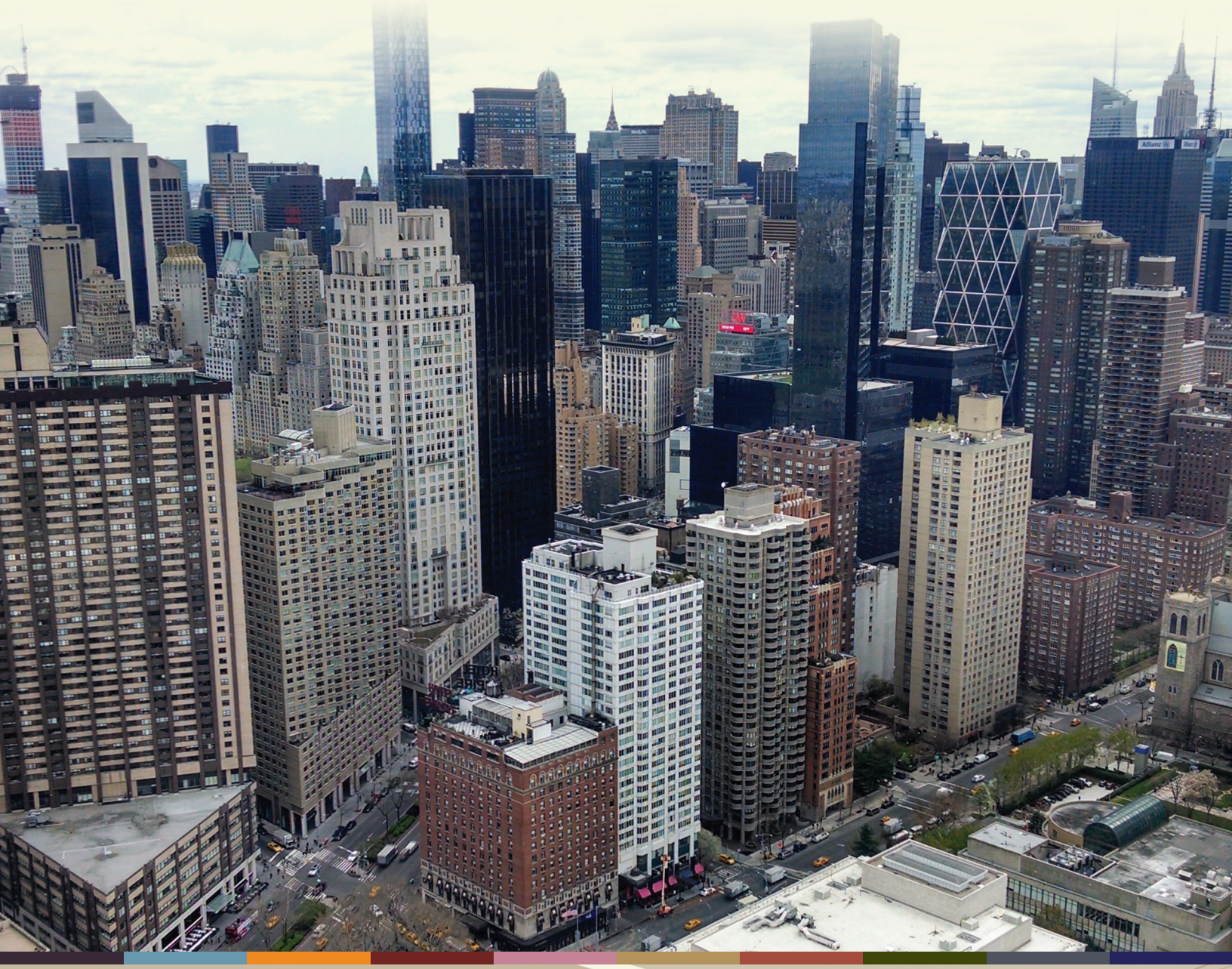
Wireless Rooftop Deployment Training Course



INSTRUCTOR MANUAL

Susan Harwood Grant SH-05134-SH9

NATE
THE COMMUNICATIONS INFRASTRUCTURE CONTRACTORS ASSOCIATION

NATE WIN
WIRELESS INDUSTRY NETWORK

Introduction

Disclaimer

This material was produced under a 2019 Susan Harwood Training Grant (SH-05134-SH9) from the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does the mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Notes for Instructors

The industry-specific Wireless Rooftop Deployment curriculum will be tailored specifically to the communications infrastructure industry and include detailed instruction on wireless rooftop deployment and safety practices workers need to know, such as updates to the general industry OSHA Walking-Working Surfaces Rule and Fall Protection Standards, industry-specific rooftop fall protection procedures, hazard assessment protocols, antenna identification, RF awareness, RF controls, and other applicable standards. The course will also include information regarding employer responsibilities, worker rights, and whistleblower laws and complaint procedures (including time constraints).

What you will need to conduct this training

1. Turning Point Technology Remote Responders
2. Laptop Computer
3. PowerPoint Projector
4. Projector Screen
5. Wireless Rooftop Deployment Training Course Student Workbooks
6. Wireless Rooftop Deployment Training Course Level 2 Evaluation Forms
7. Wireless Rooftop Deployment Training Course Certificates

Level 1 Evaluation Methodology – Turning Point Technology

In this class students will utilize Turning Point interactive response software. This interactive software is presented at the end of each section to determine if they have learned the information presented.

Turning Point is very simple to use. You will present students with either a multiple choice, or true or false question. You will visibly see the question on the overhead. You will read the question to the students, (as you may have some students that have difficulties reading), and the possible correct answer. Using a transponder, that will be provided to them before class starts, they will choose what they believe to be the correct answer. Once everyone in the class answers, you will close the voting and the correct answer will appear on the overhead along with the number of correct and incorrect answers. This will help your student in the learning process as you will receive instant feedback on their knowledge of the subject matter.

Student answers are automatically collected in detailed reports to ensure all participants are counted.

Instructor Manual

Videos

The training course curriculum includes a video that will supplement the instructional material contained in the training PowerPoint presentation. The video that will be showcased as part of the training course is the A10.48 NATE Wireless Rooftop Deployment #Climber Connection video. The video, which is embedded directly into Section 2 of the Wireless Rooftop Deployment Training Course PowerPoint, will provide another effective medium for instructors to reinforce the objectives of the course.

Course Objectives

Enhance…
knowledge of OSHA and NATE

Provide…
overview of wireless rooftop deployment safety practices and industry fatalities

Enhance…
awareness and knowledge of the current laws, regulations, and standards

Enhance…
awareness of the potential hazards and exposures associated with rooftop work

Advance…
awareness through the application of the hierarchy of controls

Enhance…
awareness in recognizing and documenting rooftop hazards

Understanding…
of radio frequency program, signage, personal protection monitor, mitigation, and plans

Identify…
appropriate fall protection system(s) and methods

Demonstrate…
knowledge to identify hazards/exposures and apply the appropriate risk mitigation practice(s)

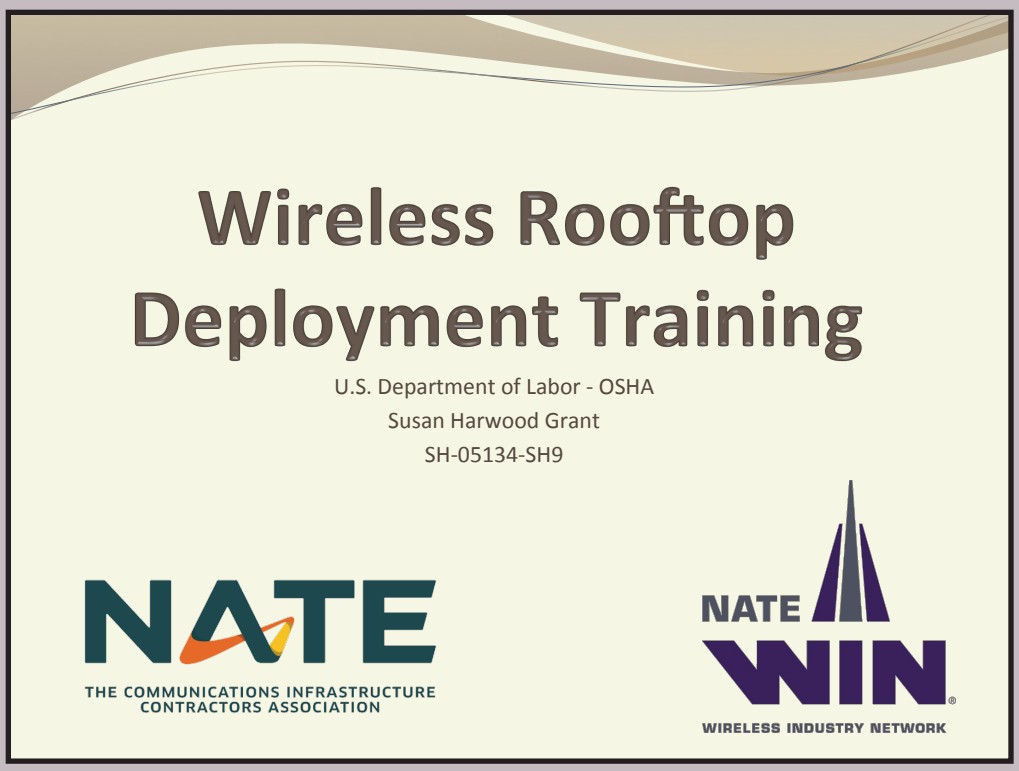
Course Organization

The training course is organized into nine sections. Each section varies in length by section. It is paramount that the instructors dictate the pace of the training and allocate the specified time for each section referenced below. Instructors also need to make sure a 45 minute break is scheduled for lunch and three 15 minute breaks are included throughout the training day. The following sections and topics are covered in this training:

- **Section 1:**
  Introduction to NATE and OSHA
- **Section 2:**
  State of the Industry
- **Section 3:**
  Applicable Laws, Regulations, and Standards
- **Section 4:**
  Potential Rooftop Hazards
- **Section 5:**
  Hierarchy of Controls Overview
- **Section 6:**
  Pre-task Planning and Job Hazard Assessment
- **Section 7:**
  Radio Frequency (RF) Hazards and Mitigation
- **Section 8:**
  Fall Protection
- **Section 9:**
  Practical Workshop

NATE WIN
WIRELESS INDUSTRY NETWORK

Table of Contents



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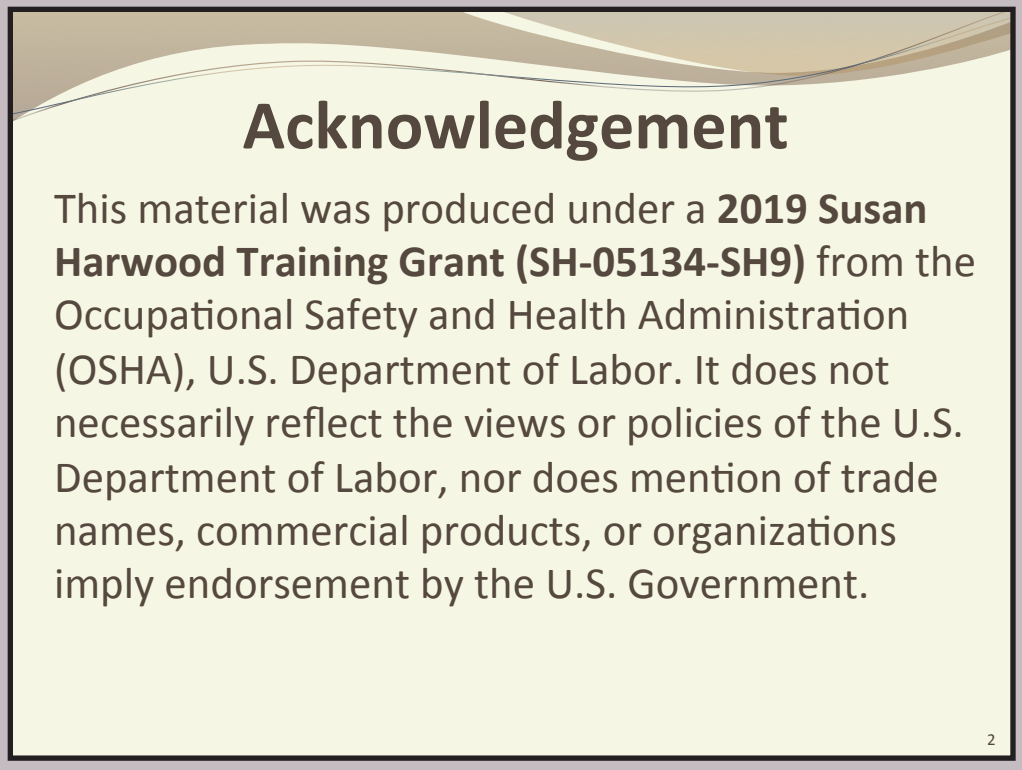


Acknowledge that funding for the development of this training and delivery of the training was provided by the Department of Labor through a Susan Harwood Grant.

Wireless Rooftop Deployment Topics

The training is organized into the following nine topic sections:

- Section 1: Introduction to NATE and OSHA
- Section 2: State of the Industry
- Section 3: Applicable Laws, Regulations, and Standards
- Section 4: Potential Rooftop Hazards
- Section 5: Hierarchy of Controls Overview
- Section 6: Pre-Task Planning and Job Hazard Assessment
- Section 7: Radio Frequency (RF) Hazards and Mitigation
- Section 8: Fall Protection
- Section 9: Practical Workshop

3

Wireless Rooftop Deployment Course Objectives

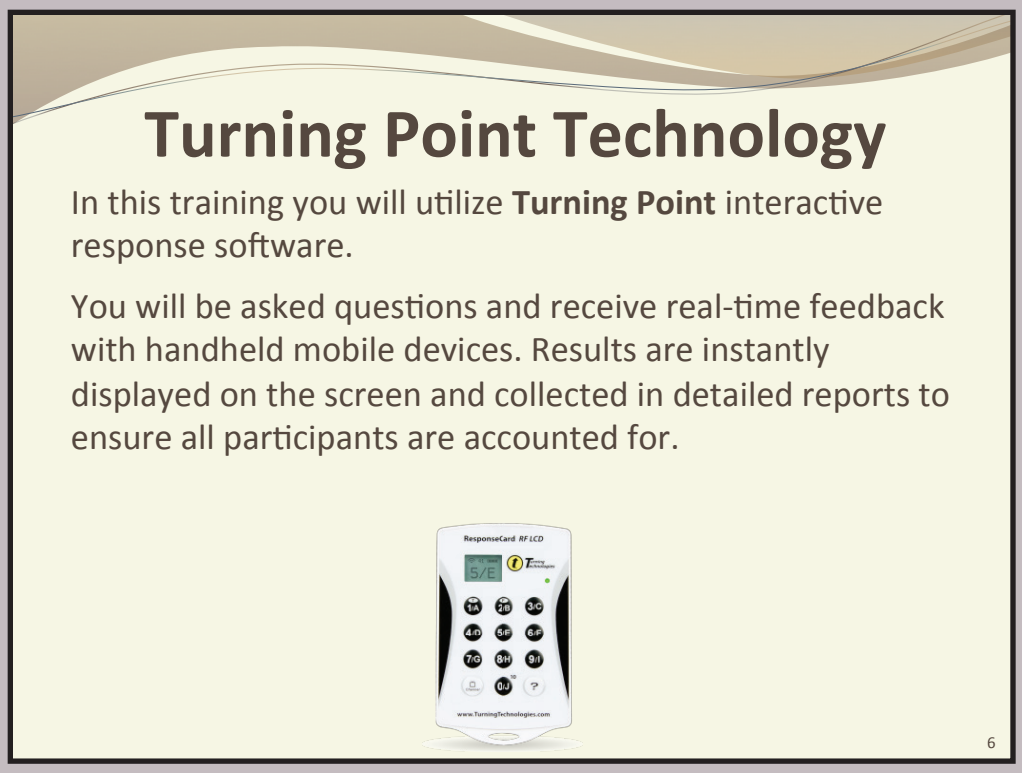
- Section 1: Enhance students knowledge of the roles of OSHA and NATE.
- Section 2: To provide a course overview video of wireless rooftop deployment safety practices and examine industry fatalities that occurred while working on rooftops.
- Section 3: Enhance awareness and knowledge of the current laws, regulations, and standards while working on rooftops.
- Section 4: Enhance awareness of the potential hazards and exposures associated with rooftop work within the telecommunications industry.
- Section 5: Advance awareness in approaching rooftop hazards through the application of the hierarchy of controls.

4

Wireless Rooftop Deployment Course Objectives

- Section 6: Enhance awareness in recognizing and documenting rooftop hazards by applying control measures through pre-task planning and assessment(s).
- Section 7: Understanding of radio frequency program, signage, personal protection monitor, mitigation, and plans to ensure safe working while on rooftop environments.
- Section 8: Identify, plan, and apply the appropriate fall protection system(s) and methods based on the rooftop environment and scope of work.
- Section 9: Demonstrate the knowledge to identify hazards/exposures and apply the appropriate risk mitigation practice(s) within a rooftop environment.

5



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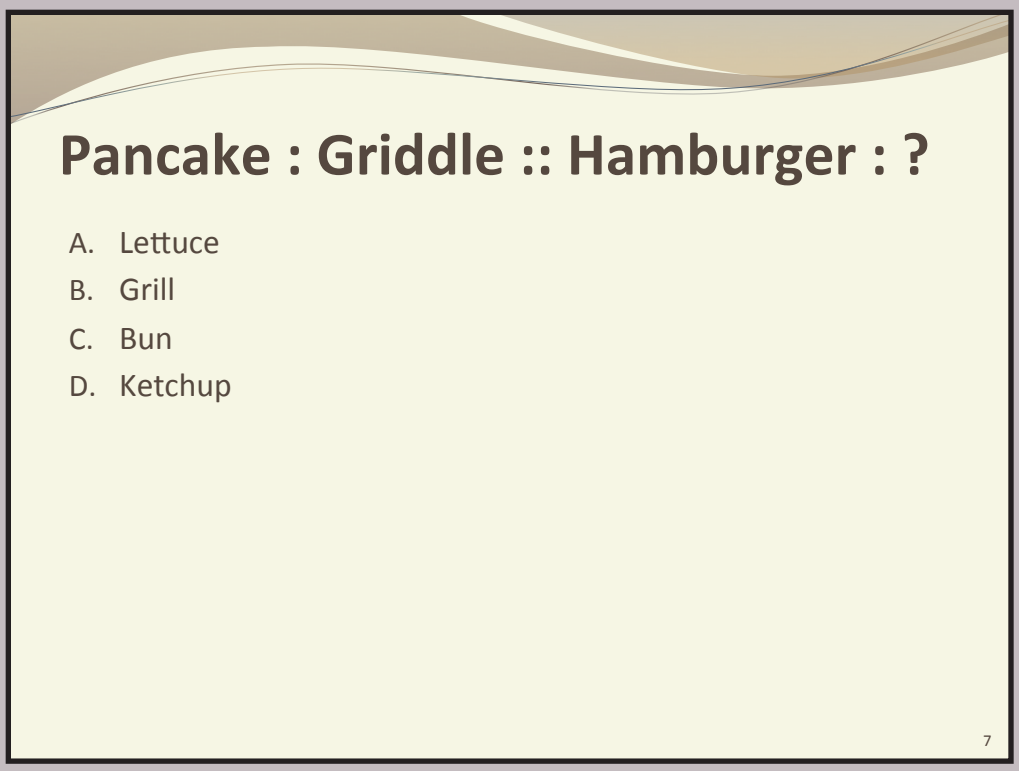


Answer: B (Grill)

What is your age?

A. 18-24
B. 25-34
C. 35-44
D. 45-54
E. 55-64
F. 65 and up

8

What is the size of your employer?

A. I don't know
B. 2-10 employees
C. 11-50 employees
D. 51-100 employees
E. More than 150 employees

9

Are you an employee or employer?

A. Employee (I am an employee at my company)
B. Employer/Manager/Supervisor

10

What primary sector do you service?

A. Wireless
B. Broadcast
C. Wireless and Broadcast
D. Utilities
E. Public Safety
F. Electrical
G. Solar
H. Real Estate Owner/Manager

11

Does your company directly perform work activities at rooftop sites?

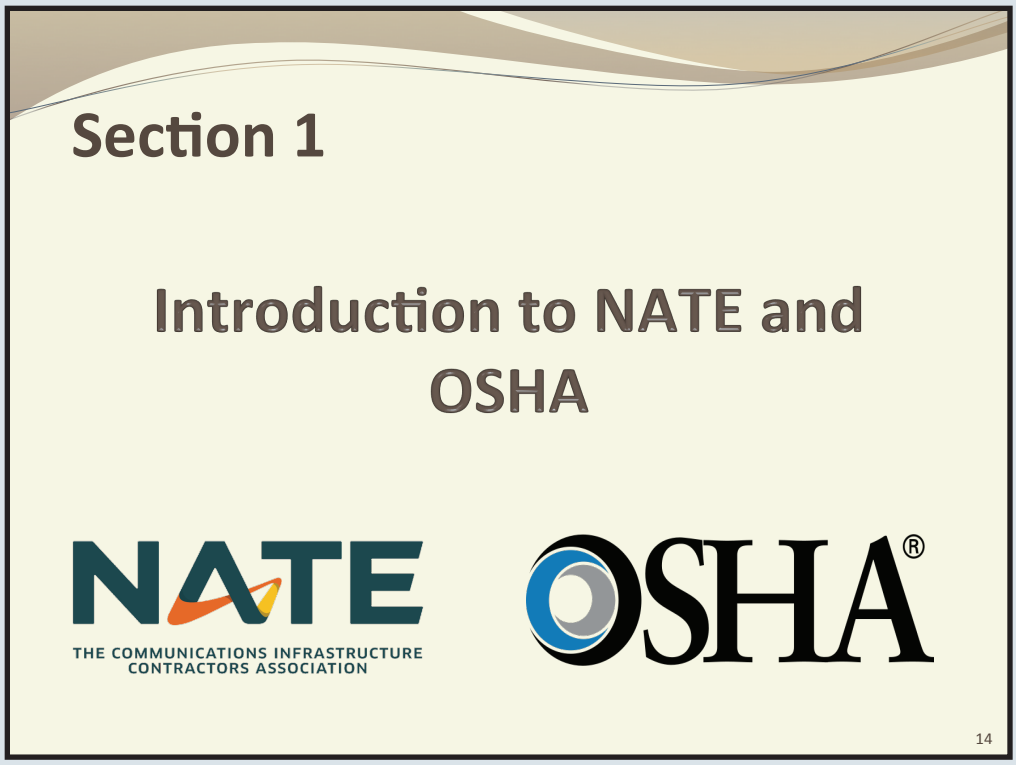
A. Yes
B. No

12

Have you ever performed work on a telecom rooftop site?

