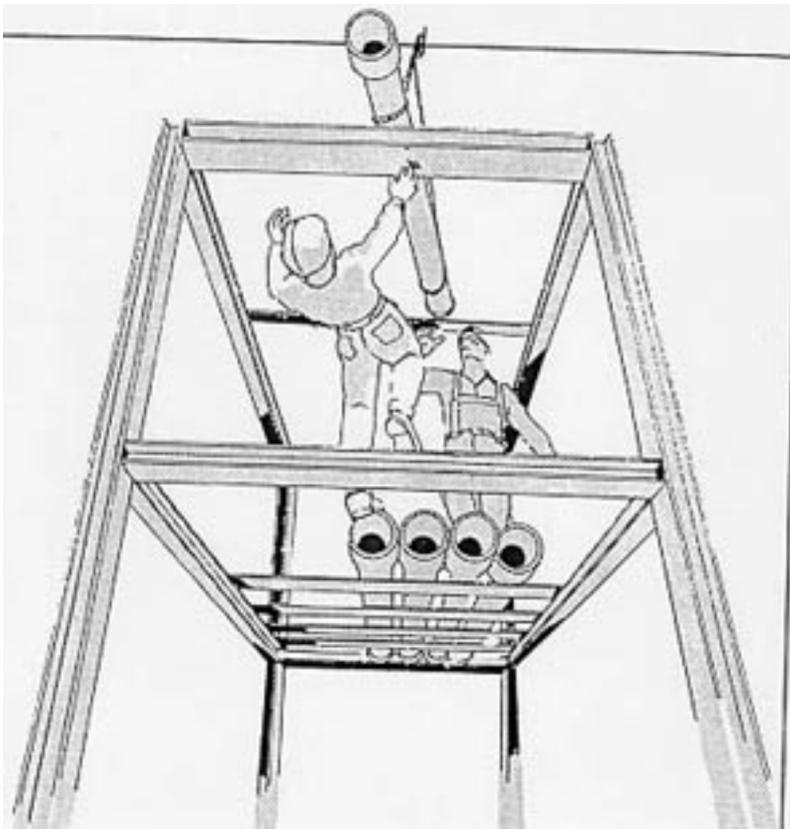
"If high voltage lines are not de-energized, visibly grounded, or protected by insulating barriers, equipment operators must maintain a minimum distance of 10 feet between their equipment and the electrical distribution or transmission lines." This can be accomplished by using a spotter, whose job it is to make sure that the 10 foot distance is not violated. *29 CFR 1926.550(a)(15)(i)*.⁶

⁶Source for case study, photo, and answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts17.html

CASE III

“Iron workers were working on structural steel, hoisting pipes from ground level to higher levels for storage. While guiding a pipe to be stored on the floor above, one employee walked backwards off the end of a stored pipe. He **fell** about 12 feet to a concrete deck, suffering a fatal head injury.”

Discuss the hazards and/or unsafe practices, which caused this accident. What could a safety and health committee do to minimize or eliminate the chance of this type of accident from happening again?



ANSWERS:

“Subpart R – Steel Erection 1926.760(a)(1) Except as provided by paragraph (a)(3) of this section, each employee engaged in a steel erection activity who is on a walking/working surface with an unprotected edge more than 15 feet above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.”

If the case study referred to “pipe-fitters” instead of iron workers then the activity would fall outside the steel erection standard and the following could be cited:

“1926.501(b)(1) Unprotected sides and edges. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.”

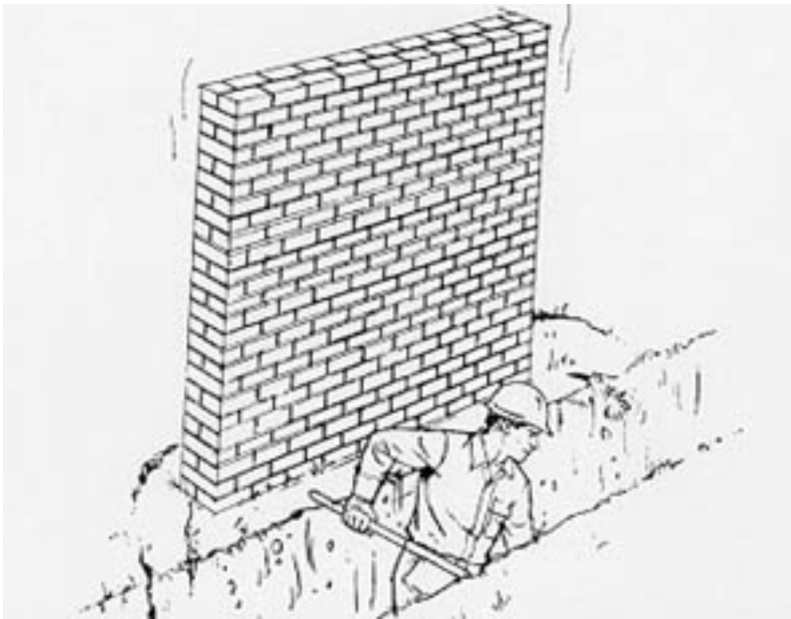
The safety committee needs to stress the importance of safety to their fellow workers. Also, the committee needs to involve the union and the employer in establishing guidelines as to who will do the work and then agree on what will be an acceptable safe practice. A review of similar related hazards during safety meetings will serve to heighten the awareness of committee members.⁷

⁷Source for case study, photo, and answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts16.html

CASE STUDY IV

“An employee was in the process of locating an underground water line. A trench had been dug approximately 4 feet deep along side a brick wall 7 feet high and 5 feet long. The brick wall **collapsed** onto the victim who was standing in the trench. The injuries were fatal.”