A. Yes
B. No

13



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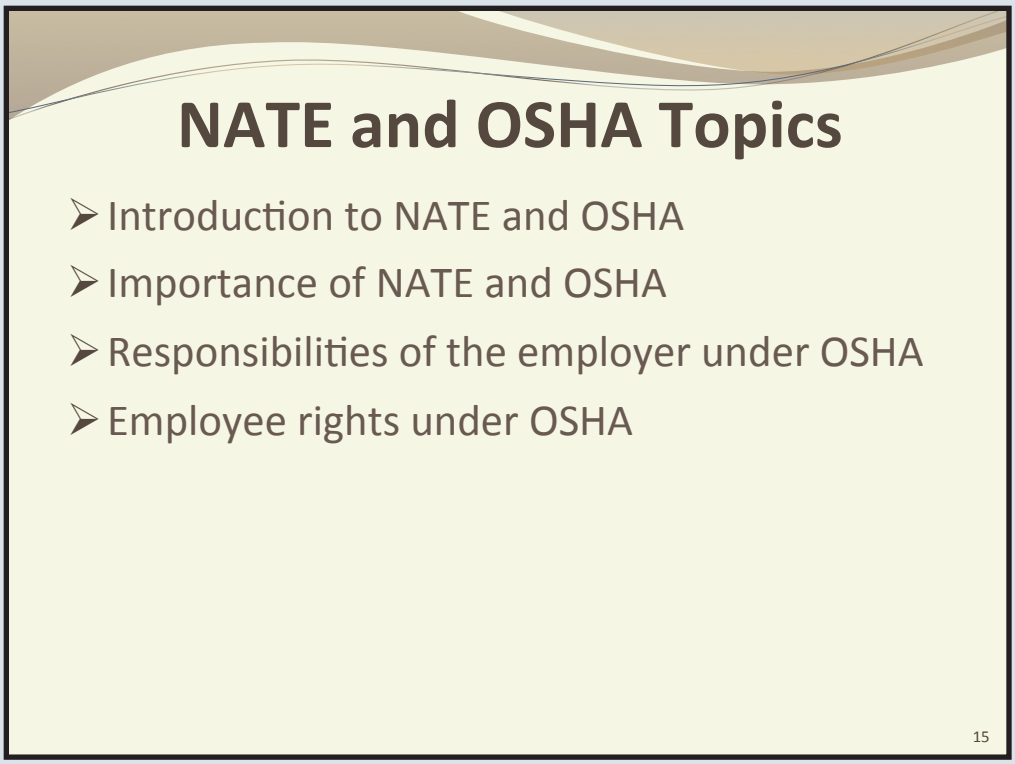
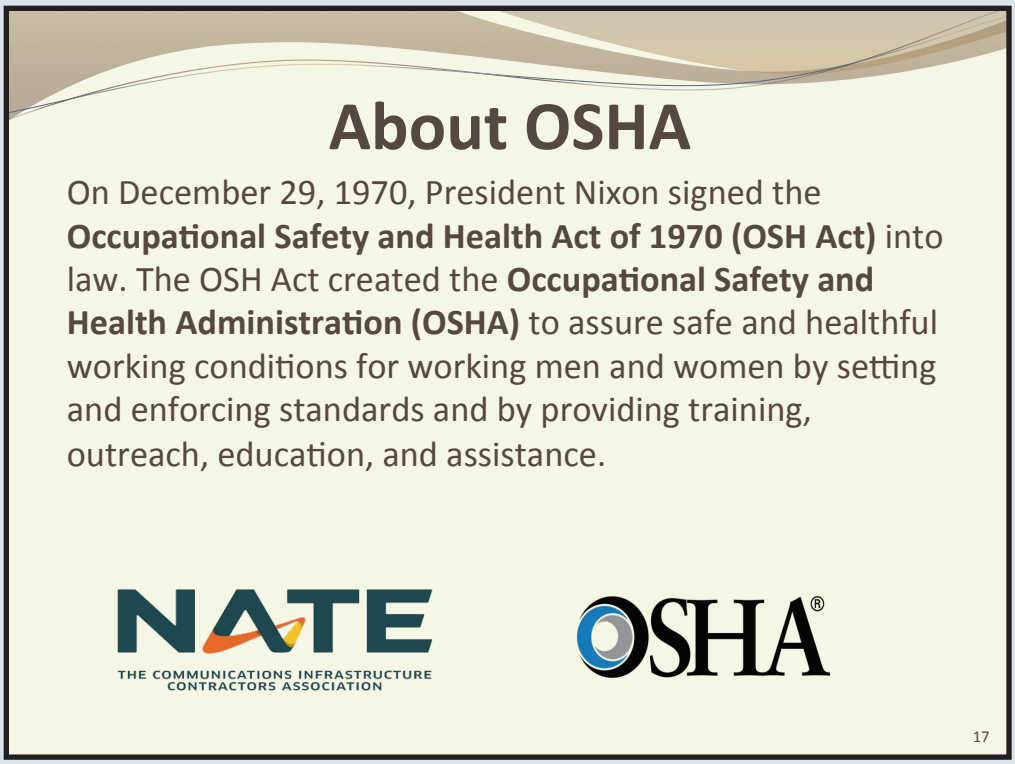

NATE and OSHA Topics
Introduction to NATE and OSHA
Importance of NATE and OSHA
Responsibilities of the employer under OSHA
Employee rights under OSHA
15

Talk about the vital role NATE plays in the wireless and broadcast infrastructure industries.

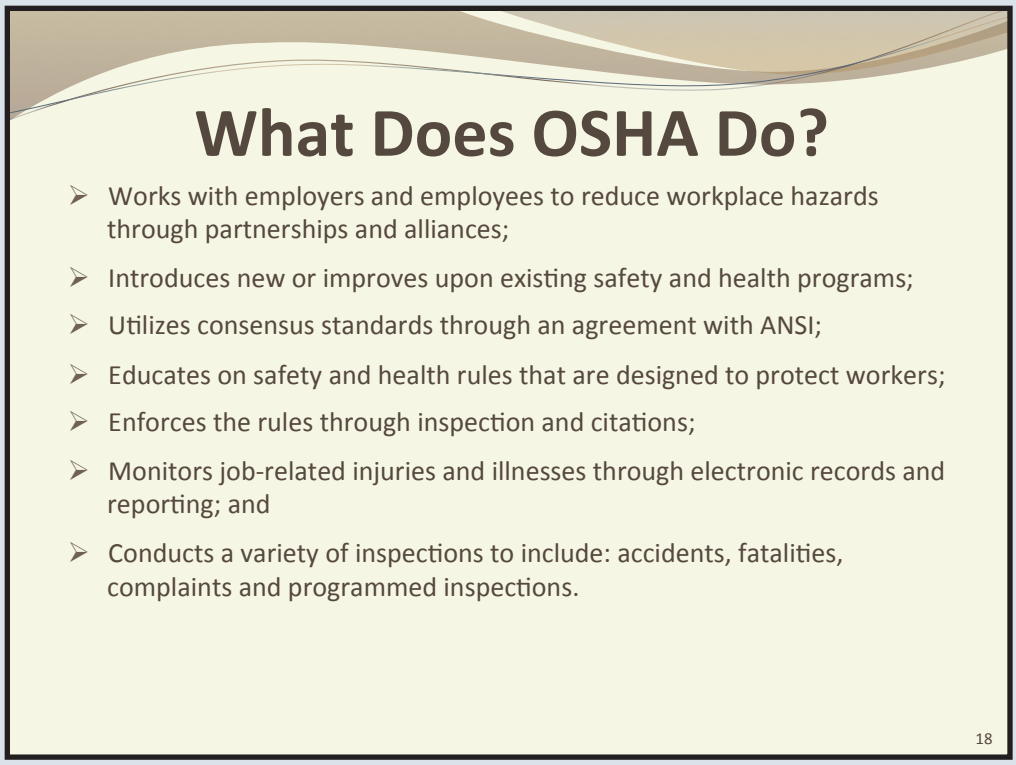
Share their personal connection to NATE and how they have worked with NATE through the years.

Mission Statement:

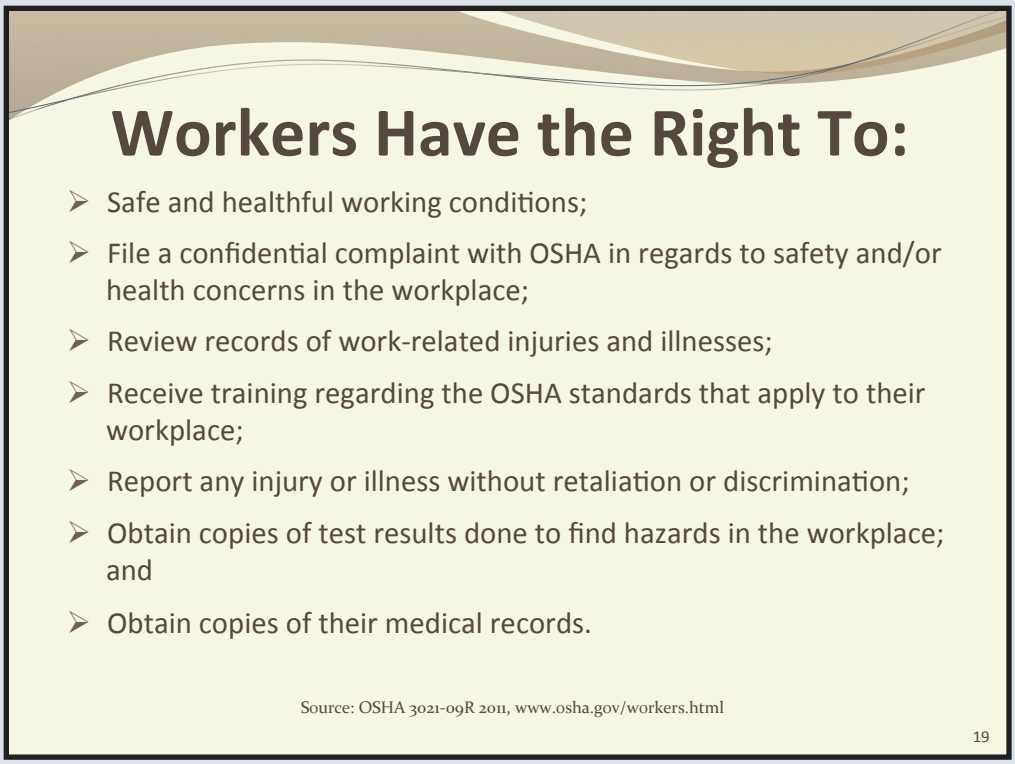
- Pursue, formulate and adhere to uniform standards of safety for tower personnel.
- Educate the general public, applicable government agencies and clients on continued progress toward safer standards within the industry.
- Keep all members informed of issues relevant to the industry.
- Provide a unified voice for tower erection, service and maintenance companies.
- Facilitate effective safety training for the industry.



Talk about OSHA being established during Nixon Administration after Congress passed the OSH Act.



Note that OSHA (the Occupational Safety and Health Administration) is a regulatory agency of the federal government that has been established to ensure that the Law is adhered to by regulating employers. This is accomplished by developing standards consistent with the law, educating employers and employees and enforcing the standards on employers.

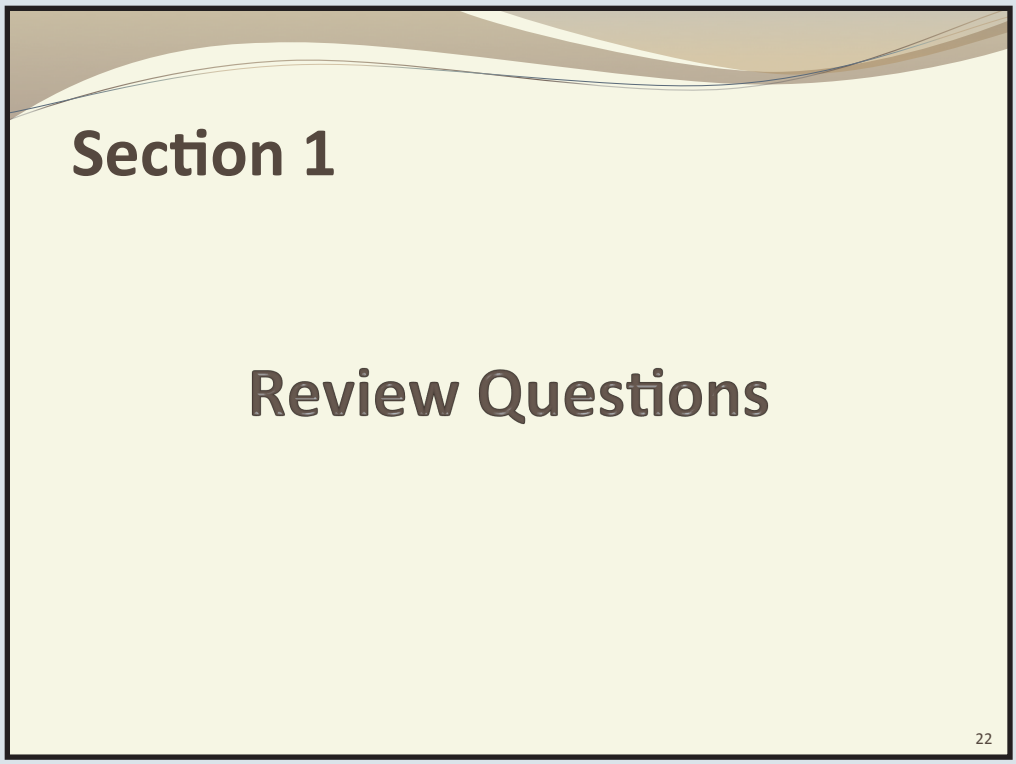


Describe this protection in simple terms or by example. This provision advocates for workers who report complaints which provide a hazard in the environment in which they work. The protection protects them from each of the bulleted points.

Point out the responsibilities employers have to protect their employees.

May outline the Whistleblower Protection protocol for employees to follow with OSHA. The website and phone number should be emphasized on this slide to educate workers on how to report this information.

- Being fired or laid off
- Being blacklisted
- Demotion
- Being denied promotion or overtime
- Pay reduction
- Reassignment
- Benefits denial

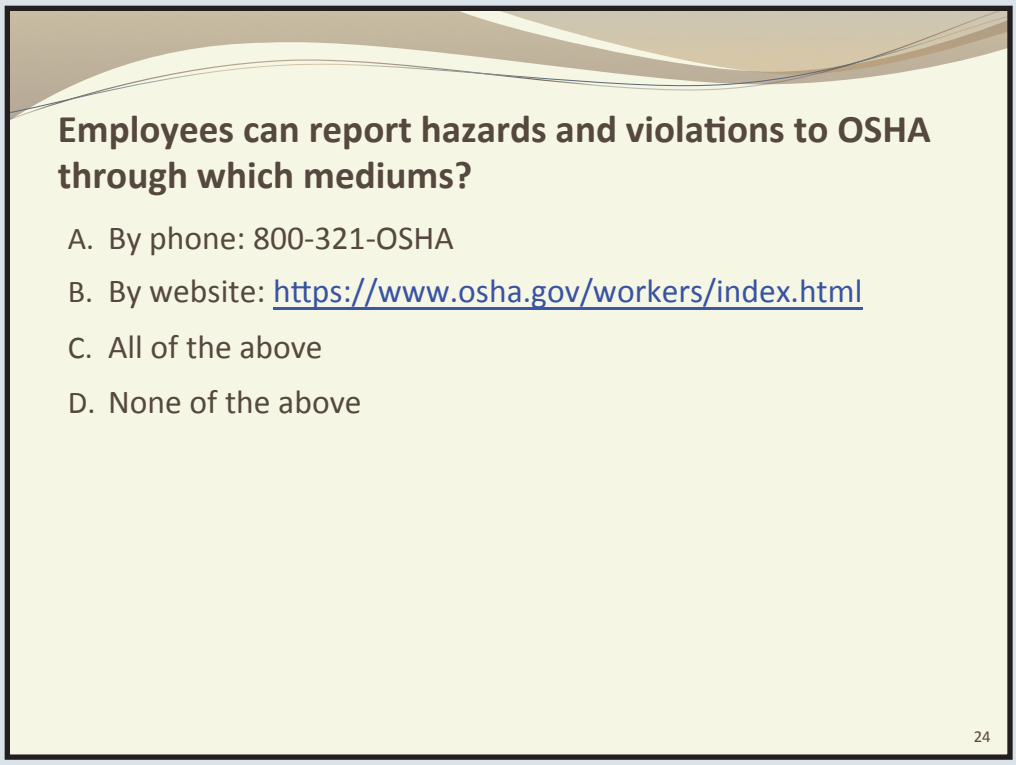

Section 1
Review Questions
22

What OSHA whistleblower statutes are designed to provide employees the freedom to report violations and protect employees from the following acts of retribution?

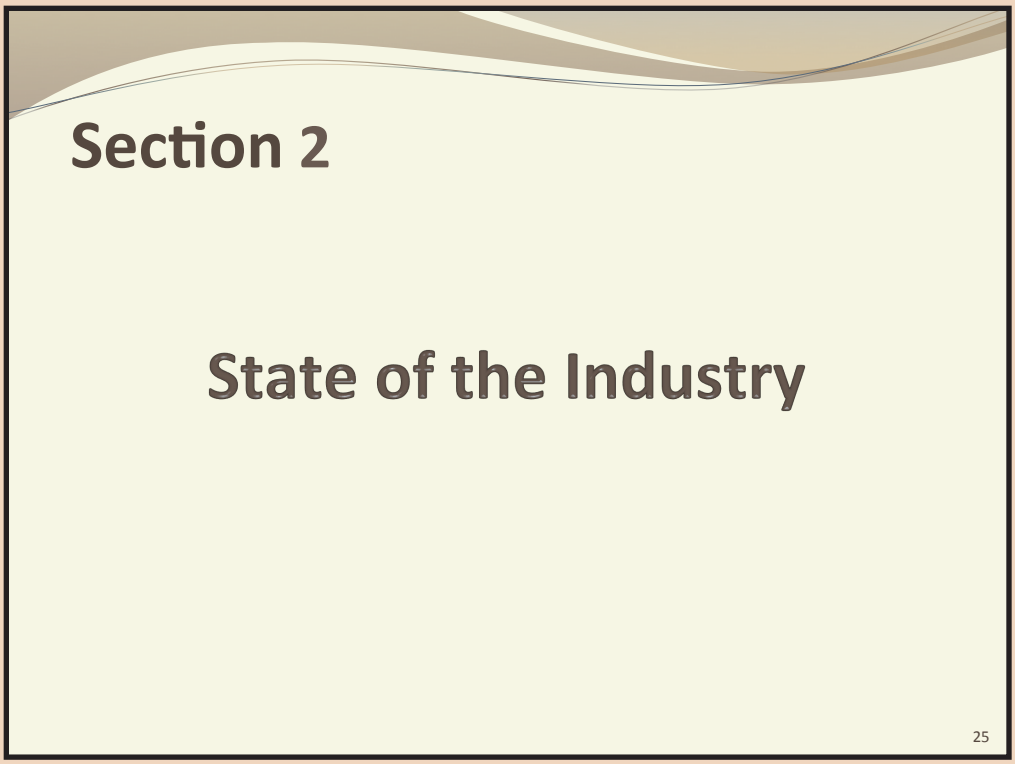
A. Being blacklisted
B. Demotion
C. Being denied promotion or overtime
D. Pay reduction
E. All of the above

23

Answer: E (All of the above)



Answer: C (All of the above)



{PLAN ON 20 MIN FOR State of the Industry}


State of the Industry Topics
#ClimberConnection Rooftop Deployment Overview Video
Industry Statistics
Incident Review
26


Wireless Rooftop Deployment Video
NATE Wireless Rooftop Deployment #ClimberConnection Video
ROOFTOP SAFETY
27

2019 CTIA Annual Survey Results

- Wireless data use almost doubles in one year. This year, we saw mobile data grow by **12.89 trillion MBs to a total of 28.58 trillion.**
- In 2018, Americans connected another **21.5 million mobile devices for a total of 421.7 million devices.**
- This equates to **nearly 1.3 devices for every person in the country.**
- In 2018, **349,344 cell sites** were in **operation - - up 8 percent from previous year.**

28

On Smart Phones and Pixie Dust

Demand for technician crews is sky high— whether it's working a 50-foot cell tower or a 2,000-foot broadcast tower. And it's easy to take for granted when our cell phones and televisions work, but it's not magic or pixie dust. It's hard, often gritty, and even dangerous work that ensures America's communications services continue to work well and are upgraded as technology improves.

(FCC Commissioner Brendan Carr; NATE UNITE February 2019)

29

Wireless Estimator Fatality Tracker

According to news website ***Wireless Estimator***, the industry experienced ten fatalities in 2014, four fatalities in 2015, seven fatalities in 2016, eight fatalities in 2017, five fatalities in 2018 and eight fatalities in 2019. Communication tower related accidents and fatalities stemming from falls, RF exposure and other hazards have been well chronicled, but **industry fatalities have also occurred at rooftop sites through the years as well.**

30

Perspective Industry Fatality Statistics

Year	Fatalities
2003	15
2004	11
2005	7
2006	19
2007	11
2008	12
2009	5
2010	7
2011	7
2012	1
2013	14
2014	10
2015	4
2016	7
2017	8
2018	5
2019	8
Total Fatalities	151

31

2018 Industry Rooftop Fatality

In **April of 2018** a tower technician died after he was electrocuted upon coming into contact with a 13kv power line while working on an LTE installation on a rooftop in Puerto Rico.

32

2016 Industry Rooftop Fatality

In **November of 2016** a tower technician fell to his death in Chula Vista, California while working on a rooftop installing transmission lines. The technician died after falling approximately 30 feet from a two-story medical office building rooftop where the work was being conducted.

33

2008 Industry Rooftop Fatality

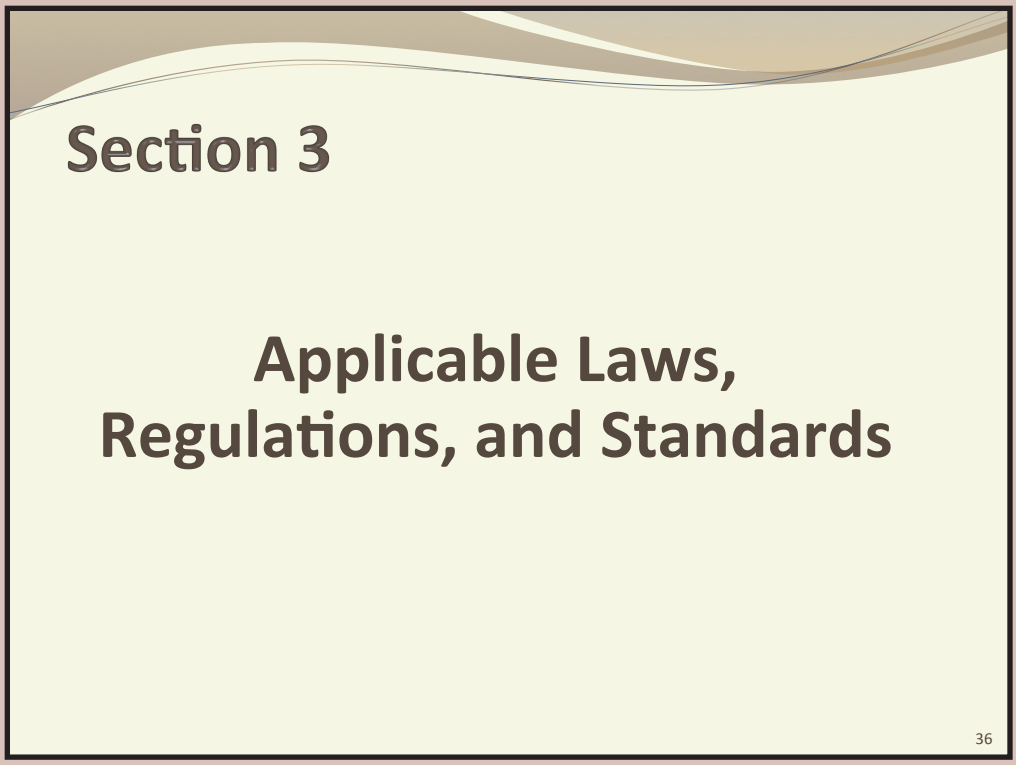
In **October of 2008**, a technician was working on a rooftop in Ellensburg, Washington when he fell through a skylight to a concrete floor and was killed.

34

Moral of the Story

Rooftop telecom sites present as many hazards as traditional communication tower sites. Be **vigilant** while deploying and maintaining infrastructure on rooftop locations!

35


Section 3
Applicable Laws, Regulations, and Standards
36

Laws, Regulations, and Standards can seem overwhelming. Laws typically are introduced from an accident or near miss. Standards exist for consistency.

Laws

- Laws are the products of written statutes, passed by either the U.S. Congress or State Legislatures. The legislatures create bills that, when passed by a vote, become statutory law.
  - Clean Air Act
  - Fair Labor Standards Act
  - Occupational Safety and Health Act

38

Regulations

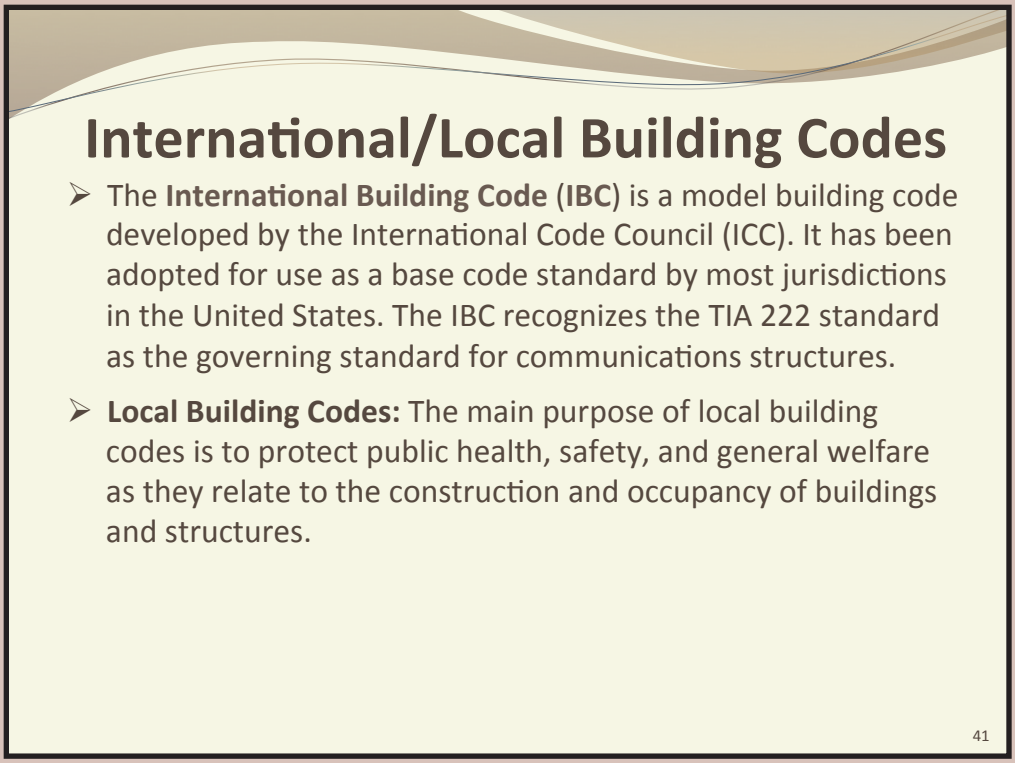
- Regulations, on the other hand, are standards and rules adopted by administrative agencies that govern how laws will be enforced.
  - OSHA 1926 – (construction)
  - OSHA 1910 – (general industry)

39

Voluntary Standards

- Voluntary standards are standards established generally by private-sector bodies and that are available for use by any person or organization; private or government. The term includes what are commonly referred to as 'industry standards' as well as 'consensus standards.'
  - Industry – (ANSI/ASSP A10.48)
  - Quality – (ISO 45001)
  - Safety – (ANSI Z359)
  - TIA – (ANSI/TIA -222-H)
  - TIA – (ANSI/TIA 322)

40



Local building codes may take precedence over international codes. They are typically based on local needs such as concrete footing depth for frost levels.

Applicable Rooftop Regulations

Regulation	Application
International/Local Building Codes	Building codes are regulations that set forth standards to which buildings must conform.
OSHA 1926 (construction)	Safety and Health Regulations for Construction.
OSHA 1910 (general industry)	Occupational Safety and Health Standards.

42

Applicable Rooftop Standards

Standard	Title	Application
ANSI/ASME B30.9,.10,.26,.30	Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings	Standards for any/all rigging components involved in an overhead lift.
ANSI/ASSP A10.48	Criteria for Safety Practices With the Construction, Demolition, Modification, and Maintenance of Communication Structures	Means and methods for work being performed on telecommunications sites.
ANSI/ISEA 121	Standard for Dropped Object Prevention Solutions	This standard establishes minimum design, performance, testing and labeling requirements.

43

Applicable Rooftop Standards (cont.)

Standard	Title	Application
ANSI/ISEA Z87	Standard for Occupational and Educational Personal Eye and Face Protection Devices	Standard sets forth requirements for the design, construction, testing, and use of eye protection devices, including standards for impact and penetration resistance.
ANSI/ISEA Z89.1	Standard for Industrial Head Protection	This standard describes types and classes, testing, and performance requirements for protective helmets. These include recommended safety requirements for authorities considering the establishment of regulations or codes concerning the use of protective helmets.

44

Applicable Rooftop Standards (cont.)

Standard	Title	Application
ANSI/TIA-222-H	Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures	Standard for the design, analysis and condition assessment of antenna support structures.
ANSI/TIA-322	Loading, Analysis, and Design Criteria Related to the Installation, Alteration and Maintenance of Communication Structures	Standards related to the installation alteration and maintenance of communication structures.

45

Applicable Rooftop Standards (cont.)

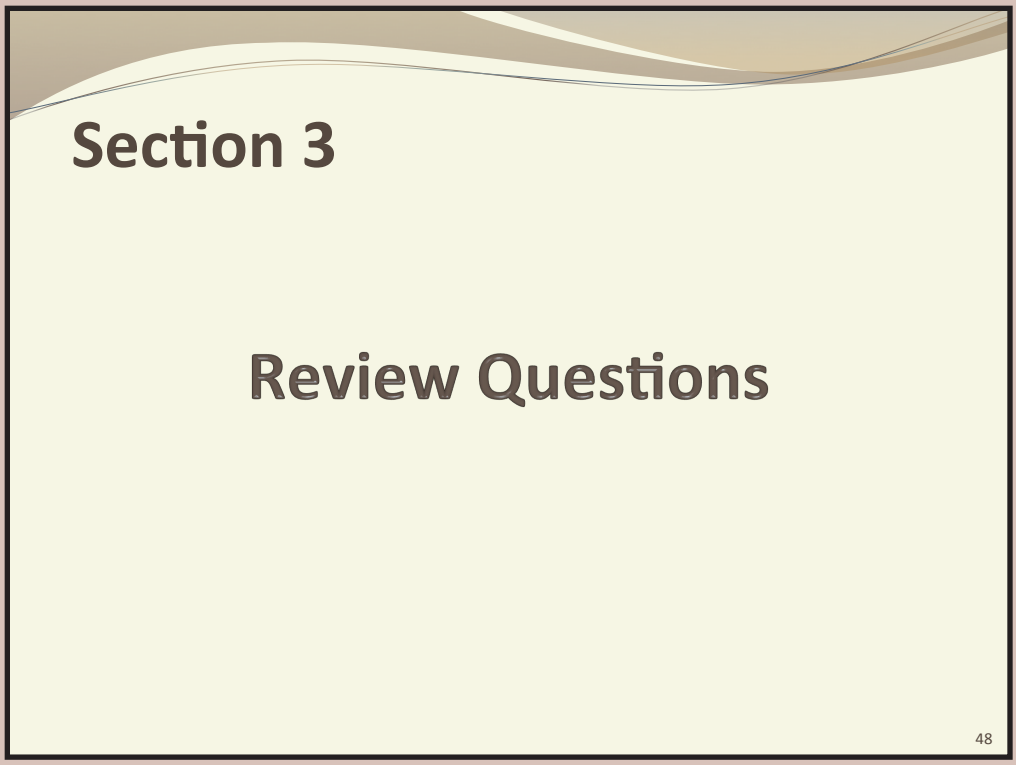
Standard	Title	Application
FCC-OET 56	Questions and Answers About Biological Effects and Potential Hazards of Radio Frequency Electromagnetic Fields	Understanding effects of overexposure and how to mitigate and manage exposure.
FCC- OET 65	Evaluating Compliance With FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields	Understanding allowable limits of RF exposure to humans.
NATE CTS	NATE Climbing Training Standard	Training topics which must be covered to be in compliance with the standard.

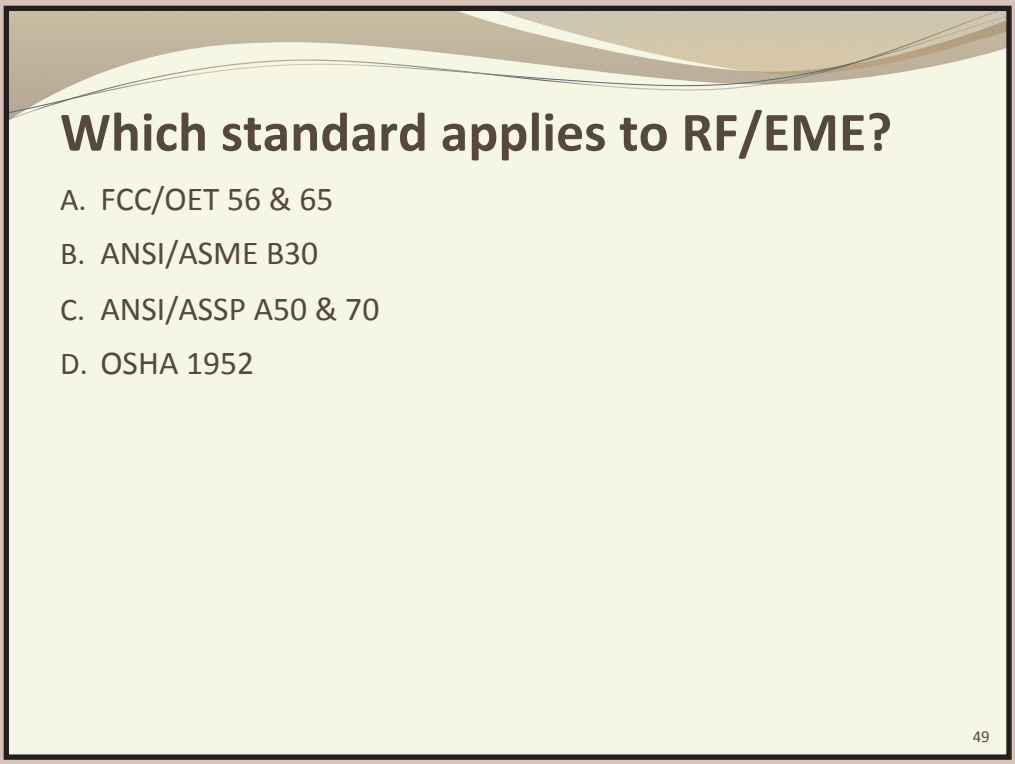
46

FCC-OET – Federal Communications Commission – Office of Engineering and Technology

Imagine a World With no Laws, Regulations or Standards…

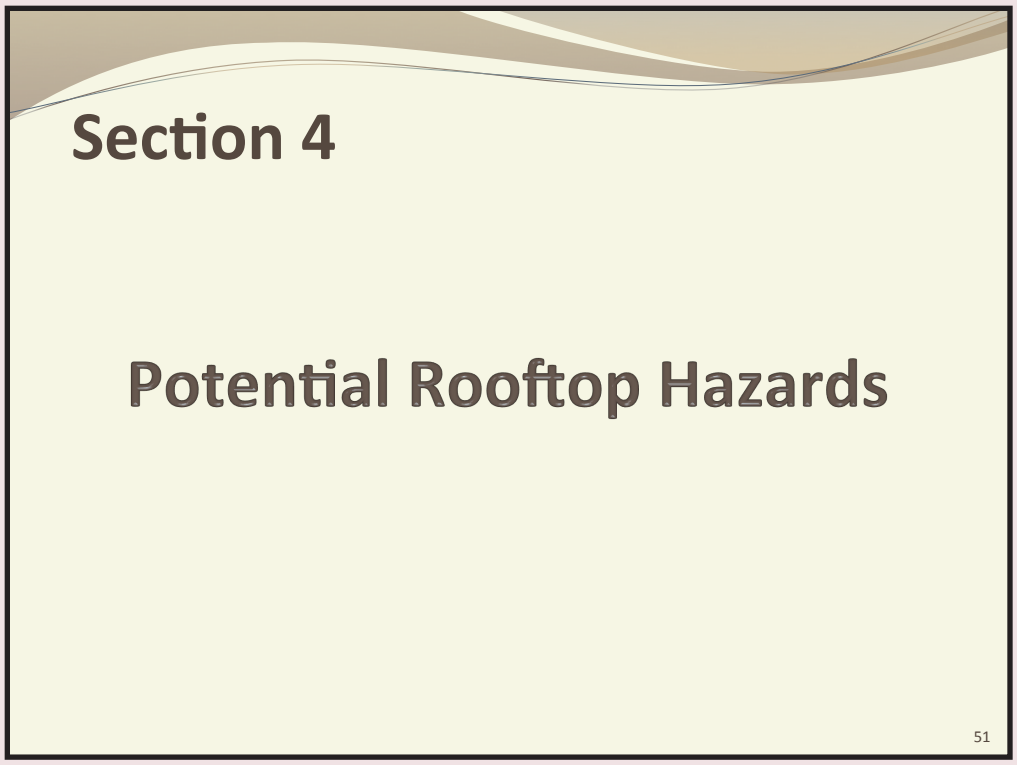
47


Section 3
Review Questions
48



Answer: A (FCC/OET 56 & 65)

Answer: B (All of the above) – typically done by subject matter experts within the field for the applicable standard.



Intent:
To enhance awareness of the potential hazards and exposures associated with rooftop work within the telecommunications industry.

All potential rooftop hazards have not been identified within the following slides.

Elevator equipment rooms:

Unguarded moving parts can create a pinch point or clothing /PPE wrapping into equipment. Often times equipment rooms are very loud and create difficulty in communicating.

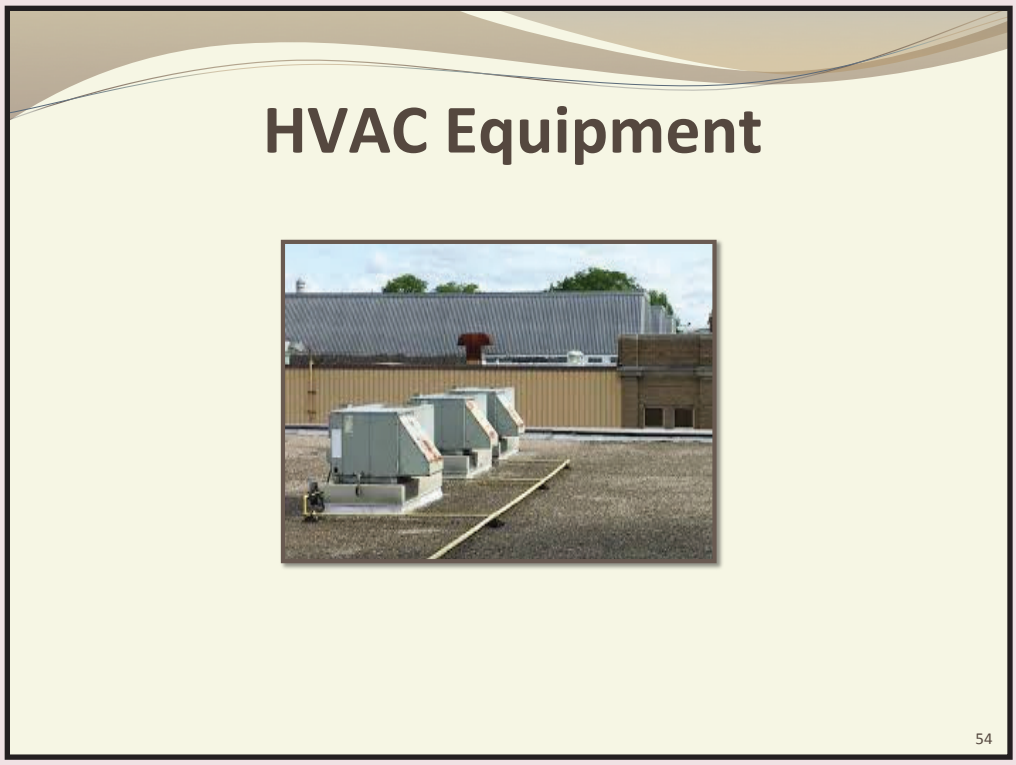
Questions that can be asked

1. Is access to the elevator room secure? (path from roof access point to elevator room access)
2. Is the door self locking?
3. Are the potential hazards guarded?
4. Lighting, Clearance….

Window cleaning equipment:

If existing suspended scaffolding are to be utilized, ensure proper inspections, operator qualifications, and fall protection equipment are all checked and verified.

Are you trained in accordance with the manufacturer's requirements for use?



HVAC equipment:

Improper use of anchor (false sense of security). Visual obstruction.

What about noise levels, can noise pose a hazard when working around HVAC equipment?

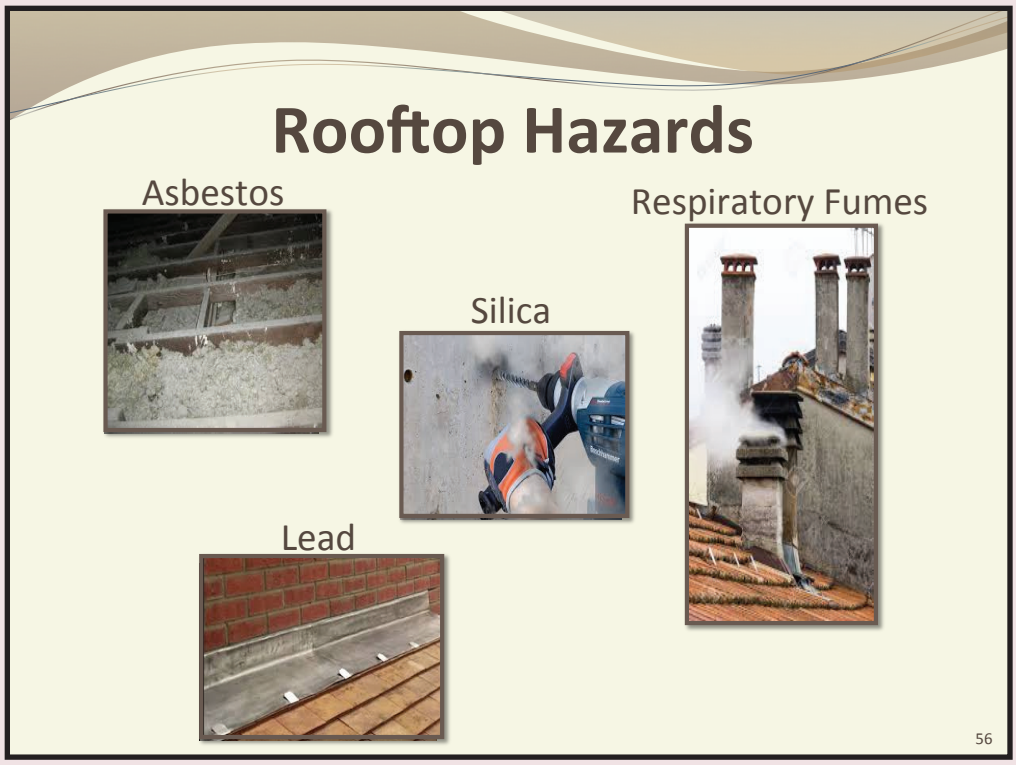
Skylights

False sense of security. Most skylights are not capable of holding the forces introduced by a falling worker into them. Proper measures must be taken to safeguard the employees (covers, railings, warning lines, etc. are effective means of isolation).

- Top photo is unprotected.
- Bottom has a barrier capable of supporting a worker if they fall into.

Rooftop Hatches

Has the potential for an immediate fall hazard if next to an unprotected edge. Transitions in and out of hatches can create a dangerous environment as often times multiple types of fall protection must be utilized. Pinch points when closing a hatch. Hatches left open can create a hole or an un-controlled access point for unauthorized individuals.

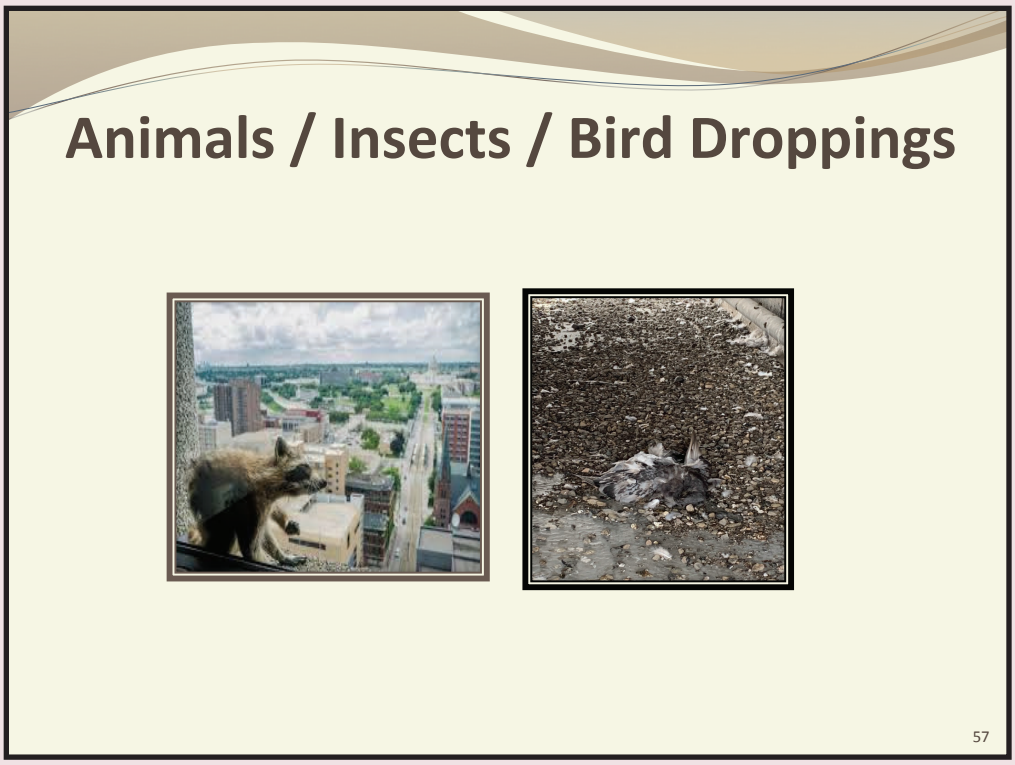


Asbestos / Lead / Silica

Identify if hazardous material is present or will be disturbed during the scope of work. If so, apply the proper mitigation steps from a qualified individual.

Respiratory / Fumes

Often times venting and equipment exhaust if piped up through a buildings roof. Some of these vents/ports have the potential for containing products that can contain hazardous partials or fumes.



Animals / Insects / Bird droppings

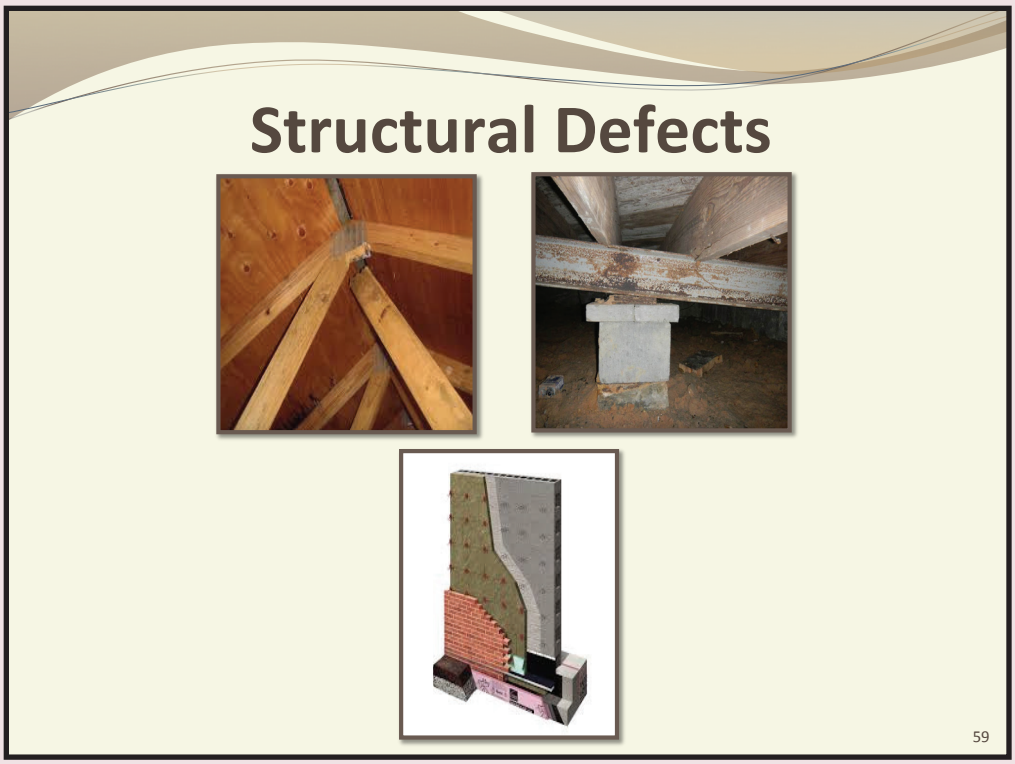
Identify the environments natural risk associated with local species, identify if any are present and take proper measures to mitigate. Insects: Bee stings and allergic reactions, spider bites, scorpions, etc. Bird / rodent droppings can lead to histoplasmosis or other potential threats.