What actions could a health and safety committee take in preventing this type of accident in the future?



ANSWER:

By utilizing the web site www.osha.gov the committee could research various types of injuries that have occurred in the construction industry. The committee may also want to review other similar accidents or near-misses as reported by the employer. Also, the committee should educate workers and supervisors about the importance of following the OSHA standard that does “not permit employees to excavate below the level of the base of foundation footings when walls are unpinned [29 CFR 1926.651(h)(3)(i)].”⁸

⁸Source for case study, photo, and answer:
http://www.osha.gov/OshDoc/data_FatalFacts/f-facts59.html

APPENDIX I: Approaches for Recognizing and Preventing Hazards

OSHA's Recommendations:

1. Management Commitment and Employee Involvement¹

The ongoing involvement of employees and commitment by management form the foundation of any effective safety and health system. Worker safety should be a key organizational goal of the employer. In addition, employee involvement enables workers to have important input in the development and implementation of a safety and health program. To these ends, OSHA recommends the following actions:

- Clearly communicate a worksite safety and health policy that is understood by employees and managers at all site locations.
- With the involvement of employees and managers, establish and communicate a concrete goal for the safety system, and clear objectives for attaining this goal.
- Provide a demonstrated commitment to the safety system on the part of the organization's top level management.
- Encourage active worker involvement in the safety system, including decision making for areas where employee safety is at stake.
- Assign and communicate clear and specific responsibility for the safety system involving all levels of employees and management throughout the organization.

¹These recommendations are derived from: OSHA, U.S. Dept. of Labor, *Construction Industry Digest*, OSHA 2202 (Revised), p. 6-12.

- Provide all necessary authority and resources to participating employees and managers to assure that assigned responsibilities can be met.
- Hold employees and managers accountable in carrying out their assigned responsibilities.
- Review the system periodically to assess the achievement of the stated goals and objectives, and make necessary changes or revisions as needed.²

2. Worksite Analysis

The worksite is a dynamic place. Frequent walkthroughs are critical in determining how the progress of the work may have created new hazards at the site. Failure to keep up with periodic hazard analysis can mean safety system failures that translate to injury, illness, or death. OSHA recommends the following proactive measures to identify construction hazards:

- With employee participation, set up a regular schedule of worksite surveys by first conducting a baseline walkthrough analysis as a point of reference.
- Be sure to continue the established routine of periodic job hazard reviews at all sites.
- Analyze from a safety and health perspective any facilities that may be planned, new, or existing. This process also should be done for processes, materials, and equipment.
- Include ergonomic risk factors in the hazard analysis of all construction tasks and processes.
- Follow the Occupational Health and Safety Act by adopting policies and practices which insure that employees are safe from any reprisal when reporting hazards to management. Utilizing employee expertise in hazard recognition strengthens a safety and health system.

²*Ibid.*, p. 6-8.

- Strengthen hazard awareness by determining the cause of any accidents or close calls and how they might be prevented in the future. Of equal importance, make sure this case experience information is communicated with all labor and management personnel.
- Identify and prevent patterns with common causes by reviewing injury/illness trends over time.
- Use OSHA and other resources listed in the *Construction Industry Digest* (p. 86-87), and on its companion website, www.osha.gov for assistance with any special problems involving worksite health and safety.³

3. Hazard Prevention and Control

A strong safety system should facilitate timely detection and remediation of any hazardous situation at the worksite. Whether a hazard is eliminated by engineering controls involving changes to the jobsite or job, or by other means, corrective action must be taken “in a timely manner.”⁴ Examples of such measures encompass the following:

- Use engineering controls as a first choice where feasible and appropriate.
- Foster compliance through training, positive reinforcement, and correction of unhealthy and unsafe practices.
- Where engineering controls are not feasible, implement administrative controls and/or the correct use of proper and adequate personal protective equipment.
- Keep the worksite and equipment safe through good maintenance.

³*Ibid.*, p. 8-9.

⁴*Ibid.*, p. 10.

- Train for emergency preparedness. Conduct emergency drills to develop quick emergency response, particularly in case of injuries and spills.
- Organize on-site first aid. Maintain readily available contacts for local physicians and emergency medical response.⁵

4. Safety and Health Training

Training is extremely important for enabling employees, supervisors, and employers to obtain the necessary education and resources for achieving and maintaining health and safety on the job.

A training program needs to focus on the nature of the construction work and the specific hazards associated with it. Employee training should provide education on:

- The legal rights and responsibilities of workers under all applicable federal and state laws. Approaches to identify and abate hazards specific to construction work.
- Emergency procedures to deal with accidents, injuries, and dangerous spills.
- Responsibilities of management to attain and maintain safe and healthful workplaces and sites.

Supervisory training needs to emphasize the key role and responsibilities of management including:

- Analysis of specific hazards associated with work under their supervision.
- Physical protection appropriate and needed for employees.
- Methods of constructive performance feedback to reinforce employee training on recognizing and preventing hazards in work under their supervision.

⁵*Ibid.*, p. 10-11.

- Enforcement of safe and healthful work practices for all personnel, both labor and management.
- Overall supervisory responsibilities regarding the attainment and maintenance of safe and healthy working environments.⁶



⁶*Ibid.*, p. 11-12.