Weather

Snow, ice, and rain can cause slippery surfaces and hidden objects to trip on and cold weather stress related issues. Sun over exposure can lead to heat related illnesses. Being on a rooftop is not the best spot to be when lightning is present.

Slips / Trips / Falls

Often times rooftops are cluttered with runs of power, coax, hybrid cables, HVAC plumbing, vents, cable trays, roof anchors, and several other objects that create a dangerous environment for tripping. Rooftops also often times have uneven surfaces creating a potential for a fall.

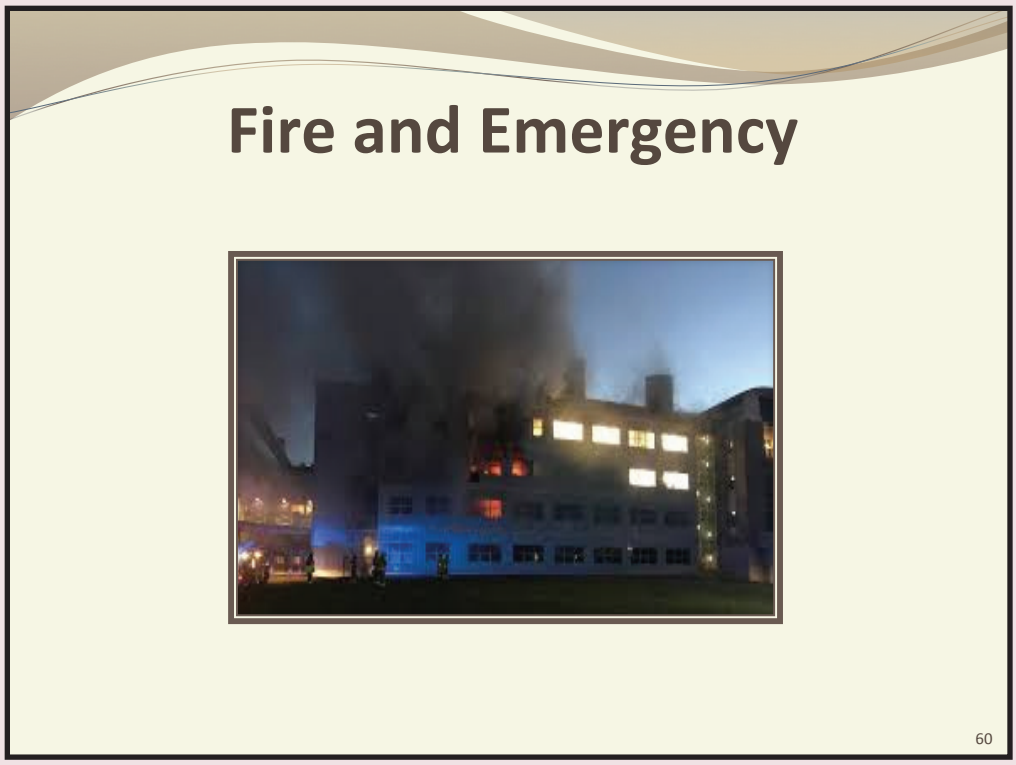


Structural defects including rooftops and walls.

Very often site construction drawings are based upon existing structural drawings and may not have had a site visit to verify the building integrity. Examples may include wall construction that may show filled cmu blocks and they are hollow, deteriorated structural steel, wood, concrete, etc.

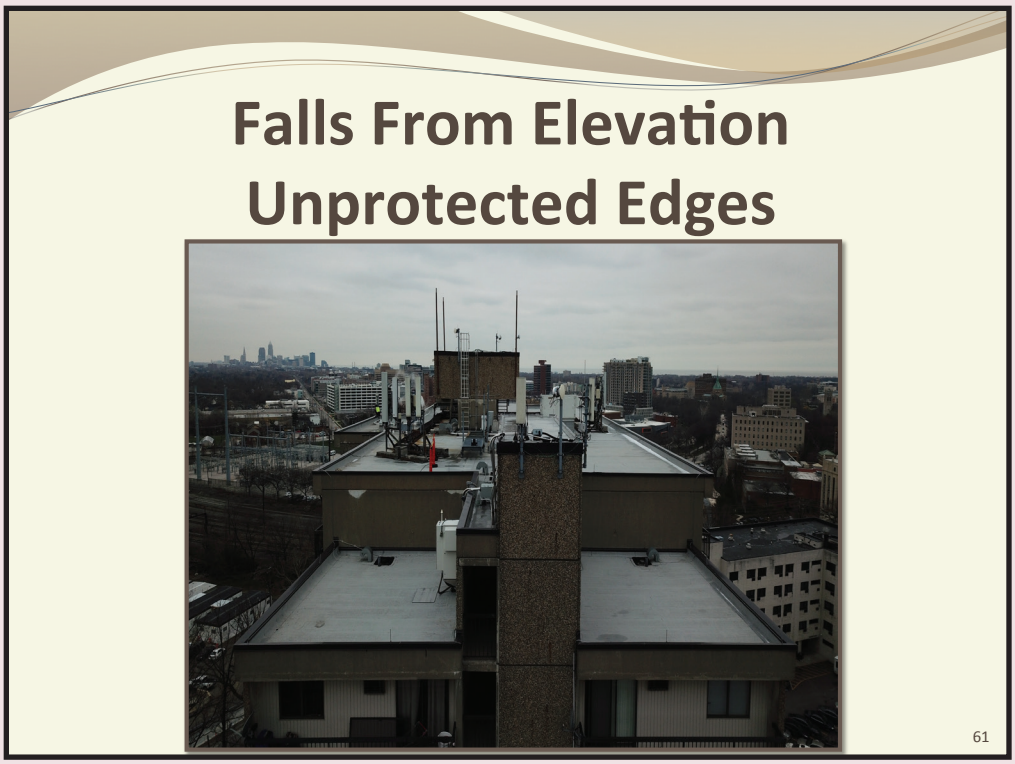
Structural Integrity

Verify loads that will be applied to a rooftop that the structural capacity can hold these forces. Example: loads introduced from a crane setting materials in a location (spools of cable, steel, etc.)



Fire & Emergency

Developing an on site Emergency Action Plan including fire escapes, extinguisher, and first aid kit location within the immediate work area, ensure EMS meeting locations are established as well as assembly location, building emergency contact personnel and process. Planning for introduced fire/hot work is key, proper rooftop material protection may include fire blankets or other types of protection and monitoring.



Falls from elevation / Unprotected edges

Understand the hierarchy of fall protection systems to achieve the best solution for the environment and task. Utilize the company's fall protection plan. Receive training on the specific fall protection systems required. A deeper dive into this topic will be covered in a later section.

RF/EME

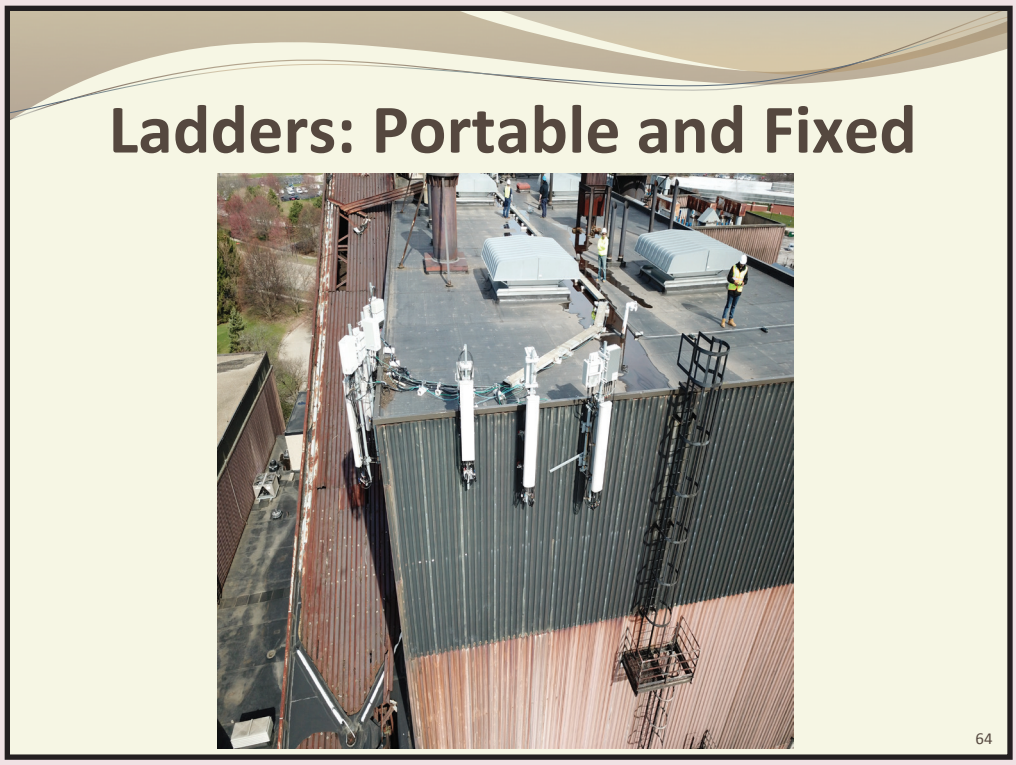
Identify potential RF sources and develop a plan to mitigate any potential exposure which may exceed the maximum permissible exposure limits. A deeper dive into this topic will be covered in a later section.

Dropped objects

A two stepped approach should be taken:

1. Dropping of any tools and materials by means of prevention (tethering, encasement, screening, toe boards).
2. Controlling the zone where a potential object could be dropped, this is considered a “drop zone.”

OSHA does cover this topic in several areas in both general industry and construction. Also, a new standard was recently released on the manufacturing guidelines and standard testing practices for consistency among manufacturers (ANSI-ISEA 121).



Ladders – portable and fixed

Portable: Consider the environment and task at hand to ensure proper type, usage, and set-up, maintenance, and inspection. Consideration must be given to a ladders distance from an unprotected edge (tipping zone).

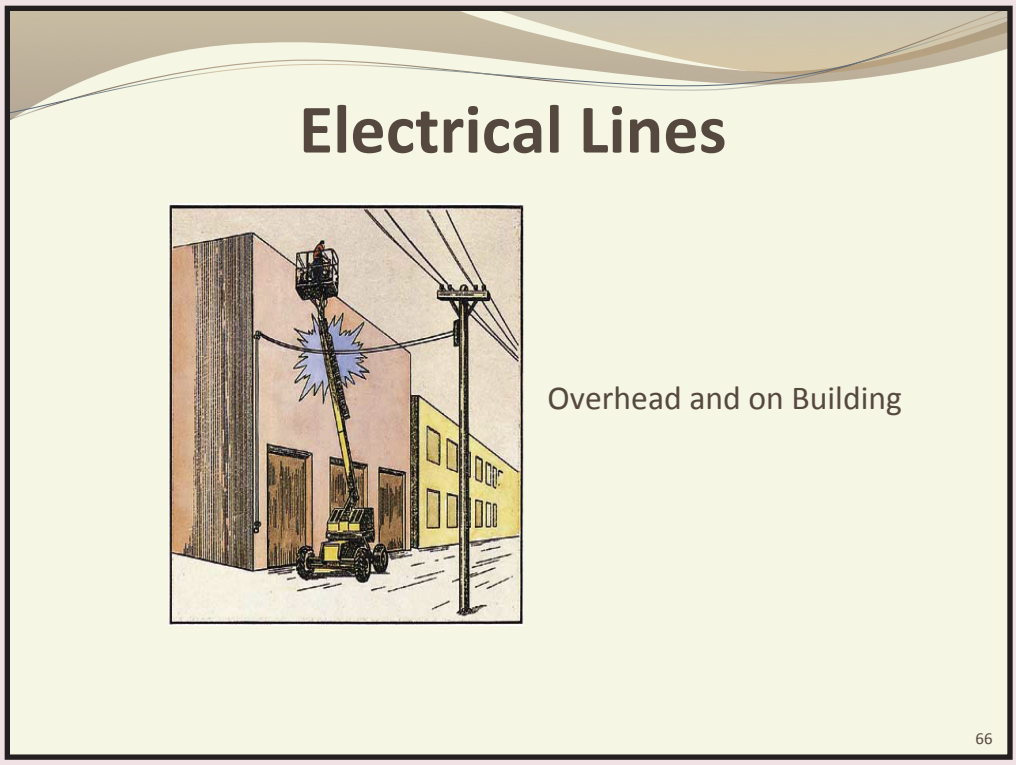
Cages and Wells – currently OSHA is phasing out cages and wells greater than 24 ft. (a 20-year phase out ending in November 2036). Installation of ladder safety systems will replace cages.

Unauthorized access

Prevention of unauthorized persons on a rooftop during site activities. Upon completion for each day ensuring access is secured for reasons of safety, theft, and liability.

Improper training

Individuals may assume they are working in a safe manner or in a safe area when actually, they may be exposed to hazards from the lack of ability to recognize the hazards via training. The level of training must meet the application of the task and the scope of work.

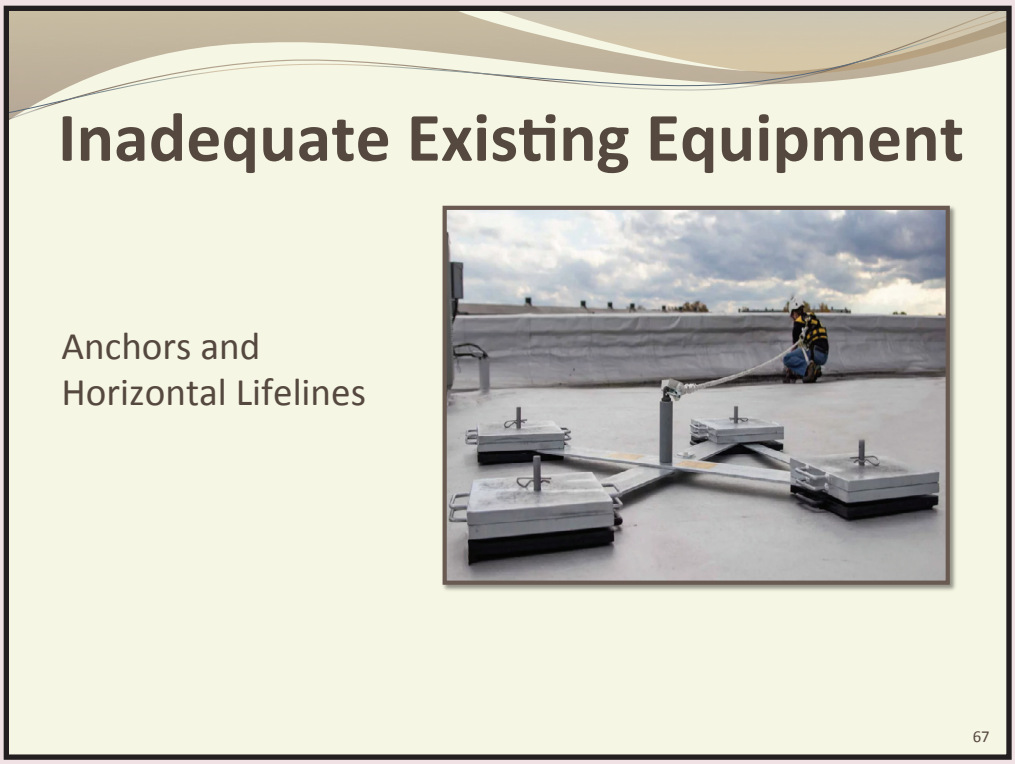


Electrical lines (overhead and on building)

May have an exposure to overhead powerlines and understanding of the high voltage safe working distance requirements. Identifying and marking these distances during work with cranes, lifts, or working next to is an important proactive approach.

Image from electronic library of construction occupational safety.

Instructor to discuss building access methods in addition to those situated on the roof top.



Inadequate existing equipment (anchors and horizontal lifelines)

Permeant fall protection systems which exceed life expectancy or has damage or has an incapability scenario. Ladders that no longer pass inspection.

Image for non-penetrating fall protection anchor system.

Confined spaces

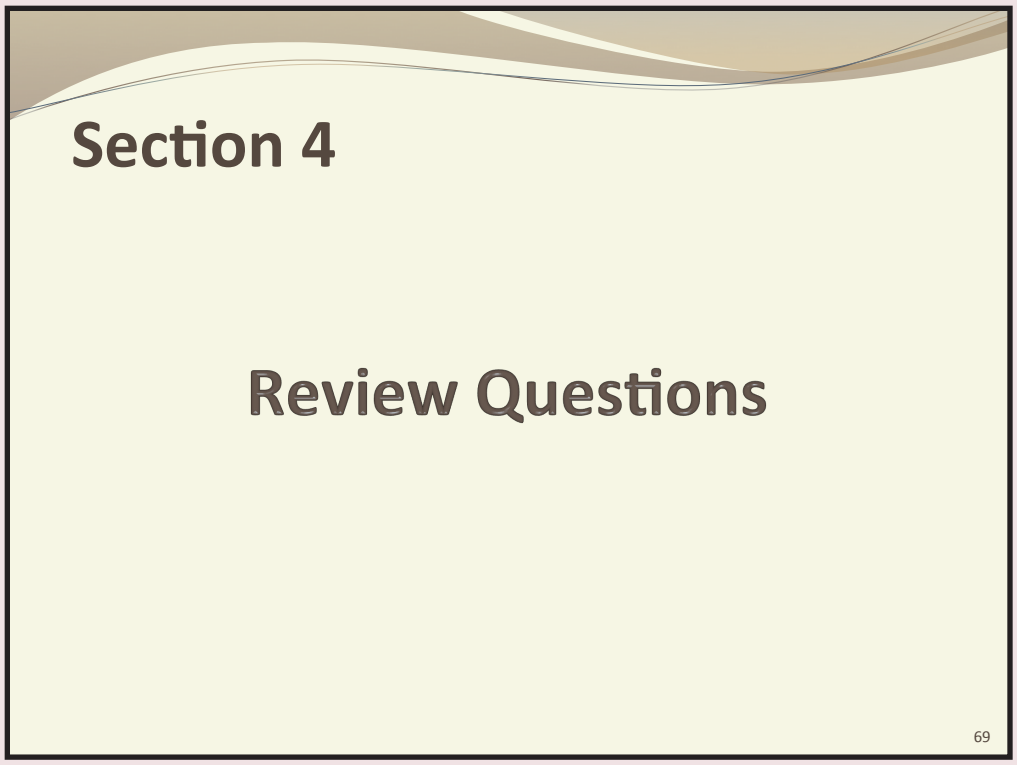
Understanding the characters of what defines a confined space:

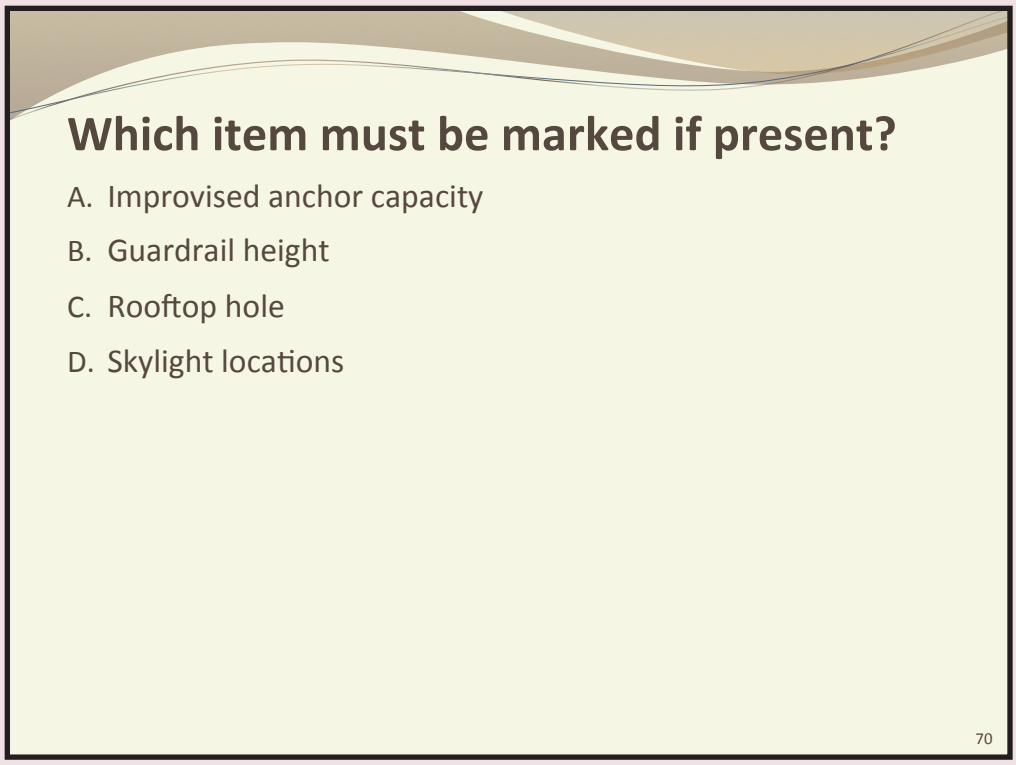
1. Limited access/egress.

2. Large enough for entrance.

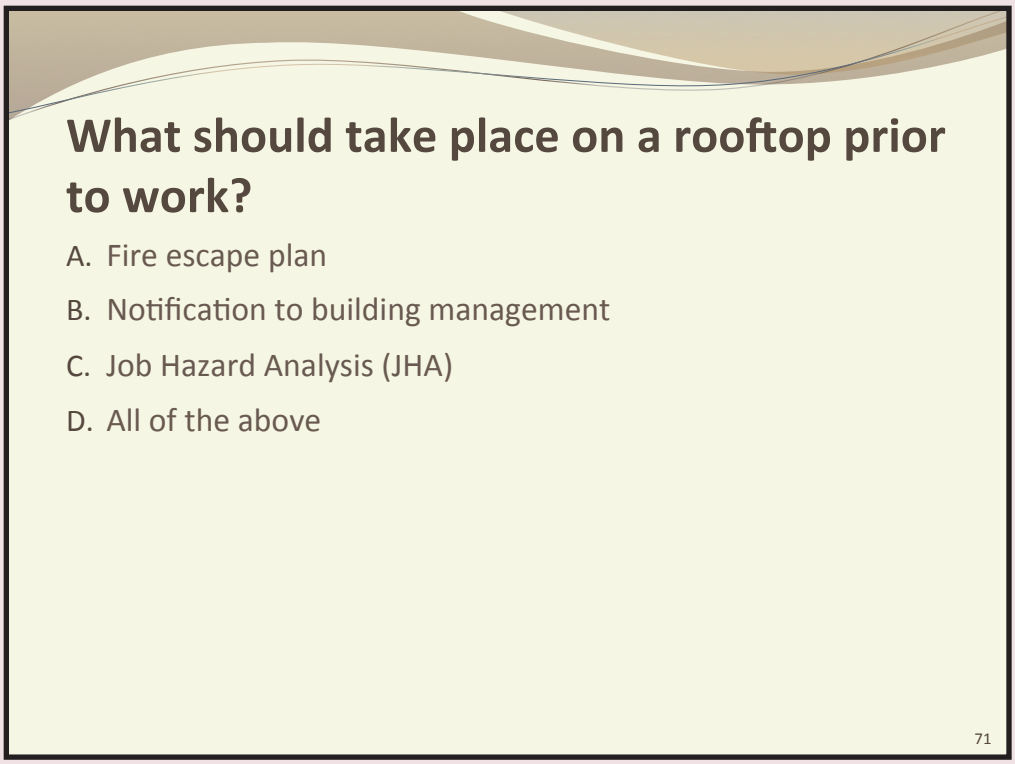
3. Not designed for continuous occupancy.