Survey for Recognizing and Documenting Hazards⁷

1. Are there work assignments or practices that expose employees to falling hazards? (On the same level or from a higher to a lower level)

1. Yes _____ 2. No _____

If yes, list the work assignment(s) or practices in the first column and provide the corresponding requested information on the same line in the other columns.

Work Assignment or Practice	Location	Resulting Hazard(s)	# of Employees Exposed	# of Employees Injured Past Year
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2. Can an employee be struck by or strike against any hazardous materials, equipment, or vehicles?

1. Yes _____ 2. No _____

If yes, list the hazardous locations in the first column and provide the corresponding information on the same line in the other columns.

Workplace Location	Resulting Hazards	# of Employees Exposed	# of Employees Injured Past Year
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⁷This survey is adapted from the *Hazard Recognition Slide-Tape Program*, which was developed originally by the Labor Education and Research Service at Ohio State University.

3. Are there work situations where a worker could be injured by getting caught on, caught in, or caught between objects such as vehicles, machines, equipment, materials, or anything else?

1. Yes _____ 2. No _____

If yes, please specify the hazardous work situations in column one and provide the requested information on the same line in the other columns.

Workplace Situation	Resulting Hazards	# of Employees Exposed	# of Employees Injured Past Year
------------------------	----------------------	---------------------------	-------------------------------------

4. Are there work situations or locations where a worker can come in contact with electrical hazards?

1. Yes _____ 2.No _____

If yes, please specify the hazardous work situations or locations where this contact could occur or has occurred in column one, and provide the requested information on the same line in the other columns.

Workplace Situation or Location	Resulting Hazards	# of Employees Exposed	# of Employees Injured Past Year
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NOTES

APPENDIX II:

OSHA Standards Dealing With Hazards Involving: Falls, Struck-by, Getting Caught, and Electrocutions¹

The following standards are included based on a review of 50 OSHA “Fatal Facts” investigations in which a fatal accident occurred. The listing for each category indicates the OSHA standards that were cited after the investigation.

Falling Hazards

“1904.39(a) Basic Requirements. Within eight (8) hours after the death of an employee from a work-related incident or the in-patient hospitalization of three (3) or more employees as a result of a work-related incident” the employer must contact OSHA.

29 CFR 1926.20(b)(2) [The employer] shall provide for frequent and regular inspections of the job site, materials, and equipment to be made by competent persons designated by the employers.

29 CFR 1926.21(b)(1) The employer should avail himself of the safety and health training programs the Secretary provides.

29 CFR 1926.21(b)(2) The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.

29 CFR 1926.28 Personal protective equipment. (a) “The employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions...”

29 CFR 1926.105(a) Safety nets must be provided when workplaces are more than 25 feet above the ground or water surface, or other surfaces where the use of ladders, scaffold,

¹Source: http://www.osha.gov/OshDoc/data_FatalFacts/f-facts01.html# At the OSHA “Fatal Facts” site, all 50 cases can be viewed by changing the number before the html.

catch platforms, temporary floors, safety lines, or safety belts is impractical.

29 CFR 1926.451 (NON-MANDATORY) APPENDIX A to SUPBPART L of PART 1926-SCAFFOLD SPECIFICATIONS

29 CFR 1926.451(a) Construct scaffolds and their components so that they can support at least four times the maximum intended load.

29 CFR 1926.451(d)(vii)(x) Tiebacks shall be equivalent in strength to the suspension ropes and shall be installed perpendicular to the face of the building or structure. Single tiebacks installed at an angle are prohibited.

29 CFR 1926.451(e) Access ladders — or the equivalent — must be provided to workers using the scaffold.

29 CFR 1926.451(e)(1) When scaffold platforms are more than 2 feet above or below a point of access, portable ladders . . . or direct access from another scaffold, or similar surface shall be used [to give safe access to all elevations].

29 CFR 1926.451(f)(8) Ice and snow must be cleared from the scaffold to eliminate slippery conditions as soon as possible.

29 CFR 1926.451(g)(2)(iii) Crawling boards/chicken ladders must be constructed so as to meet the minimum design specifications set forth for such equipment.

29 CFR 1926.451(g)(3) On suspension scaffolds each employee must be protected by an approved safety life belt attached to the lifeline. The lifeline must be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines, which will safely suspend the employee in case of fall. The lifeline must be appropriately adjusted as the work progresses.

29 CFR 1926.451(g)(3)(i) When vertical lifelines are used, they shall be fastened to a fixed safe point of anchorage, shall be independent of the scaffold, and shall be protected from sharp edges and abrasion.

29 CFR 1926.451(g)(vii)(2) Effective September 2, 1997, the employer shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection [where it] is feasible [which does not] create a greater hazard.

29 CFR 1926.451(g)(4)(i) Standard guardrails and toe boards must be installed on scaffolds.

29 CFR 1926.451(h)(2)(ii)(iv) Install standard guardrail and toe boards on all open sides and ends of platforms more than 10 feet above the ground or floor.

29 CFR 1926.501(b)(1) Floor openings must be guarded with standard railing.

29 CFR 1926.501(b)(4)(i) Each employee on walking/working surfaces shall be protected from falling through holes . . . more than 6 feet above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes.

29 CFR 1926.552(b)(l)(ii) No one may ride on material hoists except to inspect or maintain them.

29 CFR 1926.651(c)(2) Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

29 CFR 1926.651(j) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails shall be provided where walkways are six feet above lower levels.

29 CFR 1926.652 When employees are required to be in trenches four feet deep or more, an adequate means of exit such as a ladder or steps, shall be provided.

29 CFR 1926.754(e)(5)(i) . . . Decking shall be laid tightly and immediately secured upon placement to prevent accidental movement or displacement.

29 *CFR* 1926.757(a)(3) Where steel joists at or near columns span 60 feet or less, the joist shall be designed with sufficient strength to allow one employee to release the hoisting cable without the need for erection bridging.

29 *CFR* 1926.760(2) . . . Perimeter safety cables shall be installed at the final interior and exterior perimeters of the floors as soon as . . . decking has been installed.

29 *CFR* 1926.850(a) An engineering survey of structures determine their condition and the possibility of unplanned collapse to before permitting employees to start demolition operation should be obtained and a written record of the survey should be maintained.

Struck by Hazards

29 *CFR* 1926.20(b)(2) Institute a program for frequent and regular inspections of the job site, materials, and equipment by a competent person(s).

29 *CFR* 1926.21(b)(2) Employees must be instructed to recognize and avoid unsafe conditions and be made aware of regulations which apply to the work and the work area to eliminate safety and health hazards as required in the safety training and education section of OSHA's construction safety standards.

29 *CFR* 1926.100(a) and 1926.102(a)(1) Requires employees exposed to the potential hazards associated with flying nails to use appropriate personal protective equipment.

29 *CFR* 1926.251(a)(1) Rigging and equipment must be inspected regularly and maintained in a safe operating condition as required by the general provisions of OSHA's construction safety standards.

29 *CFR* 1926.251(c)(5) *re: Table H-20* That a minimum of four wire rope clips be used to form eyes in the ends of wire rope of the size used.

29 *CFR* 1926.302(e)(1) Employees using powder-actuated tools must be trained in the operation of the particular tool.

29 CFR 1926.302(e)(2) Train employees using powder actuated tools in the safe operation of the particular tool.

29 CFR 1926.302(e)(4) Operators and assistants using powder-actuated tools must be safeguarded with eye protection.

29 CFR 1926.302(e)(8) Train employees operating power actuated tools to avoid firing into easily penetrated materials.

29 CFR 1926.550(a)(1) Require proper written procedures to insure the method for lifting is within manufacturer's specifications.

29 CFR 1926.550(b) Employers shall train and test operators to determine qualifications as specified by ANSI B30.5 5-3.1.2.

Caught-In, Caught-Between, or Caught-By Hazards

OSH Act Section 5(a)(1) Employers must provide a place of employment, which are free from recognized hazards that are likely to cause death or serious physical harm to his/her employees. This section is often referred to as the "General Duty Clause."

29 CFR 1926.20(b)(4) Employers shall only permit employees qualified by training or experience to operate equipment and machinery.

29 CFR 1926.21(b)(2) Employer shall instruct each employee to recognize and avoid unsafe conditions applicable to his work environment.

29 CFR 1926.28(a) Employers must require employees to wear appropriate personal protective equipment — such as a seatbelt — whenever it is necessary to reduce a hazard.

29 CFR 1926.200(h)(1) Accident prevention tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools or equipment.

29 CFR 1926.300(b)(2) Guards must be installed on moving parts of equipment with which employees may come into contact.

29 CFR 1926.602(a)(2)(i) Employers shall assure that seat belts are in place in material handling equipment, which has rollover protective structures.

29 CFR 1926.651(c)(2) Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

29 CFR 1926.651(g)(2)(ii) Employees entering bell-bottom pier holes, or other deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it.

29 CFR 1926.651(h)(3)(i) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

29 CFR 1926.651(j)(2) Employees shall be protected from ... equipment that could pose a hazard by falling or rolling into excavations.

29 CFR 1926.652(b) Employers must shore, slope, or otherwise support the sides of trenches to prevent their collapse.

Electrocution Hazards

Employers and employees must note the presence of power lines and be extremely cautious when working near them.

29 CFR 1910.416(a)(1) Employers must not permit employees to work in proximity to any part of an electrical power circuit when the employee could contact it during the course of work, unless the employee is protected against electric shock by de-energizing the circuit and grounding it or by guarding it effectively by insulation or other means.

29 CFR 1926.20(b)(1) Employers are required to develop and maintain a safety and health program to provide guidance for safe operations.

29 CFR 1926.21(b)(2) Employees must be trained to recognize and avoid electrical hazards. Do not permit employees to work near any part of an electrical power circuit, which might be contacted in the course of the work.

29 CFR 1926.403(i)(2)(i) Except as required or permitted elsewhere in this subpart, live parts of electric equipment operating at 50 volts or more shall be guarded.

29 CFR 1926.416(a)(3) Ensure all circuits are de-energized before beginning work.

29 CFR 1926.417(a) Controls to be deactivated during the course of work on energized or de-energized equipment or circuits must be tagged.

29 CFR 1926.550(a)(15)(i) If high voltage lines are not de-energized, visibly grounded, or protected by insulating barriers, equipment operators must maintain a minimum distance of 10 feet between their equipment and the electrical distribution or transmission lines.

29 CFR 1926.550(a)(15)(ii) Do not operate equipment where any part of the equipment is within the prescribed distance of electrical power lines rated over 50KV.

29 CFR 1926.550(a)(15)(iii) When in transit, with no load and the boom lowered, crane operators must maintain a clearance of four (4) feet for voltages less than 50KV, ten (10) feet for voltages between 50KV and 345KV, and no less than sixteen (16) feet for voltages up to and including 750KV.