This can include enclosed spaces that may restrict access for rescue. If a confined space does exist, understanding requirements for entrance.


Section 4
Review Questions
69



Answer: C (Rooftop hole) – holes must be marked as such

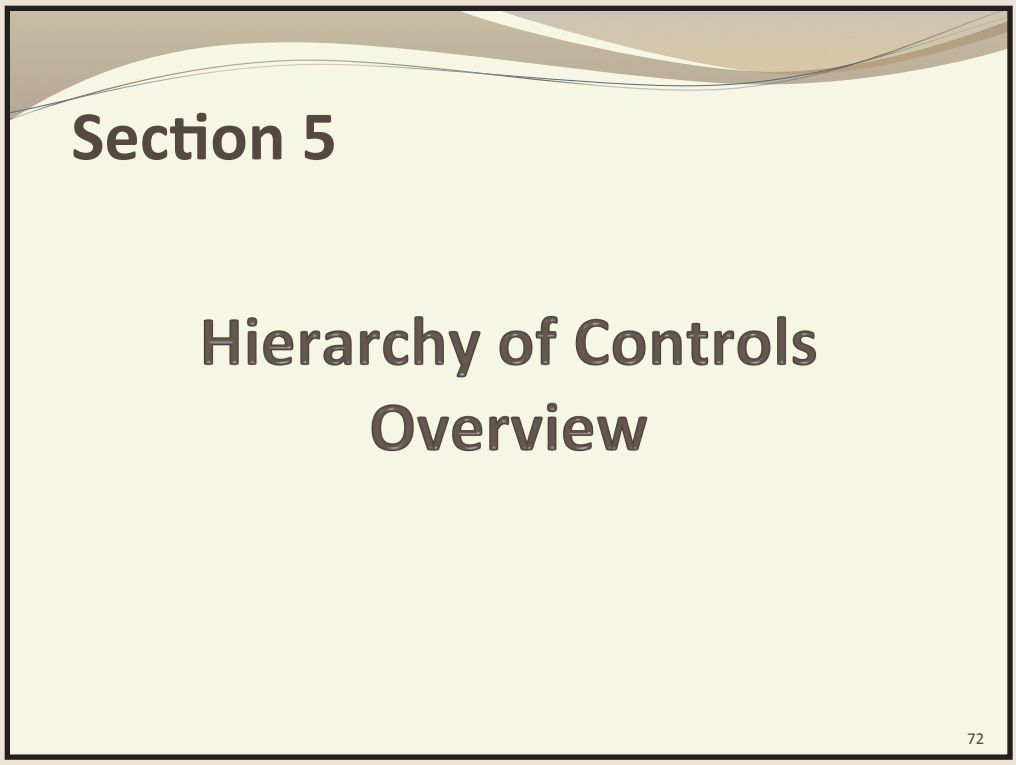


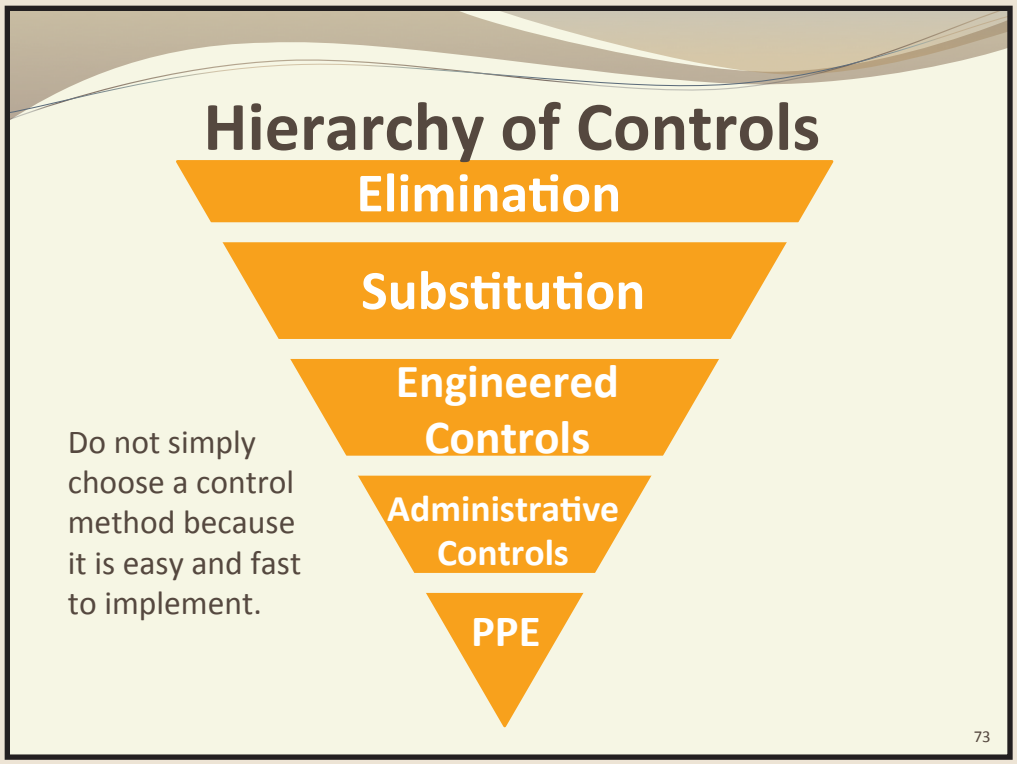
Answer: D (All of the above)

Fire escape could consist of descent outside the building.

Notification is critical for accountability.

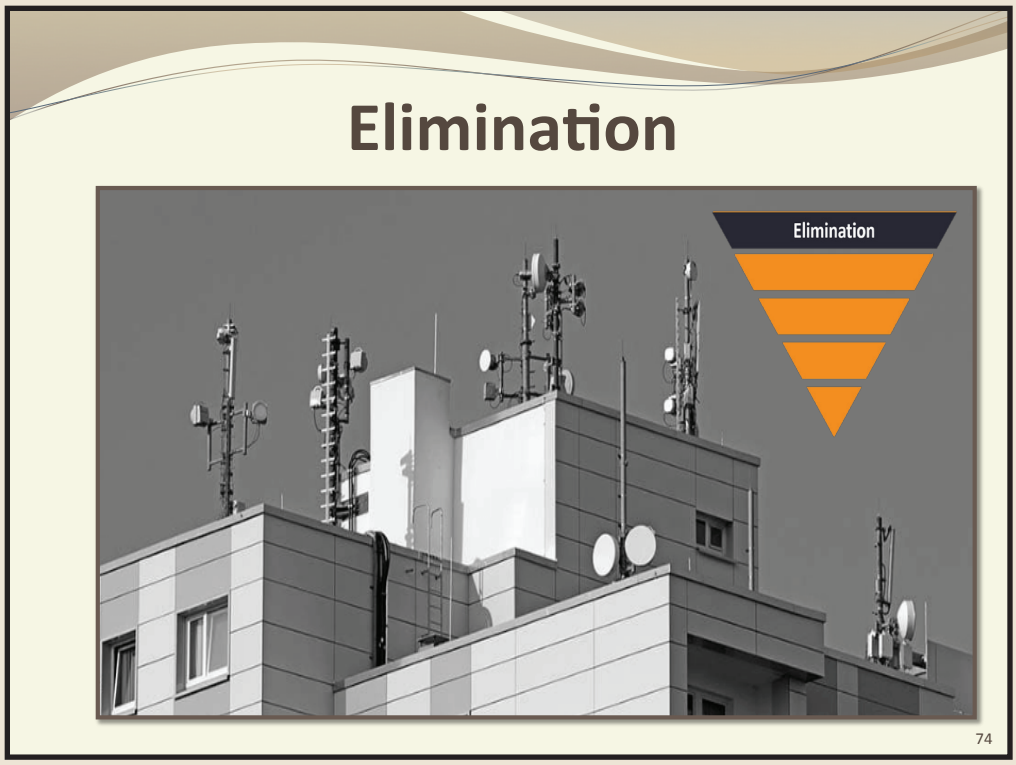
JHA is required and should be communicated with entire team.


Section 5
Hierarchy of Controls Overview
72



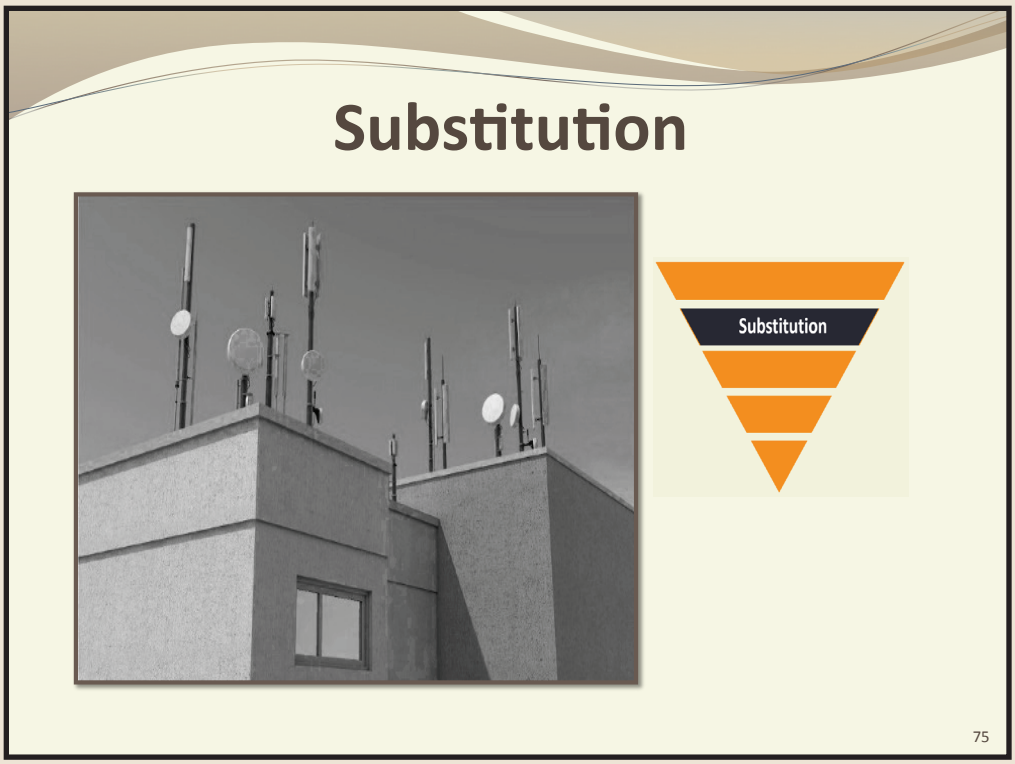
Controlling exposure to workplace hazards is the basis of worker safety. The hierarchy approached workplace hazards from a best solution standpoint. The hierarchy by design establishes the need to reach for the inherently safest solution, one that is the most effective and protective in substantially reducing the risk.

The main approach is understood within the industry as prevention through design. Eliminating hazards and controlling risks to workers to an acceptable level "at the source." The ultimate goal of prevention through design is to prevent or reduce occupational injuries, illnesses, and fatalities by including prevention considerations into all designs that impact workers.



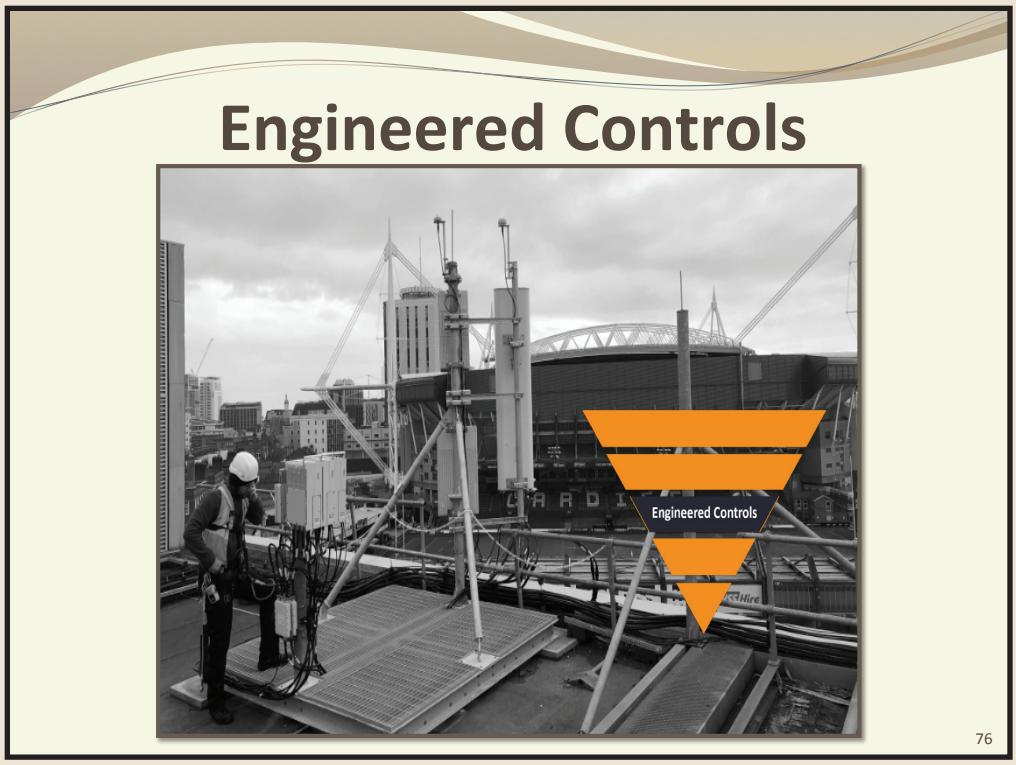
Elimination by Design – the best solution.
Physically remove the hazard, is it always possible? - No

Elimination being the most effective at reducing hazards can also be the most difficult to implement. On a building like the one in the picture it is almost too late to rely on elimination as a control measure. If elimination is considered during the design or development stage then opportunities may be possible.



Substitution by Design – replace the hazard. If elimination is not possible or too costly the next best alternative is substitution.

As for elimination, substitution can be difficult to implement in an existing process. This said substitution of a newer technology that was not readily available 15 years ago may greatly reduce the risk identified under the current hazard.



Engineered Controls by Design – isolate people from the hazard.

Engineering controls are preferred over administrative and personal protective equipment (PPE) for controlling exposure to existing hazards in the workplace as they are designed to remove the hazard before it comes in contact with the worker.

Guardrail to protect against the low parapet and allow the majority of maintenance work to be conducted away from the fall zone.

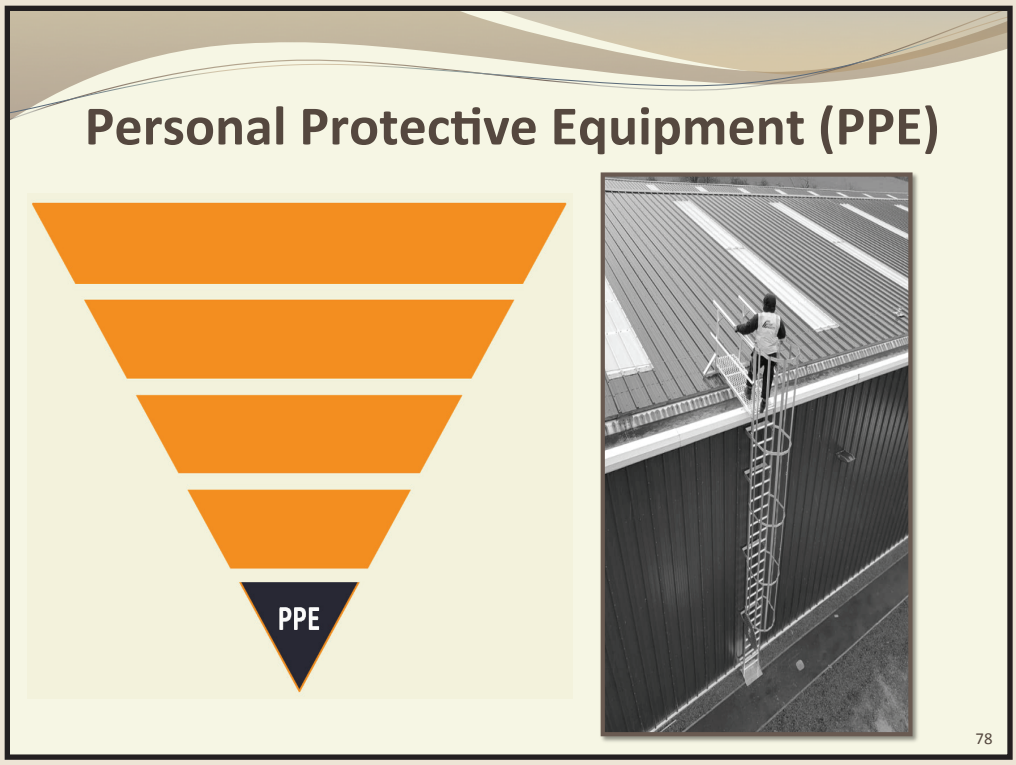
Engineered controls are generally independent of worker interactions and provide a high level of protection.

Short term engineered controls can be more costly than administrative or PPE control measures; however, long term can be seen as more cost competitive as training and equipment turnover are not an issue.

Administrative Controls: Signage / re-scheduling crew during a less hazardous time.

Administrative Controls by Design – change the way people work.

They are used where hazards are generally difficult to control, they are somewhat expensive to sustain in the long run.



PPE: Personal Protective Equipment – providing personal fall protection systems, hard hats, cut resistant gloves, glasses, etc.

Protect the worker - this assumes something hazardous will happen and this is the last line of defense to protect a worker.

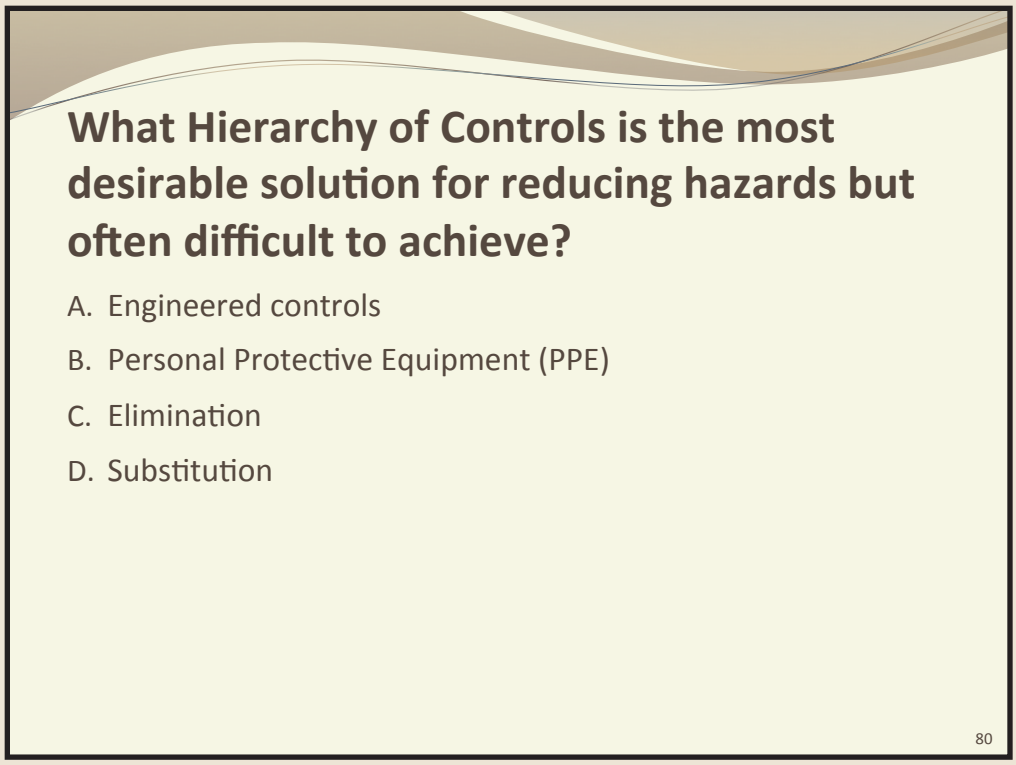
A must have for any telecommunications worker who frequents different sites. With proper training a telecommunications worker can address where and when personal fall protection solutions are necessary and when a building owner must improve the ability to safely access and work (when a higher level of hazard control is necessary).

Note: in the picture – a caged ladder leading to a horizontal travel system.
Is this the best possible solution?

Section 5

Review Questions

79



Answer: C (Elimination)

What Hierarchy of Controls is the least desirable solution for reducing hazards but often utilized because other controls are not possible?