29 CFR 1926.600(a)(6) Do not operate equipment within ten feet of electrical distribution or transmission lines rated 50 KV or less **unless** the line has been de-energized and visibly grounded at the point of work **or** insulating barriers, which are not a part of or attached to the equipment, have been erected to prevent physical contact with the line.

29 CFR 1926.950(b)(1) Employers must determine the existing conditions, such as the voltage of overhead power lines, by inspection or test before beginning work.

29 *CFR* 1926.950(d)(1)(v) Guards or barriers must be erected as necessary to adjacent energized lines.

29 *CFR* 1926.952(a)(1) The location of circuits must be determined by an inspection or test before starting work and existing conditions of mechanical equipment, energized lines, and other equipment must be inspected before work begins.

Appendix III: Control of Hazardous Energy (Lockout/Tag out)¹

29 CFR 1910.147

The following question and answers provide the core reasoning and basic understanding of this regulation.

What is the purpose of the standard?

The purpose of the standard is to prevent injury due to the unexpected startup of machinery or equipment, or the unexpected release of stored energy.

How is this accomplished?

Employers must establish an energy control program, consisting of energy control procedures, employee training, and periodic inspections to ensure that energy is isolated from their energy source(s) and rendered safe.

What are the core components of the energy control program?

The energy control program has three core components: energy control procedures, employee training, and periodic inspections.

Energy control procedures detail and document the specific information that an authorized employee must know to accomplish lockout/tag out, namely, the scope, purpose, authorization rules and techniques to be utilized for the control of hazardous energy.

Employee training and retraining, along with additional training under a tag out system, ensures that the employer understands the purpose and function of the energy control programs.

The **periodic inspections** of the energy control procedures ensure that the procedures and the requirements of the standard are being followed.

¹Source: www.osha.gov (includes direct language and highlights of *CFR 29 1910.147*).

Please note: The NFPA 70-E will become an OSHA standard on August 13, 2007.

What is the intent of the energy control program?

To ensure that before any employee services equipment where the potential exists for unexpected energization or start-up of equipment or the release of stored energy, the machine or equipment is isolated from the energy source and rendered inoperative.

Does the employer have the flexibility to develop his/her own program?

Yes. Employers are expected to develop programs and procedures, training and inspections, that meet the needs of their particular workplace and the particular types of machines and equipment they use and service as long as they meet the requirements of the standard.

Why must employees be trained?

- So that they understand the purpose and function of the energy control program.
- So that employees acquire the knowledge and skills necessary for the safe application, usage and removal of the energy controls.

The standard requires different levels of training for the three categories of employees; what are the differences in the training required for the three categories?

- Authorized employees must receive training on the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
- Affected employees must receive training on the purpose and use of the energy control procedure.
- Other employees (those whose work activities are or may be in an area where energy control procedures may be utilized) must be instructed about the procedure and about the prohibition relating to attempts to

restart or reenergize machines or equipment that are locked out or tagged out.

If an energy-isolating device is not capable of being locked out, can the employer use a tag out system?

Yes, if an energy-isolating device is not capable of being locked out, the employer's energy control program must use a tag out system.

If an energy-isolating device is capable of being locked out, must the employer use a lock out system?

Yes. Unless the employer can demonstrate that the tag out system will provide full employee protection, as described in the standard. The employer may choose to use a tag out system as long as the requirements for additional training and periodic inspections are met.

The following OSHA standards for construction deal with lockout and tagging of circuits:

1926.417 Lockout and tagging of circuits

1926.600(a)(3)(i)

1926.601(b)(10)

1926.702(j)

1926.702(j)(1) Lockout/Tagout Procedures

"No employee shall be permitted to perform maintenance or repair activity on equipment (such as compressors mixers, screens or pumps used for concrete and masonry construction activities) where the inadvertent operation of the equipment could occur and cause injury, unless all potentially hazardous energy sources have been locked out and tagged."

1926.702(j)(2) "Tags shall read Do Not Start or similar language to indicate that the equipment is not to be operated."

1926.950(d) Deenergizing lines and equipment.

In addition the ANSI standard on Lockout/Tagout also can be referenced under the general duty clause of OSHA, section 5(a)(1).

NOTES

APPENDIX IV: Resources on Occupational Health and Safety in Construction

This section contains electronic links to information about construction hazards in general, and about the four hazards covered in this handbook.

The first link below contains a number of useful OSHA publications on a broad range of occupational health and safety topics in both print and electronic format. Electronic versions are in pdf and/or html formats. Publications from this link are germane to construction in general, and to falls, caught-in, struck-by, and electrocution hazards. They are included below in their respective hazard categories.

Also check this link if you would like printed versions of the electronic safety material. You may select one copy of up to 5 different publications on the list by using convenient Order buttons on the page. An address for ordering additional copies by mail also is provided. <http://www.osha.gov/pls/publications/pubindex.list>

The Bureau of Labor Education website also provides links designed to support the material in this manual: <http://dll.umaine.edu/ble/> Labor Education at the University of Maine. Use these links as a first line of support for specific questions. Contact the Bureau if you do not find the information you need in this section of the manual, or on the supporting web pages on the Bureau's website.