A. Administrative controls

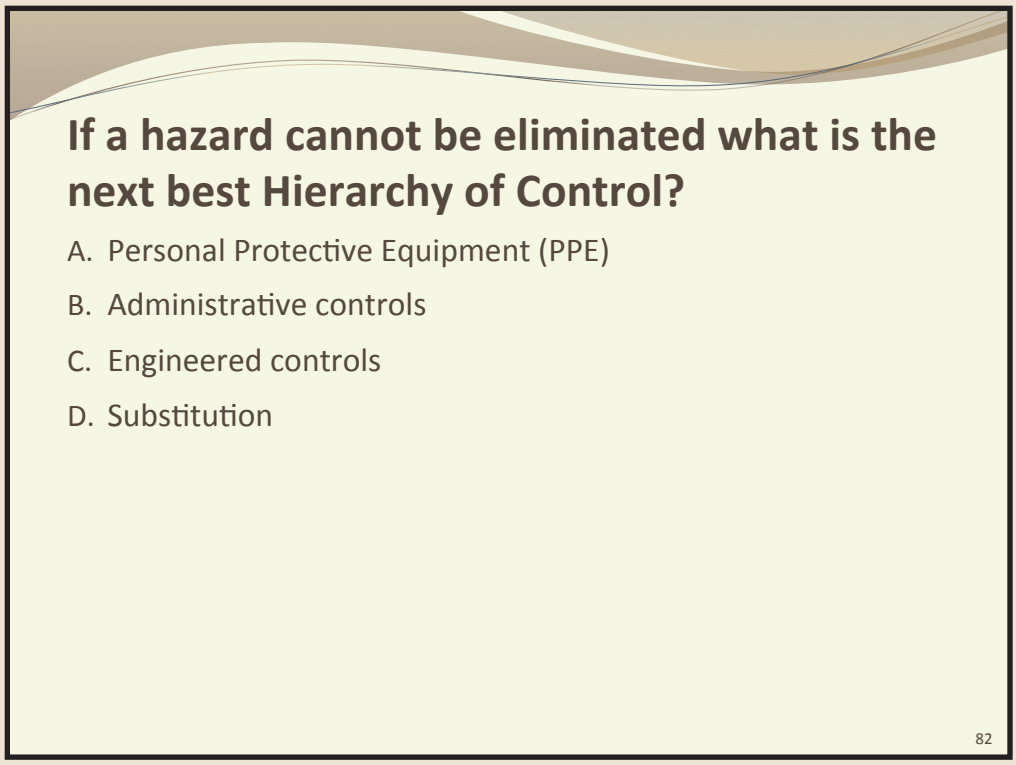
B. Elimination

C. Personal Protective Equipment (PPE)

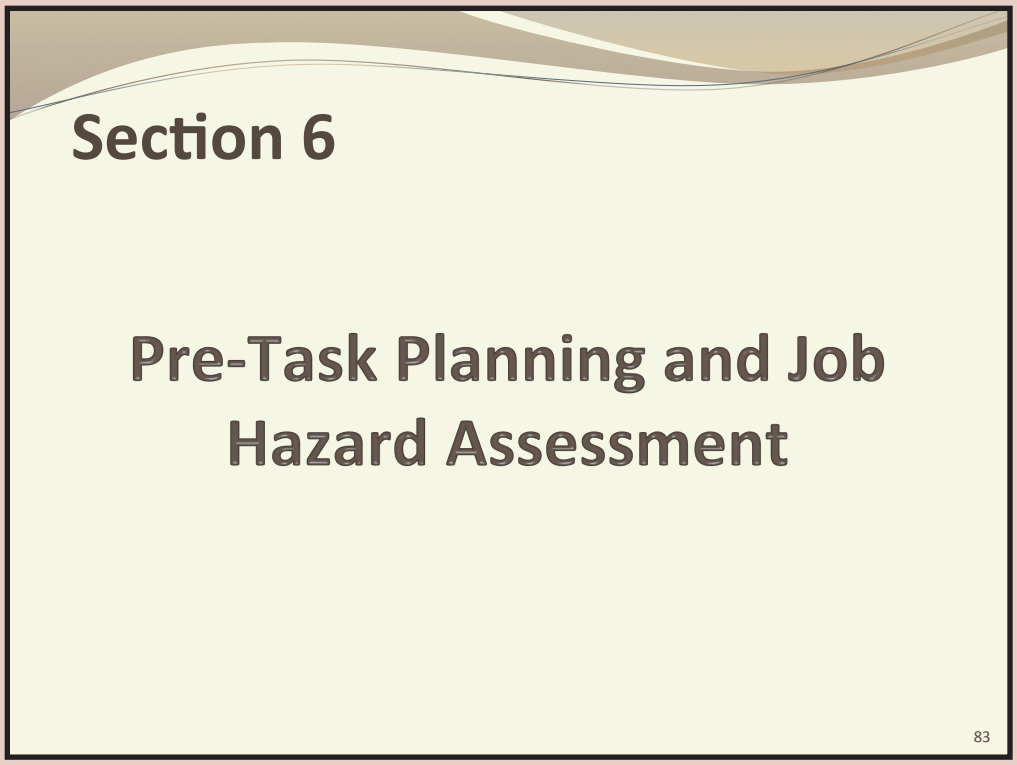
D. Engineered controls

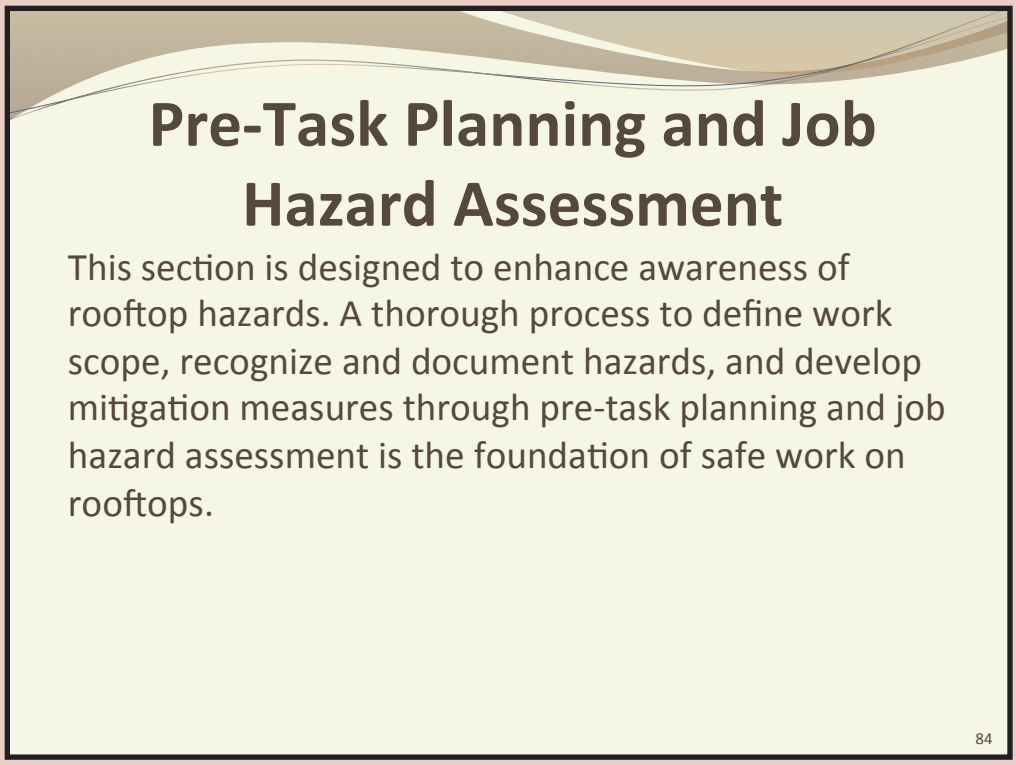
81

Answer: C (Personal Protective Equipment - PPE)

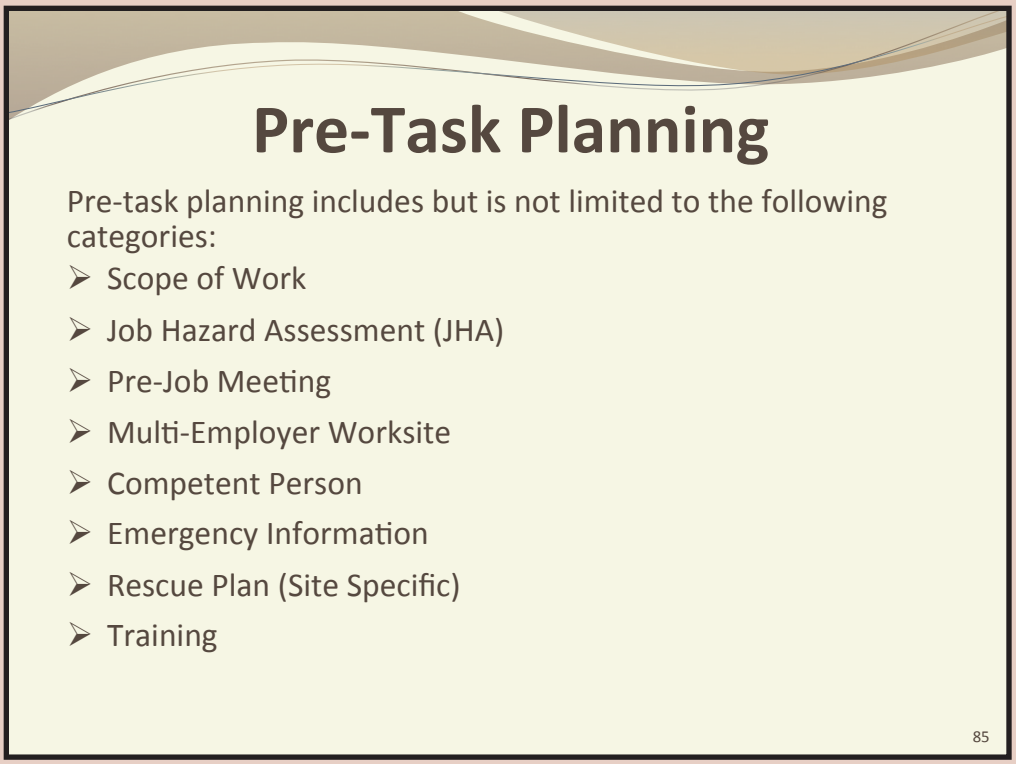


Answer: D (Substitution)

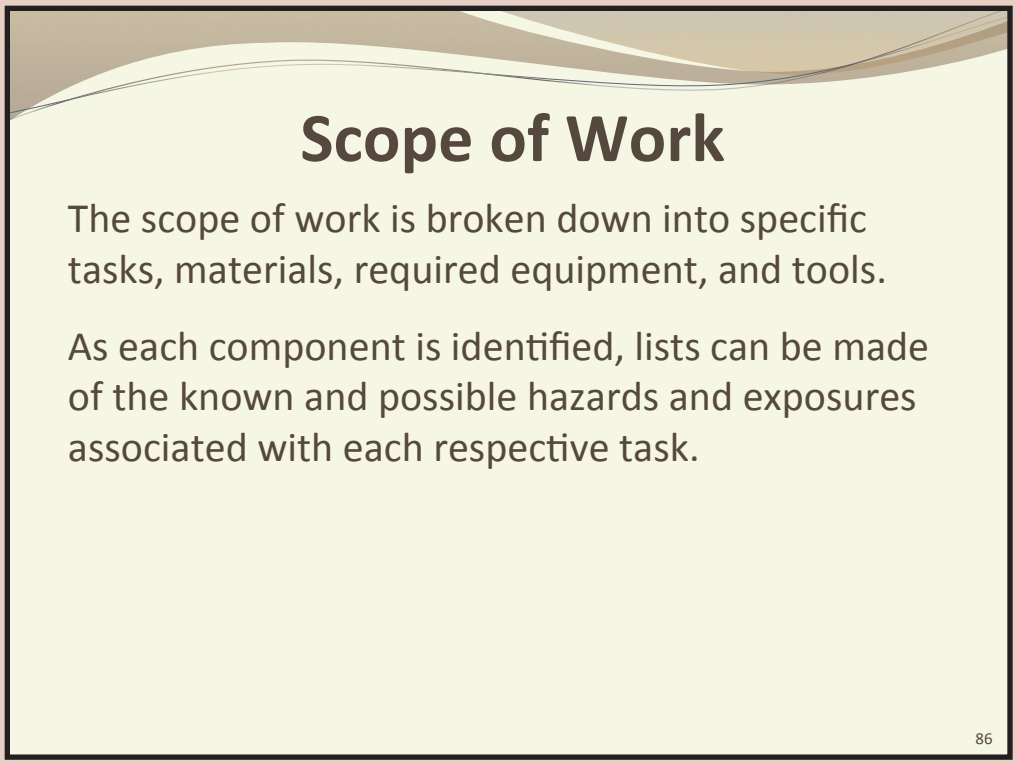

Section 6
Pre-Task Planning and Job Hazard Assessment
83



This slide is to briefly discuss what Section 6 is all about. Pre-task planning and a job hazard assessment is a process performed by a work crew to identify and evaluate workplace hazards with the goal of eliminating or controlling them. Before the commencement of work activities, hazards present on the job site must be clearly identified, documented and discussed to successfully limit the employee exposures to those hazards. Pre-task planning and a job hazard assessment has been proven to be excellent tools to identify and evaluate hazards in the workplace.



This slide outlines the components of what comprises an overall pre-task plan and a job hazard assessment. Not much time needs to be spent on this slide as you will go into detail of each individual component throughout this section.

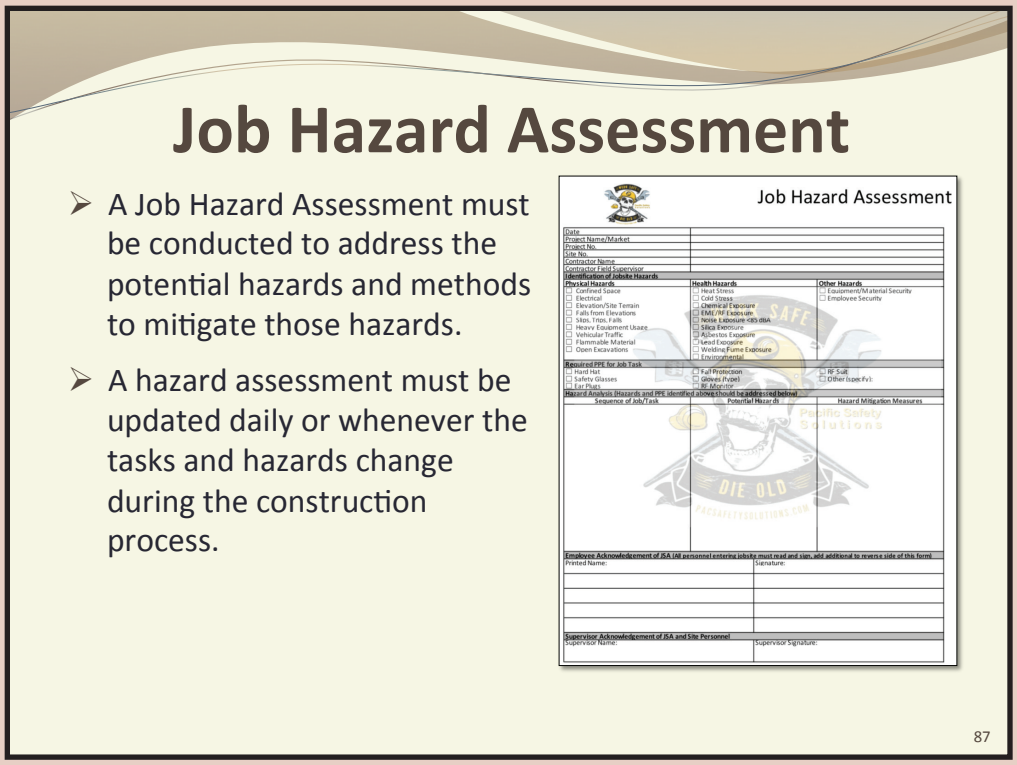


This slide deals with the overall scope of work the crew will perform for the day. The scope of work needs to be broken down into tasks.

Break the job down into steps. Each of the steps of a job should accomplish some major task. The task will consist of a set of movements. Look at the first set of movements used to perform a task, and then determine the next logical set of movements. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. How does that break down into job steps? Picking up the box from the conveyor and putting it on a hand truck is one logical set of movements, so it's one job step. Everything related to that one logical set of movements is part of that job step.

The next logical set of movements might be pushing the loaded hand truck to the storeroom. Removing the boxes from the truck and placing them on the shelf is another logical set of movements. And finally, returning the hand truck to the receiving area might be the final step in this type of job.

Be sure to list **ALL** the steps in a job. Some steps might not be done each time, such as checking the casters on a hand truck, for example. However, that task is a part of the job as a whole and should be listed and analyzed.



This slide deals with assessing the hazards associated with the overall scope of work. Remember, the scope of work is broken down into tasks. The tasks are broken down into steps. With the steps identified, what are the hazards associated with each step? Once the hazards are identified, control measures can be put into place.

Use a quick general example for a rooftop: the scope of work is for an antenna and line crew to upgrade an existing site with new technologies. The scope of work can be broken down into individual steps such as but not limited to the following:

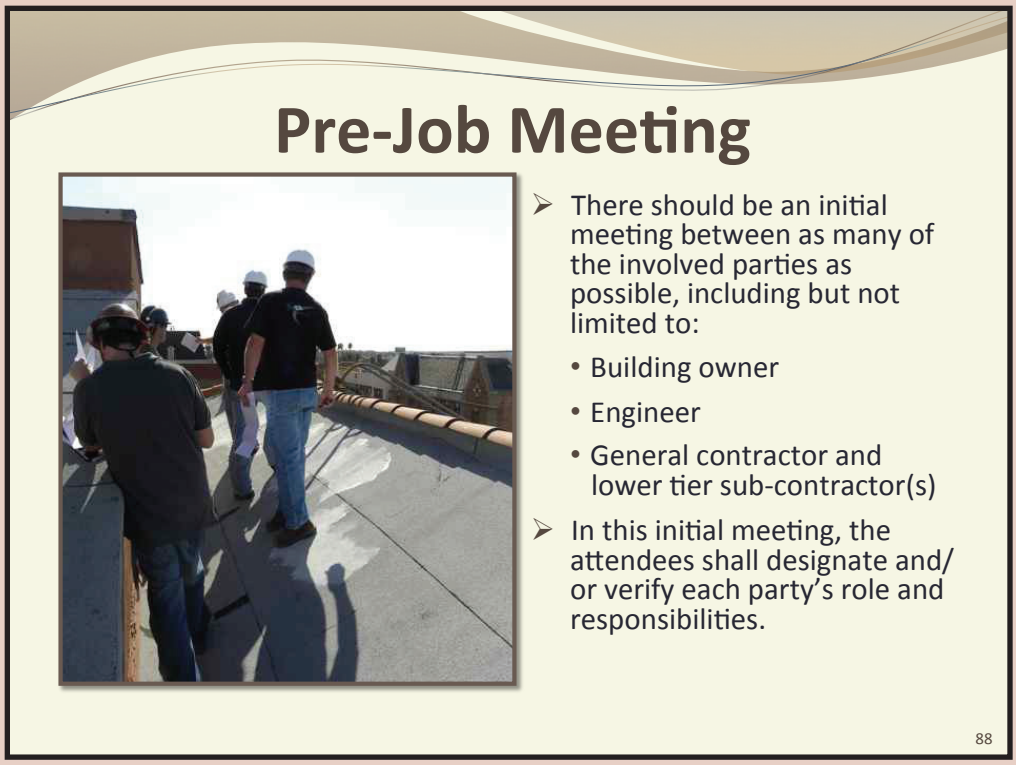
1. Working off ladders to reach the equipment
2. Staging material onto the roof
3. Manually handling material
3. Use of a crane to position the equipment/materials onto the roof
4. Replacing coax for the new technology

Use the step of replacing coax for the new technology to identify the tasks associated with that step.

The crew will be replacing coax in the existing cable tray. The cable tray runs along an unprotected edge, which is below 39”. The crew will be working within 15’ of this unprotected edge. The hazard for the crew while working on the cable tray is falling. The control measure is to set up a temporary guardrail along the unprotected edge to control the exposure of the crew members to a fall.

As it relates to updating the hazard assessment, this happens when an unidentified task appears on the job and this unidentified task was not addressed in the initial hazard assessment.

For example: The customer shows up with 12 batteries and needs help moving them into the shelter. This new task was not addressed at the beginning of the job and now presents a new set of hazards which need to be identified and controlled.



This slide deals with meeting all parties involved with the job. The pre-job meeting should include a coordinated effort between facility owners, structural engineers, contractors and/or technicians to assist in controlling the hazards associated with fall hazards, structural and facilitating proper planning.

Sometimes the structural engineers may not be available, but they will review the construction drawings to determine if the roof/building is strong enough to support the new equipment, (for example steel platform).

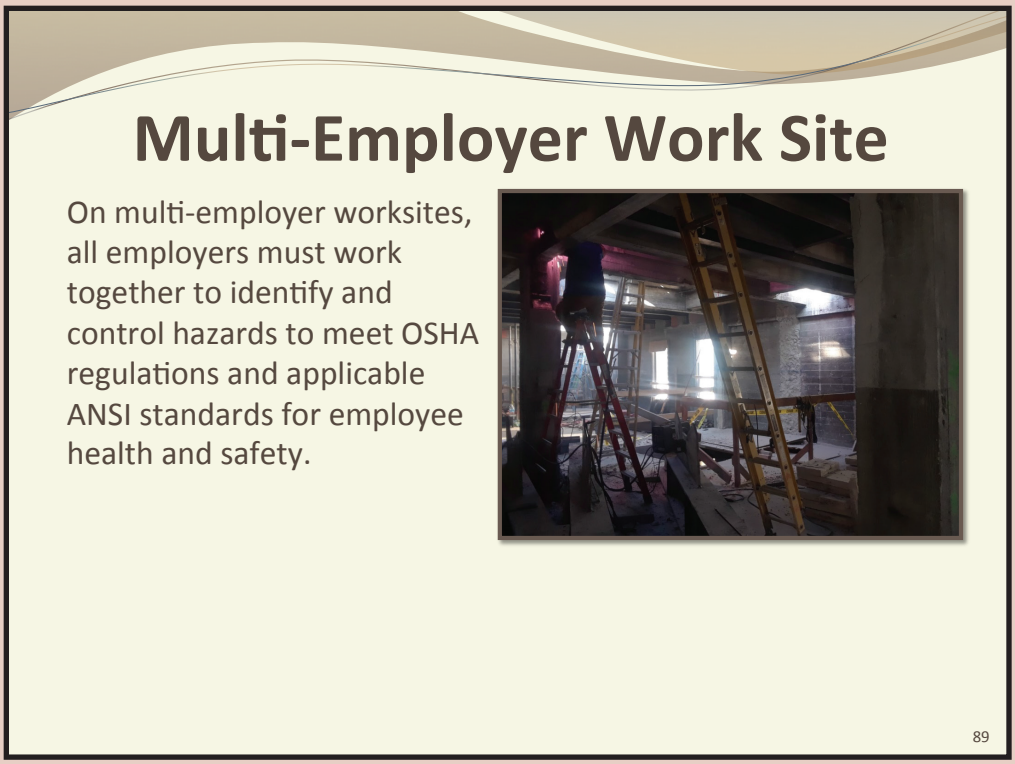
Meeting with the building owners is important because this is where overall planning for the job is discussed. This includes but not limited to the following:

1. Access – How will the crew access the rooftop? Can the crew use the main elevator or does the crew have to use the freight elevator? Does the crew need to be escorted onto the roof each day?
2. Work hours – What are the hours of operation? Some building owners have specific hours of operation for the crew so that the work does not disrupt the tenants. Some of the tenants can be occupants of a hotel or a business.
3. Special requests – Parking for the crew. Are there dedicated parking stalls to use?
4. Emergencies – What is the protocol for an emergency? How will the crew be notified in case there is an emergency?

These are just some examples of many on why the building owner needs to be involved in this meeting.

The reason for the general contractors and lower tier subcontractors to be involved in the meeting is to go over the general scope of work to determine the schedule as well as to address the hazards associated with the scope of work. This meeting can determine if sky lights need to be covered/barricaded. If the use of a warning line system needs to be used. Is there a need to install temporary guardrails? Will the use of a fall restraint system be required?

The meeting is vital for planning safety into the job. Get safety involved on the front end in order to plan appropriately. Remember the 6 P's – Proper, Planning, Prevents, Piss, Poor, Performance.



This slide deals with multi-employer work sites. A multi-employer work site consists of just that, there are multiple contractors working on the same job-site. With multiple contractors working on the same job-site, there is a potential for a contractor to create a hazardous condition to which another contractor may be exposed. The rules for a multi-employer work site are based off OSHA's Multi-Employer Citation Policy.

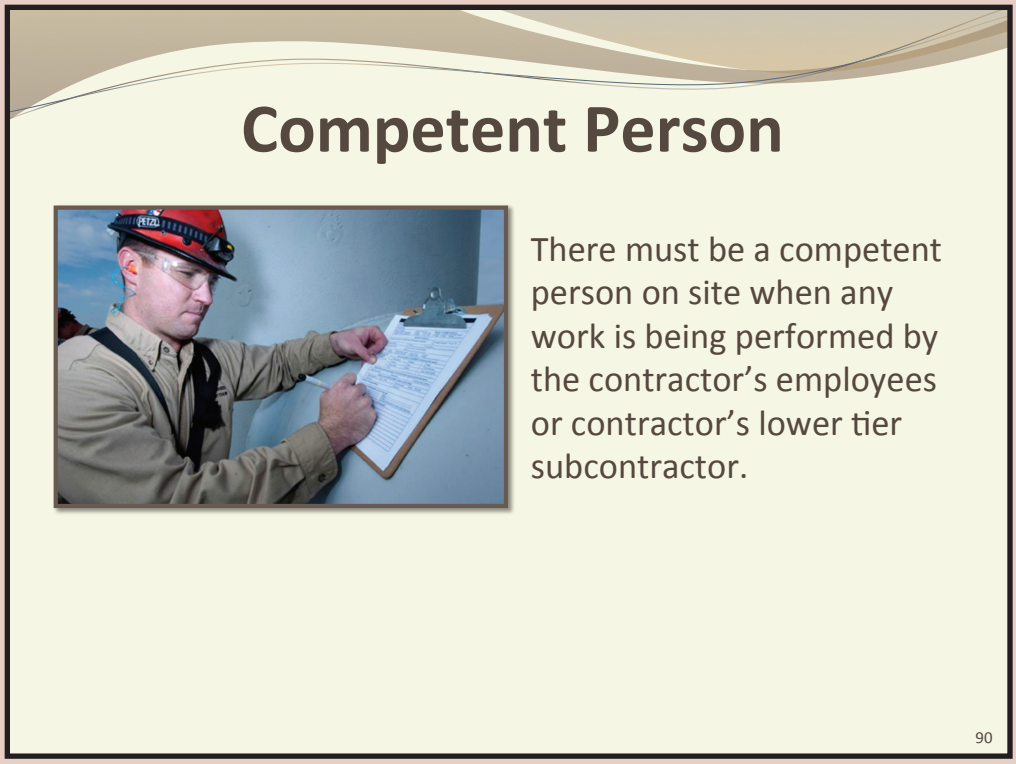
A multi-employer work site is comprised of the following:
1. Creating Employer – The employer who creates a hazard.
2. Exposing Employer – The employer whose employees are exposed to the hazard.
3. Controlling Employer – The employer who controls the work site and is ultimately responsible.
4. Correcting Employer – The employer who is responsible for correcting the hazard.