General Construction:

Construction Safety and Health Outreach Program: Materials Handling and Storage:

<http://www.osha.gov/doc/outreachtraining/htmlfiles/mathan.html>

Construction e-Tool — includes electrical, falls, struck-by, and trenching hazards:

<http://www.osha.gov/SLTC/etools/construction/index.html>

OSHA Construction Resource Manual — information, in a single source, on all OSHA requirements for the construction industry:

http://www.osha.gov/Publications/Const_Res_Man/index.html

Hand and Power Tools:

<http://www.osha.gov/pls/publications/pubindex.list>

Job Hazard Analysis:

<http://www.osha.gov/pls/publications/pubindex.list>

Hazard communication:

<http://www.osha.gov/SLTC/hazardcommunications/index.html>

Highway work zones:

http://www.osha.gov/doc/highway_workzones/index.html

Personal protective equipment:

<http://www.osha.gov/SLTC/personalprotectiveequipment/index.html>

Construction Resource Manual (electronic only) Summary of OSHA standards for construction.

http://www.osha.gov/Publications/Const_Res_Man/index.html

Women in the Construction Workplace:

<http://www.osha.gov/doc/accsh/haswicformal.html>

National Association of Women in Construction

<http://www.nawic.org/>

Providing Safety and Health Protection for a Diverse Construction Workforce: Issues and Ideas. This page includes accommodations for women in the construction workplace.

<http://www.cdc.gov/niosh/99-140.html>

Caught-in Hazards:

Confined spaces:

<http://www.osha.gov/SLTC/confinedspaces/index.html>

Electronic Permit-required Confined Space Program:

<http://www.osha.gov/dep/etools/eprcs/prcsmanual-high.pdf>

Permit-Required Confined Spaces:

<http://www.osha.gov/pls/publications/pubindex.list>

Machine Guarding e-Tool:

<http://www.osha.gov/SLTC/etools/machineguarding/index.html>

Trenching e-Tool:

<http://www.osha.gov/SLTC/etools/construction/trenching/mainpage.html>

Trenching and Excavation:

<http://www.osha.gov/SLTC/trenchingexcavation/index.html>

Excavations:

<http://www.osha.gov/pls/publications/pubindex.list>

Lockout-Tagout Interactive Training Program:

<http://www.osha.gov/dts/osta/lototraining/index.htm>

Carbon Monoxide Poisoning Quick Card — English or Spanish:

<http://www.osha.gov/pls/publications/pubindex.list>

Underground Construction (Tunneling)

<http://www.osha.gov/pls/publications/pubindex.list>

Electrocution Hazards:

General electrical:

<http://www.osha.gov/SLTC/constructionelectrical/index.html>

Electrical Safety Quick Card:

<http://www.osha.gov/pls/publications/pubindex.list>

Lockout-Tagout Interactive Training Program:

<http://www.osha.gov/dts/osta/lototraining/index.htm>

Control of Hazardous Energy: Lockout/Tagout

<http://www.osha.gov/SLTC/smallbusiness/sec11.html>

Electric Power Generation/Transmission/Distribution e-Tool:

http://www.osha.gov/SLTC/etools/electric_power/illustrated_glossary/index.html

Power Transmission and Distribution in Construction:

<http://www.osha.gov/SLTC/powertransmission/index.html>

Electrical hazards, and standards:

<http://www.osha.gov/SLTC/electrical/index.html>

Controlling Electrical Hazards:

<http://www.osha.gov/pls/publications/pubindex.list>

Ground-Fault Protection on Construction Sites:

<http://www.osha.gov/Publications/3007/3007.html>

Fall Hazards:

Fall protection in construction:

<http://www.osha.gov/SLTC/constructionfallprotection/index.html>

Fall Protection Tips - English or Spanish:

<http://www.osha.gov/pls/publications/pubindex.list>

Walking/working surfaces:

<http://www.osha.gov/SLTC/walkingworkingsurfaces/index.html>

Scaffolding:

<http://www.osha.gov/SLTC/scaffolding/index.html>

Scaffolding e-Tool:

<http://www.osha.gov/SLTC/etools/scaffolding/index.html>

Crane or Derrick Suspended Personnel Platforms:

<http://www.osha.gov/pls/publications/pubindex.list>

Stairways and Ladders:

<http://www.osha.gov/pls/publications/pubindex.list>

Supported Scaffold Inspection Tips Quick Card — English or Spanish

<http://www.osha.gov/pls/publications/pubindex.list>

Supported Scaffold Safety Tips Quick Card — English or Spanish

<http://www.osha.gov/pls/publications/pubindex.list>

Struck-by Hazards:

Materials handling:

<http://www.osha.gov/doc/outreachtraining/htmlfiles/ma than.html>

Sling Safety:

<http://www.osha.gov/pls/publications/pubindex.list>

“... the mishandling of materials is the single largest cause of accidents and injuries in the workplace.”

Crane, derrick, and hoist safety:

<http://www.osha.gov/SLTC/cranehoistsafety/recognition.html>

Required dress for flaggers:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=24362

Standards for flaggers:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10682

Work Zone Traffic Safety:

http://www.osha.gov/Publications/work_zone_safety.html

NOTES

APPENDIX V: Glossary of Terms Used in this Handbook¹

Absorption — the passage of material through the skin or other human membrane into the body.

Acute — used to describe a condition or disorder that is brief, severe and quickly comes to a crisis.

Administrative Controls — involve changes in the workplace policies and procedures, such as warning alarms, labeling systems, reducing the time workers are exposed to a hazard, and training.

Asphyxiate/Asphyxiant — any substance that denies oxygen to the body such as an inert substance that merely displaces air or the bonding of a chemical to blood cells that deny the cells from absorbing oxygen.

Carcinogen — any substance that causes cancer in humans or animals.

Chronic — an illness or injury that lasts over a long period and sometimes causes a long-term change in the body.

Ecology/Ecological — relating to the environmental concerns with the protection and preservation of the environment. This is important information related to the EPA/DEP in hazardous waste clean-up procedures.

Engineering Controls (Safeguarding Technology) — designed to keep the hazard from reaching the worker, such as machine guarding devices, noise dampening technology, needles that retract after use, using mechanical lift devices, or an exhaust ventilation system that carries away contaminants before they can get in the breathing zone of workers.

¹Sources for the terminology used in this glossary: The American Heritage College Dictionary, third edition, Houghton Mifflin Company, 1997.

CFR 29 Parts 1910.1000 to End, revised as of July 1, 2003.

CFR 29 Parts 1926, Revised as of July 1, 2006.

Resource Handout on Controlling Hazards, Worker and Union Roles in Safety and Health, Labor Safety and Health Training Project, George Meany Center — National College, July 2004 p. 51.

Flashpoint — the lowest temperature at which a material will generate a flammable vapor.

Fume — a condensed vapor of molten metal.

Hazard — a source of risk or danger, which can cause an accident, disease that could cause serious injury or death.

Inhalation — a substance, usually a vapor or gas, that is breathed through the nose or mouth into the lungs.

Ingestion — to take into the body by mouth for digestion or absorption.

Lanyard — a rope, suitable for supporting one person. One end is fastened to a safety belt or harness and the other end is secured to a substantial object or a safety line.

Mutagen — an external agent, for example, radiation or some chemical that increases the rate of mutation of cells or organisms.

Personal Protective Equipment (PPE) — the use of this equipment is a way of controlling hazards by placing protective equipment directly on the workers' body to protect the worker. Such equipment includes respirators, gloves, protective clothing, hard hats, goggles and earplugs. This equipment must be used when no other more effective means to control the hazard can be utilized, developed or installed.

Polymerization — the process of chemicals bonding with other chemicals that could potentially cause more harmful effects if the combination of the two chemicals was not to have happened. This is important information to know when working with hazardous materials.

Process — a series of actions or operations leading to a particular result.

Process Safety Management (PSM) — the managing of highly hazardous chemicals in processes that exhibit one or more of these characteristics; flammable, toxic, reactive or explosive.

Promulgate — to proclaim or put a law into action or force.

Reactive — readily responsive to heat, light, pressure, air, or a chemical that is incompatible with other materials, producing fire, explosions, or hazardous vapors.

Toxicity — referring to some form of harmful effects on animals or humans.

Toxin — a poisonous substance or chemical.

Toxicology/Toxicological — scientific study of poisons, especially their effects on the body and their antidotes. This information is needed by physicians in the treatment of individuals that may have been exposed to poisonous chemicals.

Welder's Flash — burns to the retina of the eyes from over exposure to ultraviolet radiation of electric arc welding.

Worksite Systems Approach — the viewing of a worksites' interacting and interdependent parts in a systematic way.

NOTES

APPENDIX VI: OSHA Safety Checklists¹

Personal Protective Equipment (PPE)

Eye and Face Protection

- ☐ Safety glasses or face shields are worn anytime work operations can cause foreign objects getting into the eye such as during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles).
- ☐ Eye and face protectors are selected based on anticipated hazards.
- ☐ Safety glasses or face shields are worn when exposed to any electrical hazards including work on energized electrical systems.

Foot Protection

- ☐ Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- ☐ Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

Hand Protection

- ☐ Gloves should fit snugly.
- ☐ Workers wear the right gloves for the job (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards).

¹Source: OSHA, U.S. Dept. of Labor, Worker Safety Series — Construction, OSHA 3252-05N 2005, p. 13-20.

Head Protection

- ☐ Workers shall wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.
- ☐ Hard hats are routinely inspected for dents, cracks or deterioration.
- ☐ Hard hats are replaced after a heavy blow or electrical shock.
- ☐ Hard hats are maintained in good condition.

Scaffolding

- ☐ Scaffolds should be set on sound footing.
- ☐ Damaged parts that affect the strength of the scaffold are taken out of service.
- ☐ Scaffolds are not altered.
- ☐ All scaffolds should be fully planked.
- ☐ Scaffolds are not moved horizontally while workers are on them unless they are designed to be mobile and workers have been trained in the proper procedures.
- ☐ Employees are not permitted to work on scaffolds when covered with snow, ice, or other slippery materials.
- ☐ Scaffolds are not erected or moved within 10 feet of power lines.
- ☐ Employees are not permitted to work on scaffolds in bad weather or high winds unless a competent person has determined that it is safe to do so.
- ☐ Ladders, boxes, barrels, buckets or other makeshift platforms are not used to raise work height.
- ☐ Extra material is not allowed to build up on scaffold platforms.

- ☐ Scaffolds should not be loaded with more weight than they were designed to support.