Employers at multi-employer work sites need to know their responsibilities and must coordinate assigned roles, and accountability for each contractor's employee health and safety. If they don't, they may be cited under OSHA's Multi-Employer Citation Policy.

As it pertains to what the employer's responsibilities are, this essentially is identifying who the controlling employer is. It also pertains to what the expectations are of the lower tier contractors, which is to follow all the health and safety rules set by the controlling contractor.

It is recommended the owner or general contractor have overall responsibility, (which is considered the controlling employer) for the work site.

Here is an example of a telecom multi-employer work site:
The Creating Employer – The creating employer can be the contractor or their lower tier subcontractor.
Exposing Employer – The exposing employer can be the contractor or their lower tier subcontractor.
Controlling Employer – Controlling employers are employers who have general supervisory authority over the work site, such as a general contractor on a construction site. These employers have the power to correct safety and health violations or to require others to correct them. Control can be established by contract or by the exercise of control and practice. A controlling employer must exercise reasonable care to prevent and detect OSHA violations. However, this duty is less than what is required of an employer protecting its own employees. A controlling employer also doesn't need to inspect for hazards as frequently as the employer it hired and is also not held to the same knowledge of applicable standards as that employer.
Correcting Employer – Often times the contractor who creates the hazard is the one who corrects the hazard. There are times when a lower tier subcontractor is considered the correcting employer, but this is unusual and must be in writing through a contract.



This slide demonstrates the overall importance of a competent person being on site. The definition of a competent person according to ANSI/ASSE A10.48 – 2016 is "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has authorization to take prompt corrective measures to eliminate or control exposure to the hazards."

The reason for a competent person to be on-site is to make sure all work is being conducted in a safe manner. With this said, the competent person must conduct daily site inspections (at a minimum) when work is being performed to detect hazardous conditions, equipment or materials or unsafe work practices and to ensure compliance with the applicable regulations and standards. The competent person must ensure the hazards on the site are recognized and immediately corrected or measures to control the hazards are implemented.

It is recommended the competent person engage the entire crew and/or lower tier subcontractors in this process

Rescue Plan (Site Specific)

Each employer must have a documented site-specific rescue plan.

The site-specific plan must identify those employees that are designated by the employer to provide first aid, CPR, and rescue.

Site Specific Rescue Plan

Date:		Job Number:	
Site Name:		Site Supervisor:	

Work is taking place at an elevated location and a rescue plan is necessary.	☐ Yes ☐ No
The rescue plan is good for the complete job.	☐ Yes ☐ No

Type of Structure

☐ Monopole ☐ Self Support Tower ☐ Guyed ☐ Rooftop ☐ Water Tank ☐ Other

Method(s) Used To Rescue A Fallen Climber

Manual Rope Rescue ☐ Capstan Hoist ☐ Base Mounted Hoist ☐

Crane/Boom Truck ☐ Bucket Truck ☐ Aerial Lift Equipment ☐

Check List

The Emergency Data Sheet is filled out and posted?	☐ Yes ☐ No
The Job Safety Analysis is complete and on-site?	☐ Yes ☐ No
The appropriate First Aid individuals are on-site?	☐ Yes ☐ No
The appropriate Rescue individuals are on-site?	☐ Yes ☐ No
The appropriate Rescue Equipment is on-site for the rescue plan.	☐ Yes ☐ No
If there are any special obstructions or conditions that need to be discussed, ensure you document them in the comments.	☐ Yes ☐ No
Once the rescue plan is made, the equipment for the plan shall be inspected to ensure it is on-site and in proper working condition.	☐ Yes ☐ No

Descriptive Comments

Reminders

1. Remain calm. 2. Call EMS first. 3. Assess the person's medical condition. 4. Do not become the victim. 5. Secure the site of any other hazards. 6. Contact the office as soon as possible.

Employee's Name (Print)	Rescue Trained	Employee's Initials
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	

All employees on-site must be part of the rescue plan discussion, and the rescue plan shall stay on-site for the duration of the job. On completion of the job, this form shall be put in the job file.

Competent Person Signature

91

This slide deals with having a rescue plan. As mentioned on the slide itself, this will be site specific. With regards to rescue on a rooftop, there can be a couple scenarios where this will need to be developed. Rescue plans need to documented and executed on site. A rescue plan consists of the following:

1. Having the appropriately number of trained personnel to conduct the rescue.
2. The rescue equipment must be readily available.
3. A rescue plan must be written, on site and followed.

The reasons for a rescue on a rooftop are as follows:

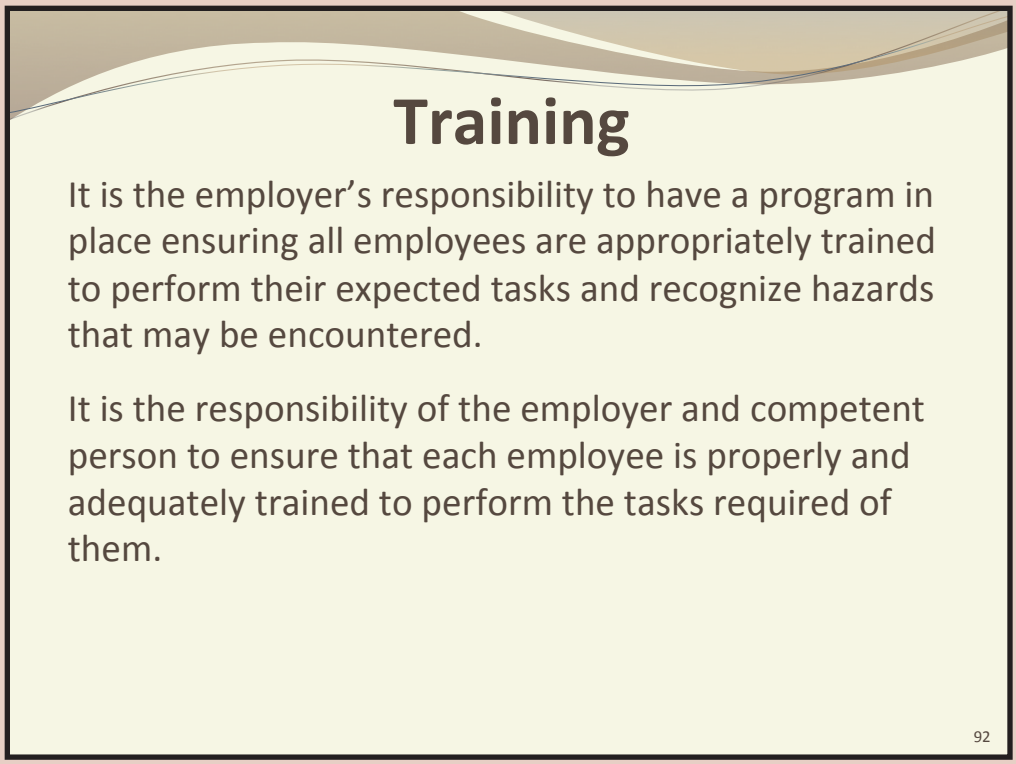
1. The scope of work requires a control descent. In this case a rescue plan must be developed in case the crewmember who is conducting the control descent gets into trouble and needs assistance.
2. A crewmember is using a personal fall arrest system. Any time a personal fall arrest system is used a rescue plan must be developed.
3. If there is an emergency within the building, (fire) how will the crewmembers on the rooftop be notified? This is also part of the pre-job meeting. There needs to be communication between the building owner and the crew working on the roof to be contacted should an emergency arise. Is there a certain pathway that needs to be followed from the rooftop to ground level?

Briefly go over the imbedded rescue plan to identify the minimum components of a rescue plan.

Additionally, touch upon the need for employees to follow their company's RF safety policies and procedures. This is another reason for a Competent person to be on site. The competent person must be able to identify RF transmitters on the rooftop and adjacent rooftops/towers. The competent person must also use the RF monitor in order to see what the RF/EME levels are. Depending on the levels of RF/EME will determine the mitigation measures.

For example:

1. Don't stand in front of live transmitters.
2. Always assume the transmitters are live until proven otherwise.
3. Set up a warning a line identifying hot spots along the roof.
4. Power off the sector, which is being worked on.



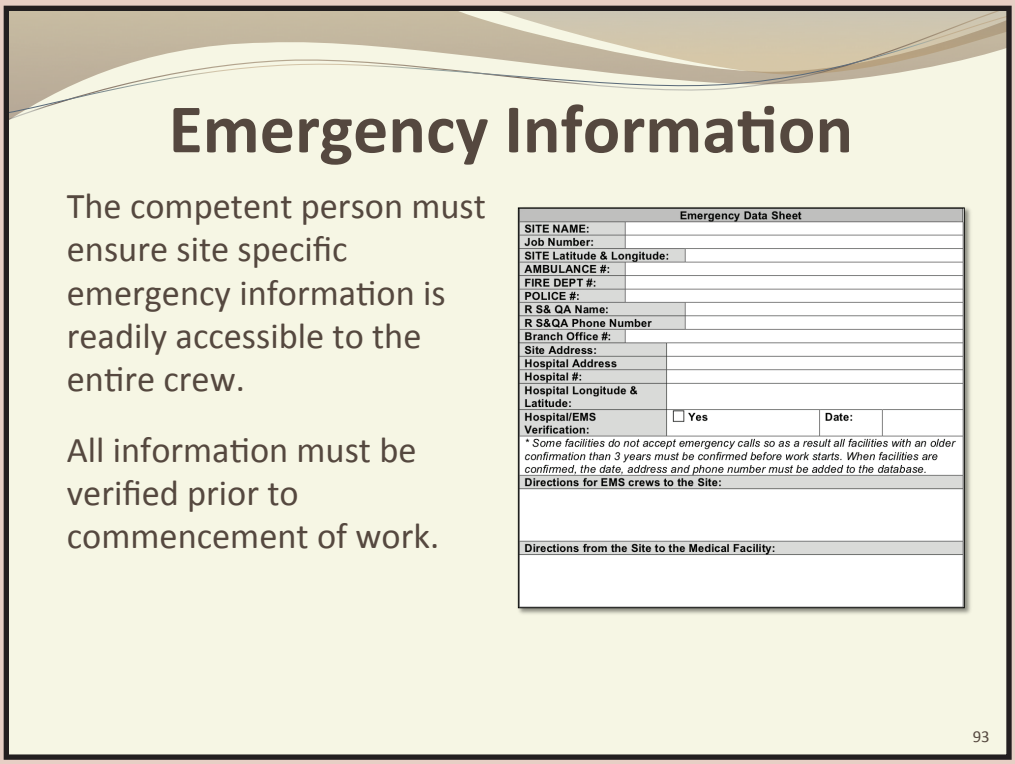
Training and education is one of the most important and fundamental elements of any safety program. Training allows the employees to learn about the hazards associated with their assignments, brings new ideas into the workplace and reinforces existing ideas and practices.

The primary focus of employee safety training is to identify and eliminate unsafe conditions through control methods and behavioral observations in-an-effort to prevent injury or illness in the workplace.

When discussing this slide, demonstrate the importance of training employees to identify hazards on rooftops, which include but are not limited to the following:

1. Being able to identify potential fall hazards, (skylights, working within 15' of an unprotected edge, what an unprotected edge is >39" (42" in CA).
2. Being able to set up the appropriate fall protection system.
3. RF/EME exposure. Being able to identify existing transmitters on rooftops.
4. Being able to implement appropriate control measures to control crewmember exposure to existing transmitters. This can include the use of RF/EME monitors, conducting RF assessments and setting up control access zones for crewmembers to avoid high RF/EME areas.
5. Environmental hazards such as bird feces, bees, wasps, protected species, nests.
6. Hazardous atmospheres – fume hoods releasing gas/vapor/fumes in close proximity to the working area.
7. Confined spaces – being able to identify a confined space and the requirements for working in the confined space.

These are just a few examples of what hazards could potentially be on a rooftop.

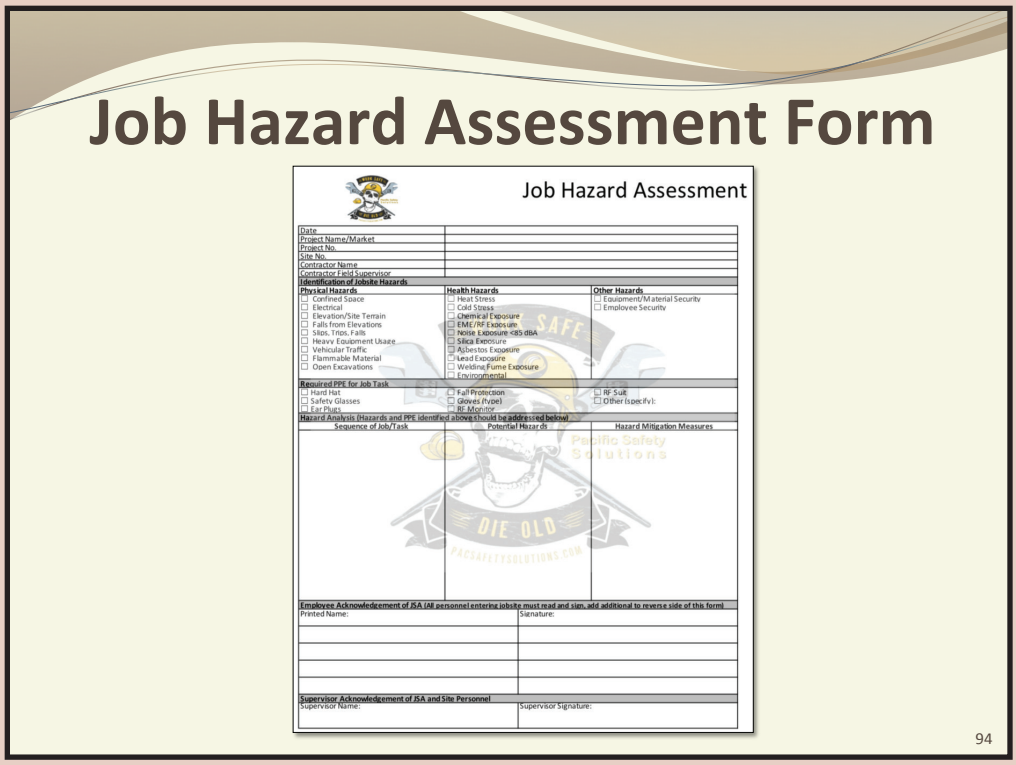


This slide deals with the necessary emergency information required on a telecom job-site. Briefly go over the imbedded emergency data sheet to identify the minimum components of the emergency information.

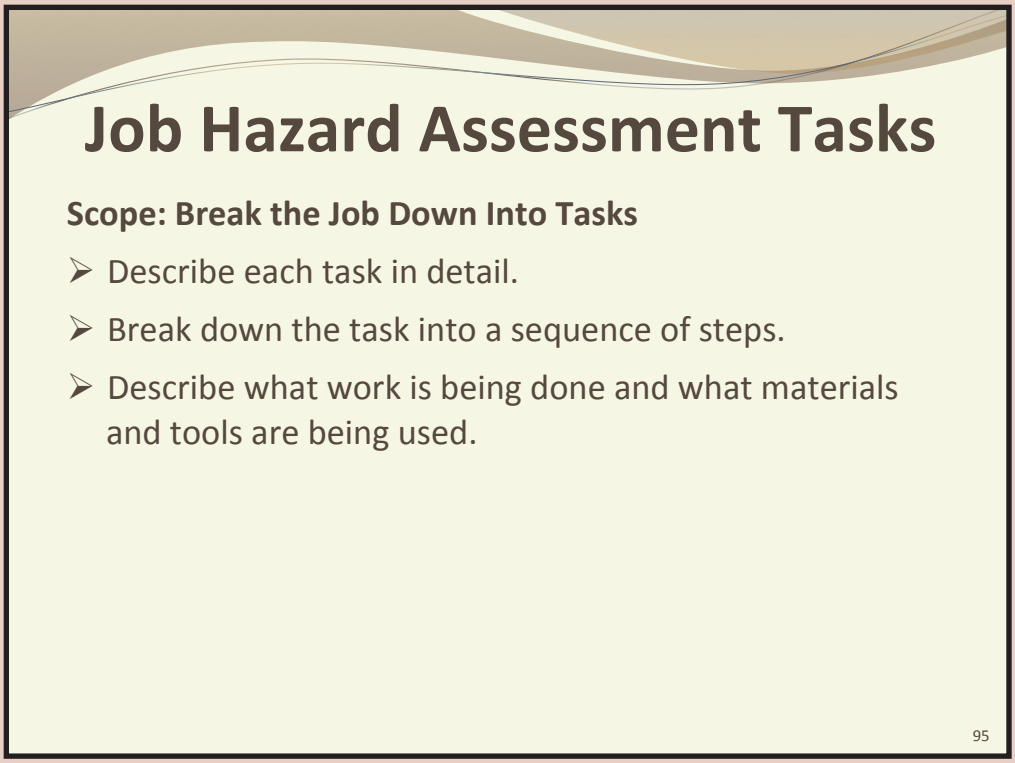
Additionally, discuss the importance for having the emergency information, which includes but is not limited to the following reasons:

1. Crewmembers know who to call in case of an emergency.
2. In the case of an injured crewmember, they know where the closest hospital is or the closest occupational clinic is located.
3. They have the jobsite address or Lat/Long in case they need to coordinate with EMS.

Explain there is an industry tool on Wireless Estimator that can assist in developing an Emergency Action Plan, (EAP) which is essentially the required emergency information for the site.



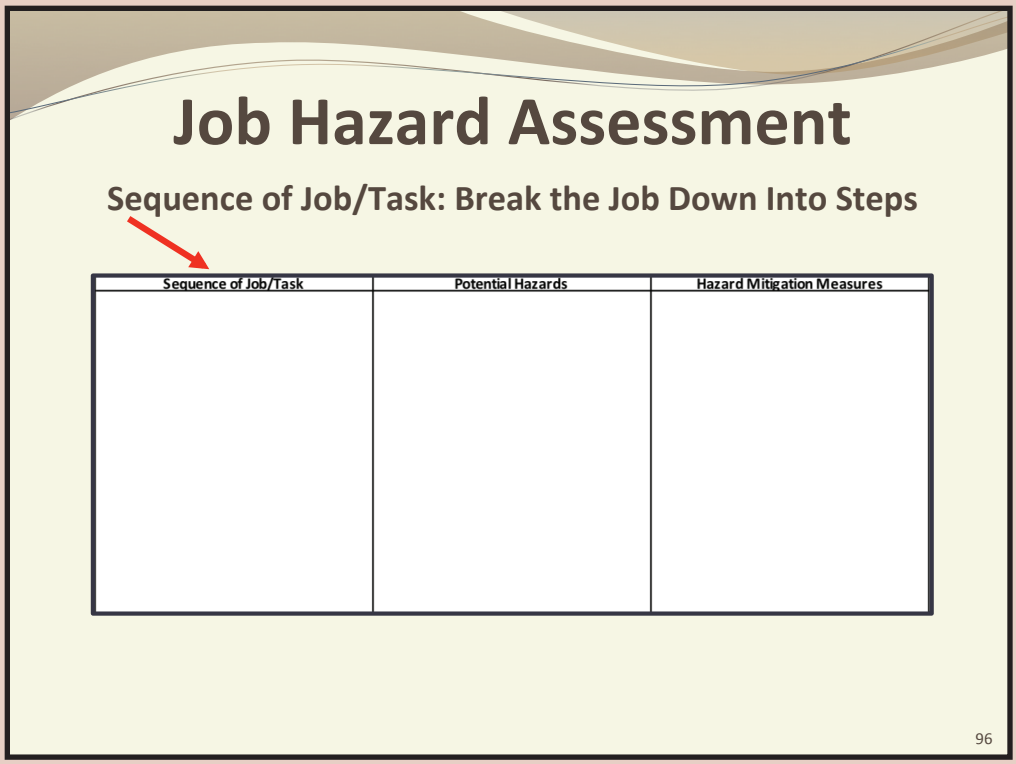
This slide shows what a general job hazard assessment is comprised of. Briefly go over the imbedded job hazard assessment. You already covered the general job hazard assessment earlier so this is just a review. Keep in mind you will be covering this in more detail in the coming slides.



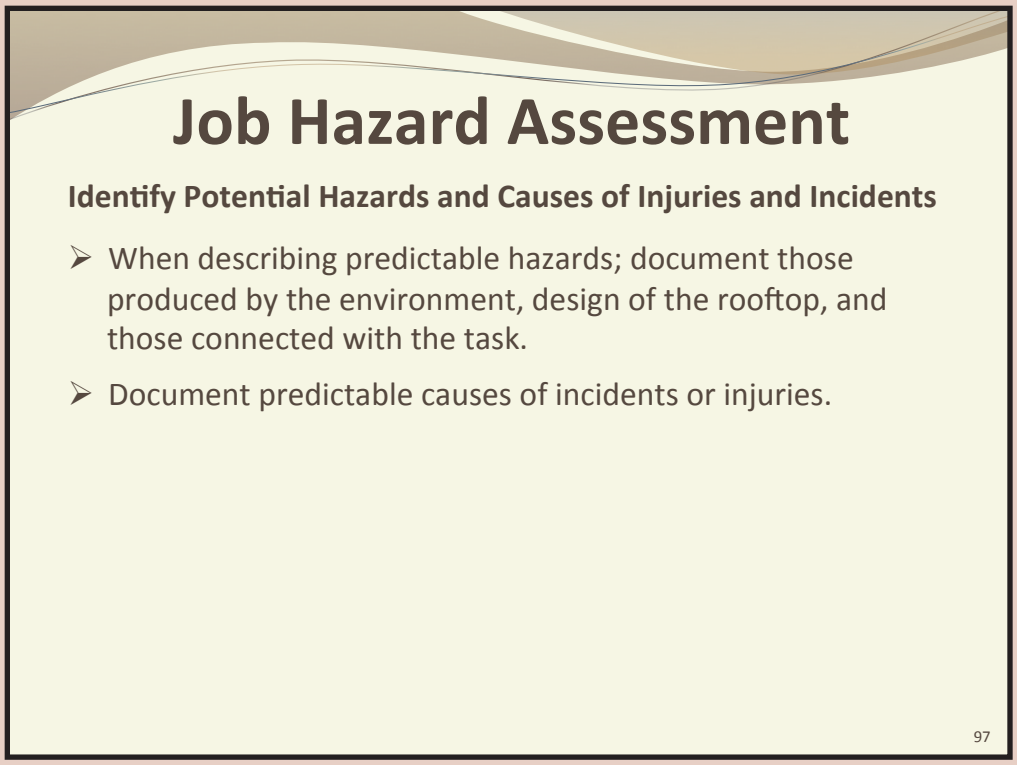
Now we are going to go into detail on conducting the job hazard assessment. This is the first part of assessing the hazards where we break the the scope of work into steps than into tasks.

You already covered this but we need to cover it again.

Break the job down into steps. Each of the steps of a job should accomplish some major task. The task will consist of a set of movements. Look at the first set of movements used to perform a task, and then determine the next logical set of movements. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. How does that break down into job steps? Picking up the box from the conveyor and putting it on a hand truck is one logical set of movements, so it's one job step. Everything related to that one logical set of movements is part of that job step.