Electrical Safety

- ☐ Work on new and existing energized (hot) electrical circuits is prohibited until all power is shut off and grounds are attached.
- ☐ An effective Lockout/Tagout system is in place.
- ☐ Frayed, damaged or worn electrical cords or cables are promptly replaced.
- ☐ All extension cords have grounding prongs.
- ☐ Protect flexible cords and cables from damage. Sharp corners and projections should be avoided.
- ☐ Use extension cord sets used with portable electrical tools and appliances that are the three-wire type and designed for hard or extra-hard service. (Look for some of the following letters imprinted on the casing: S, ST, SO, STO).
- ☐ All electrical tools and equipment are maintained in safe condition and checked regularly for defects and taken out of service if a defect is found.
- ☐ Do not bypass any protective system or device designed to protect employees from contact with electrical energy.
- ☐ Overhead electrical power lines are located and identified.
- ☐ Ensure that ladders, scaffolds, equipment or materials never come within 10 feet of electrical power lines.
- ☐ All electrical tools must be properly grounded unless they are of the double insulated type.
- ☐ Multiple plug adapters are prohibited.

Floor and Wall Openings

- ☐ Floor openings (12 inches or more) are guarded by a secured cover, a guardrail or equivalent on all sides (except at entrances to stairways).
- ☐ Toeboards are installed around the edges of permanent floor openings (where persons may pass below the opening).

Elevated Surfaces

- ☐ Signs are posted, when appropriate, showing the elevated surface load capacity.
- ☐ Surfaces elevated more than 48 inches above the floor or ground have standard guardrails.
- ☐ All elevated surfaces (beneath which people or machinery could be exposed to falling objects) have standard 4-inch toeboards.
- ☐ A permanent means of entry and exit with handrails is provided to elevated storage and work surfaces.
- ☐ Material is piled, stacked or racked in a way that prevents it from tipping, falling, collapsing, rolling or spreading.

Hazard Communication

- ☐ A list of hazardous substances used in the workplace is maintained and readily available at the worksite.
- ☐ There is written hazard communication program addressing Material Safety Data Sheets (MSDS), labeling and employee training.
- ☐ Each container of a hazardous substance (vats, bottles, storage tanks) is labeled with product identity and a hazard warning(s) (communicating the specific health hazards and physical hazards).

- ☐ Material Safety Data Sheets are readily available at all times for each hazardous substance used.
- ☐ There is an effective employee training program for hazardous substances.

Crane Safety

- ☐ Cranes and derricks are restricted from operating within 10 feet of any electrical power line.
- ☐ The upper rotating structure supporting the boom and materials being handled is provided with an electrical ground while working near energized transmitter towers.
- ☐ Rated load capacities, operating speed and instructions are posted and visible to the operator.
- ☐ Cranes are equipped with a load chart.
- ☐ The operator understands and uses the load chart.
- ☐ The operator can determine the angle and length of the crane boom at all times.
- ☐ Crane machinery and other rigging equipment is inspected daily prior to use to make sure that it is in good condition.
- ☐ Accessible areas within the crane's swing radius are barricaded.
- ☐ Tag lines are used to prevent dangerous swing or spin of materials when raised or lowered by a crane or derrick.
- ☐ Illustrations of hand signals to crane and derrick operators are posted on the job site.
- ☐ The signal person uses correct signals for the crane operator to follow.
- ☐ Crane outriggers are extended when required.

- ☐ Crane platforms and walkways have antiskid surfaces.
- ☐ Broken, worn or damaged wire rope is removed from service.
- ☐ Guardrails, hand holds and steps are provided for safe and easy access to and from all areas of the crane.
- ☐ Load testing reports/certifications are available.
- ☐ Tower crane mast bolts are properly torqued to the manufacturer's specifications.
- ☐ Overload limits are tested and correctly set.
- ☐ The maximum acceptable load and the last test results are posted on the crane.
- ☐ Initial and annual inspections of all hoisting and rigging equipment are performed and reports are maintained.
- ☐ Only properly trained and qualified operators are allowed to work with hoisting and rigging equipment.

Forklifts

Forklift truck operators are competent to operate these vehicles safely as demonstrated by their successful completion of training and evaluation.

- ☐ No employee under 18 years old is allowed to operate a forklift.
- ☐ Forklifts are inspected daily for proper condition of brakes, horns, steering, forks and tires.
- ☐ Powered industrial trucks (forklifts) meet the design and construction requirements established in American National Standards Institute (ANSI) for Powered Industrial Trucks, Part II ANSI B56.1-1969.
- ☐ Written approval from the truck manufacturer is obtained for any modification or additions which affect capacity and safe operation of the vehicle.

- ☐ Capacity, operation and maintenance instruction plates, tags or decals are changed to indicate any modifications or additions to the vehicle.
- ☐ Battery charging is conducted in areas specifically designated for that purpose.
- ☐ Material handling equipment is provided for handling batteries, including conveyors, overhead hoists or equivalent devices.
- ☐ Reinstalled batteries are properly positioned and secured in the truck.
- ☐ Smoking is prohibited in battery charging areas.
- ☐ Precautions are taken to prevent open flames, sparks or electric arcs in battery charging areas.
- ☐ Refresher training is provided and an evaluation is conducted whenever a forklift operator has been observed operating the vehicle in an unsafe manner and when an operator is assigned to drive a different type of truck.
- ☐ Load and forks are fully lowered, controls neutralized, power shut off and brakes set when a powered industrial truck is left unattended.
- ☐ There is sufficient headroom for the forklift and operator under overhead installations, lights, pipes, sprinkler systems, etc.
- ☐ Overhead guards are in place to protect the operator against falling objects.
- ☐ Trucks are operated at a safe speed.
- ☐ All loads are kept stable, safely arranged and fit within the rated capacity of the truck.
- ☐ Unsafe and defective trucks are removed from service.

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