Here is where you show the students where to put the sequence of tasks. No need to spend a lot of time on this slide as you are just showing them where it goes. Again, this is a general job hazard assessment.



This slide deals on identifying the hazards associated with each task.

Identify the hazards associated with each task. Examine each step to find and identify hazards, actions, conditions and possibilities, which could lead to an accident.

It's not enough to look at the obvious hazards. It's also important to look at the entire environment and discover every conceivable hazard, which might exist.

Be sure to list health hazards as well, even though the harmful effect may not be immediate. A good example is the harmful effect of inhaling a solvent or chemical dust over a long period of time.

It's important to list ALL hazards. Hazards contribute to accidents, injuries and occupational illnesses.

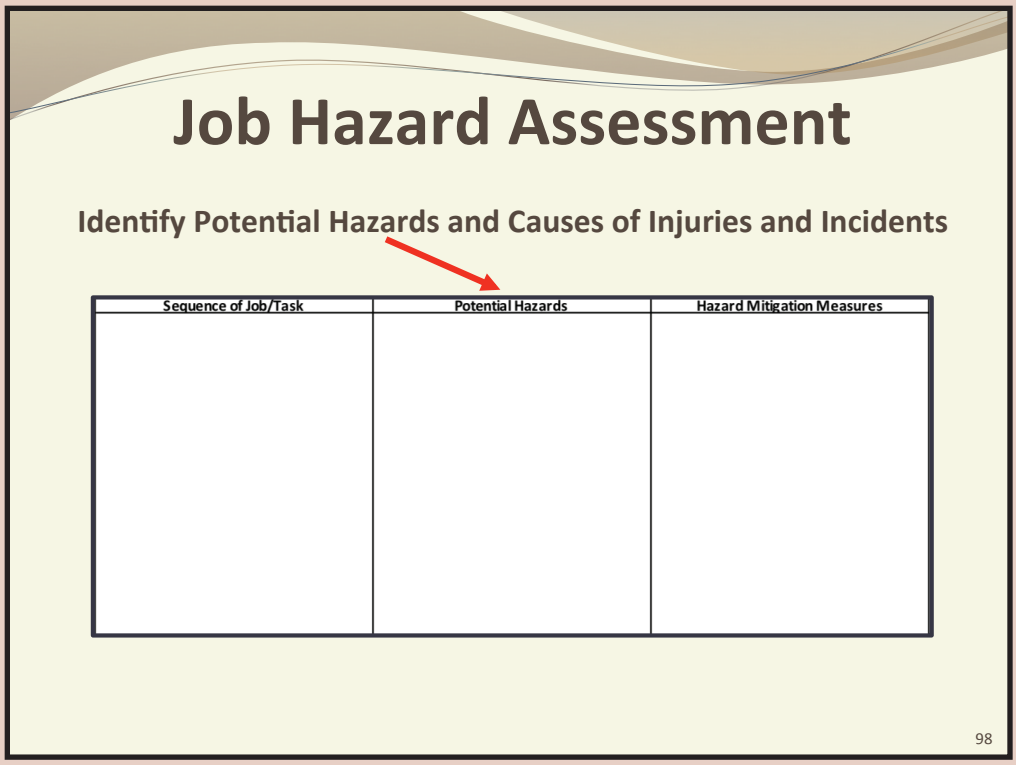
In order to do part 3 of the JHA effectively, you must identify potential and existing hazards. That's why it is important to distinguish between a hazard, an accident and an injury. Each of these terms has a specific meaning.

HAZARD – A potential danger. Working in close proximity to a fall hazard.

ACCIDENT – An unintended happening that may result in injury, loss or damage. Falling through a skylight is an accident.

INJURY – The result of an accident. A broken back from the fall would be an injury.

Some people find it easier to identify possible accidents and illnesses and work back from them to the hazards. If you do that, you can list the accident in parenthesis following the hazard. Be sure you focus on the hazard for developing recommended actions and safe work procedures.



Here is where you show the students where to put the potential hazards. No need to spend a lot of time on this slide as you are just showing them where it goes. Again, this is a general job hazard assessment.

This slide deals on identifying the control measures associated with each task.

Using the first two columns as a guide, (sequence of tasks and potential hazards) decide what actions are necessary to eliminate or minimize the hazards that could lead to an accident, injury or occupational illness.

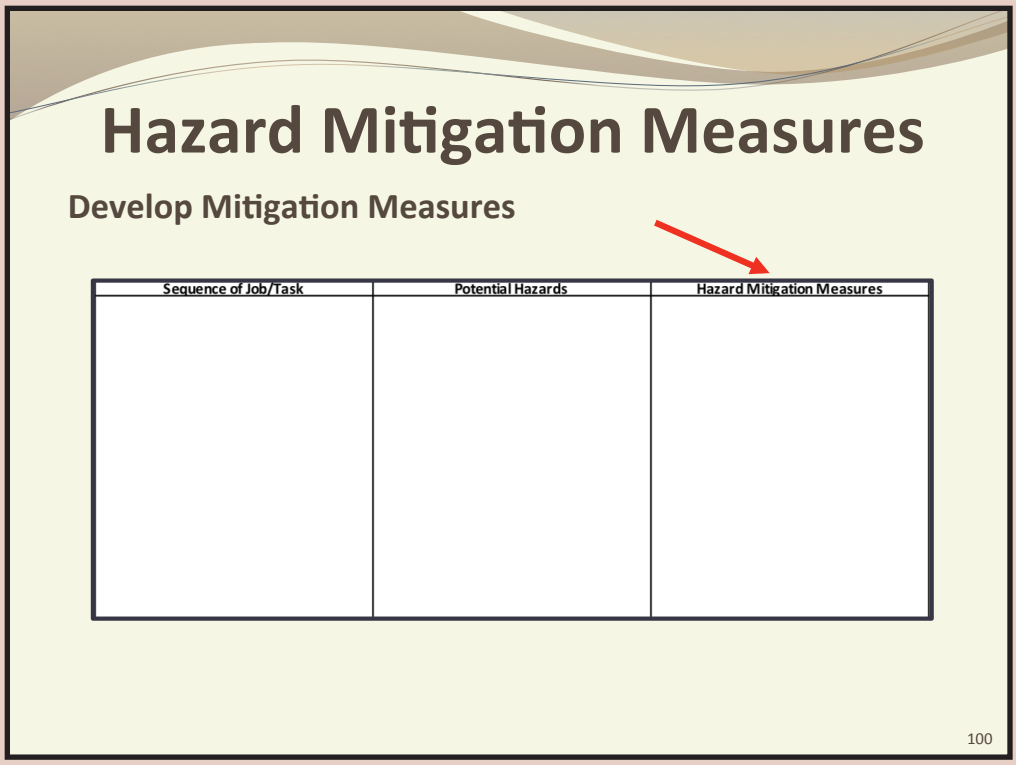
Among the actions that can be taken are: 1) engineering the hazard out.
2) Job instruction training. 3) Good housekeeping. 4) Provide personal protective equipment.

List recommended safe operating procedures on the form, and also list required or recommended personal protective equipment for each step of the job.

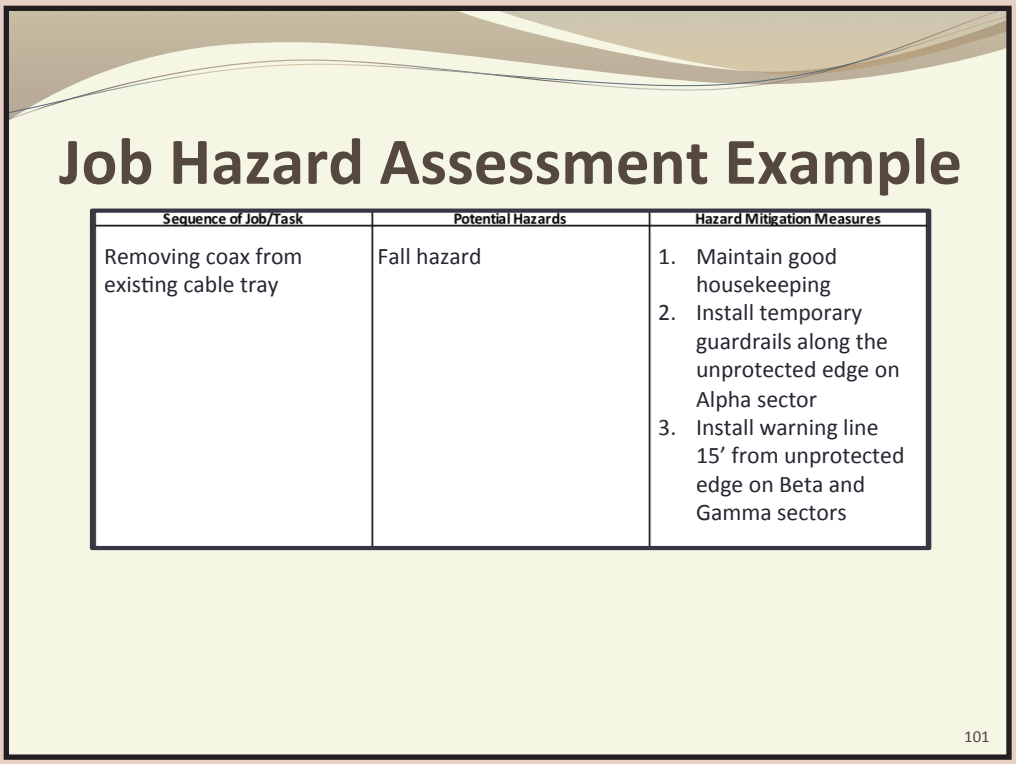
Be specific. Say **EXACTLY** what needs to be done to correct the hazard, such as, “lift, using your leg muscles.” Avoid general statements like, “be careful.”

Give a recommended action or procedure for every hazard.

If the hazard is a serious one, it should be corrected immediately. The JHA should then be changed to reflect the new conditions.

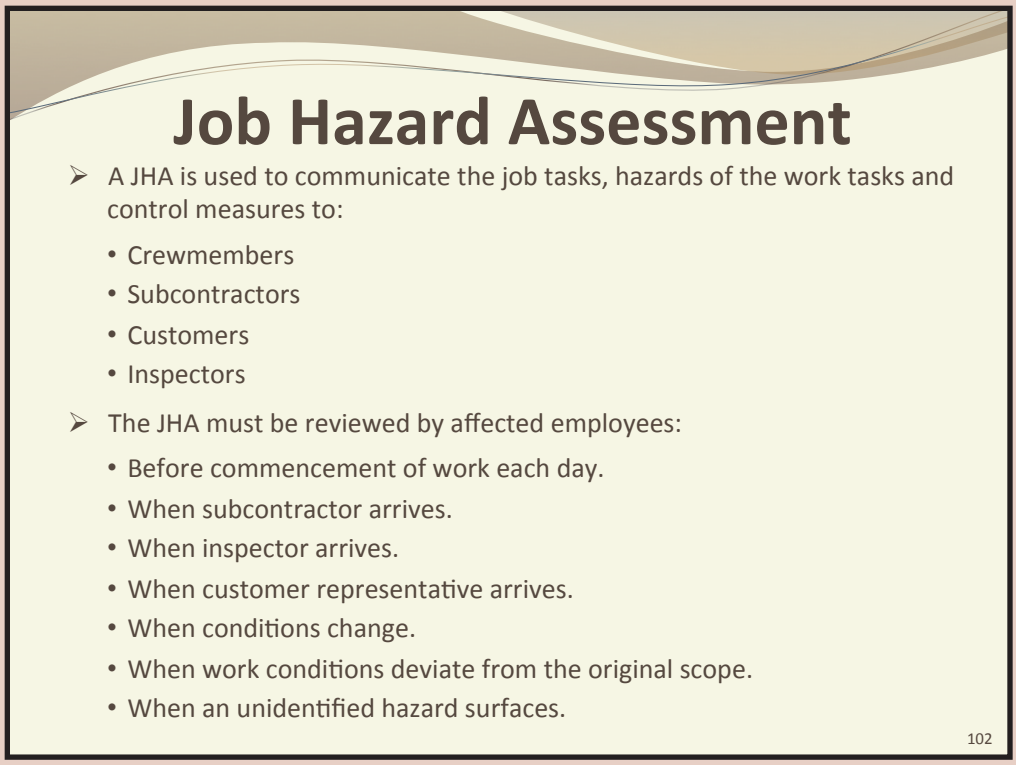


Here is where you show the students where to put the control measures. No need to spend a lot of time on this slide as you are just showing them where it goes. Again, this is a general job hazard assessment.



This slide shows an example on how a basic task for removing coax from cable tray is broken down to identify the task, the potential hazards, and the control measures. When developing the JHA it is imperative to be specific and detailed. What you don't want is to be vague. For example, using this task for removing coax from cable tray, you would not want to say the potential hazard is falling and the control measure is to be careful. That does nothing. The JHA is a tool to be used in order to prevent incidents from occurring. It is imperative to be detailed on the tasks, the potential hazards and most importantly the control measures.

As you move left to right, (Sequence of Task, Potential Hazards, and Hazard Mitigation Measures) you should be adding more into each box just like on this slide. You want to make sure the mitigation/control measures are detailed.



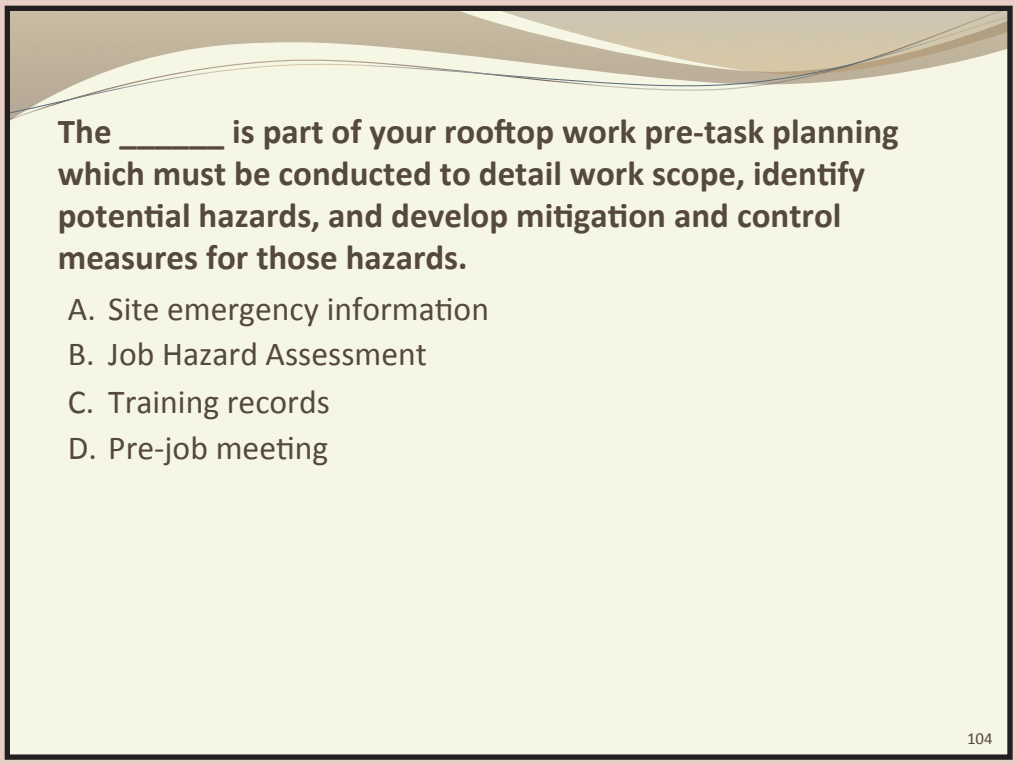
This slide shows what the purpose of a job hazard assessment is for, who is to review it and when it needs to be reviewed.

Here is where you will summarize the JHA. This is where you state the JHA is to be used as a tool in order to identify hazards associated with tasks and to put control measures in place to prevent injury and illness to all affected parties on site. The JHA is to be reviewed by all affected parties prior to them working. If the unidentified hazard surfaces it's the role of the competent person to identify that, communicate the unidentified hazard to affected parties and document it on the JHA.

Section 6

Review Questions

103



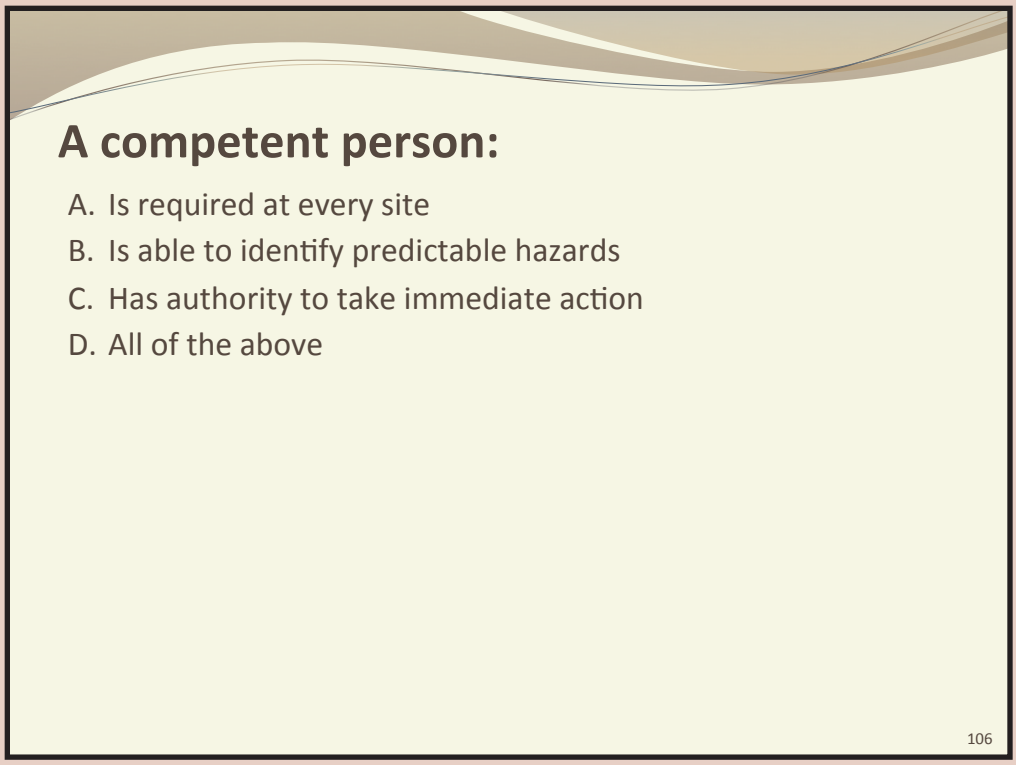
Answer: B (Job Hazard Assessment)

Pre-task planning prior to work on a rooftop is designed to _____ rooftop hazards.

A. Decrease in the severity of
B. Enhance awareness of
C. Eliminate all
D. Reduce PPE needed for

105

Answer: B (Enhance awareness of)



Answer: D (All of the above)

Section 7

Radio Frequency (RF) Hazards and Mitigation

107

Five Basic Components of Wireless Site Compliance

- Access Management
- "RF" Awareness Training
- Hazard Identification
- Site Policies for Worker Safety
- RF Mitigation Measures

108

Physical Hazard

Because **RF (Radio Frequency)** energy is recognized as a ***Physical hazard***, you must consider both the worker's and the public's exposure when planning operations at communications sites, or for that matter, any location where RF energy may be present.

(Some states list it in their Hazcom standards)

109

Why are we here today?

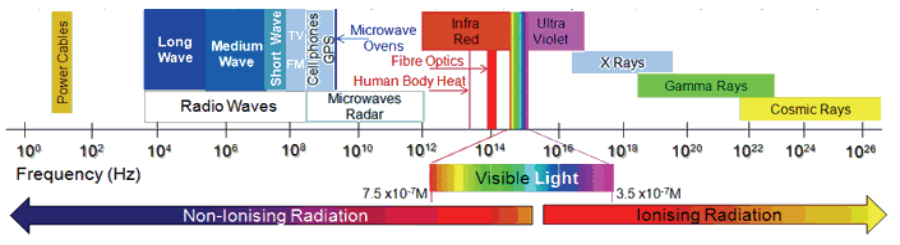
OSHA 1910.1020 (c)(13)

"Toxic substance or harmful physical agent" means any chemical substance, biological agent, or physical stress (noise, heat, cold, vibration, repetitive motion, ionizing, and non-ionizing radiation).

110

What is Non-Ionizing Radiation?

Non-ionizing radiation is described as a series of energy waves composed of oscillating electric and magnetic fields traveling at the speed of light.



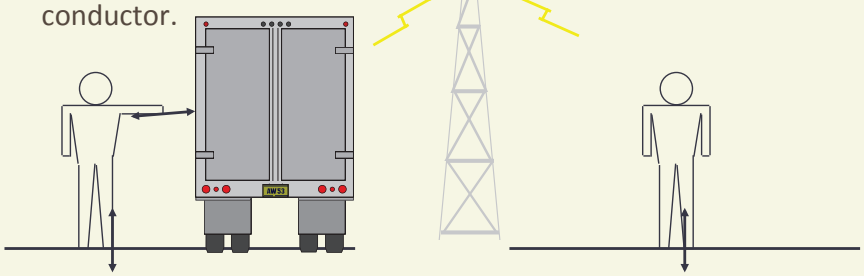
111

Induced and Contact Currents

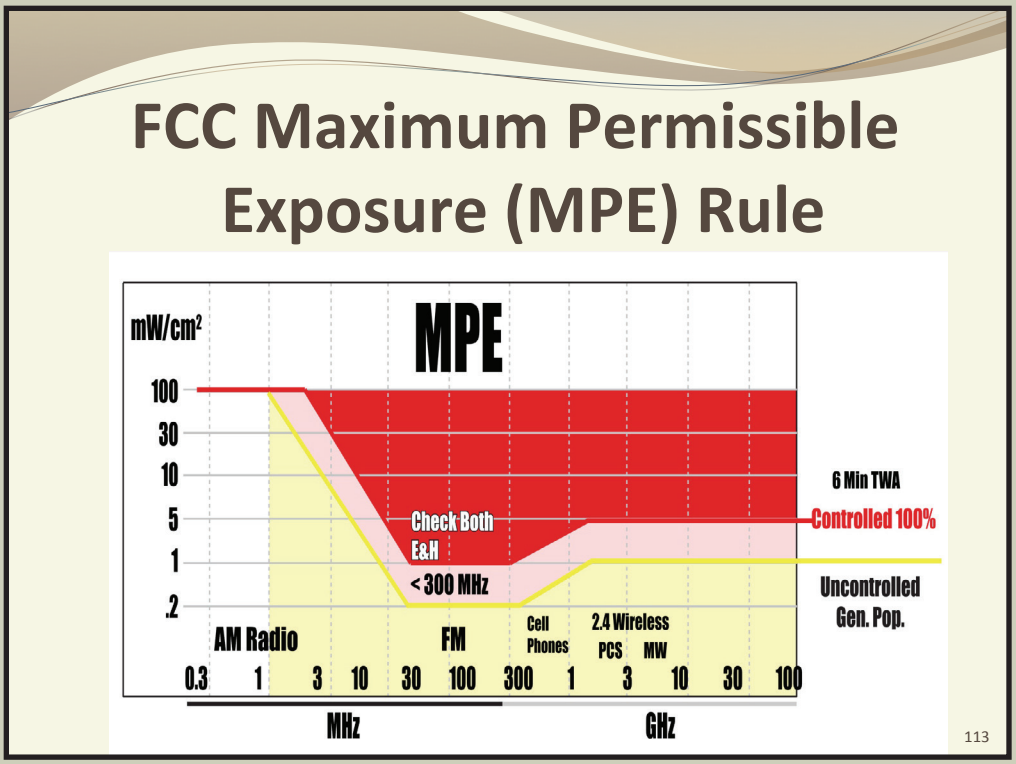
Two Scenarios:

- RF induces voltage in ungrounded conductor.
- Person acts as current path to ground by touching charged conductor.

- RF induces voltage flow in person.
- Current flows to ground.

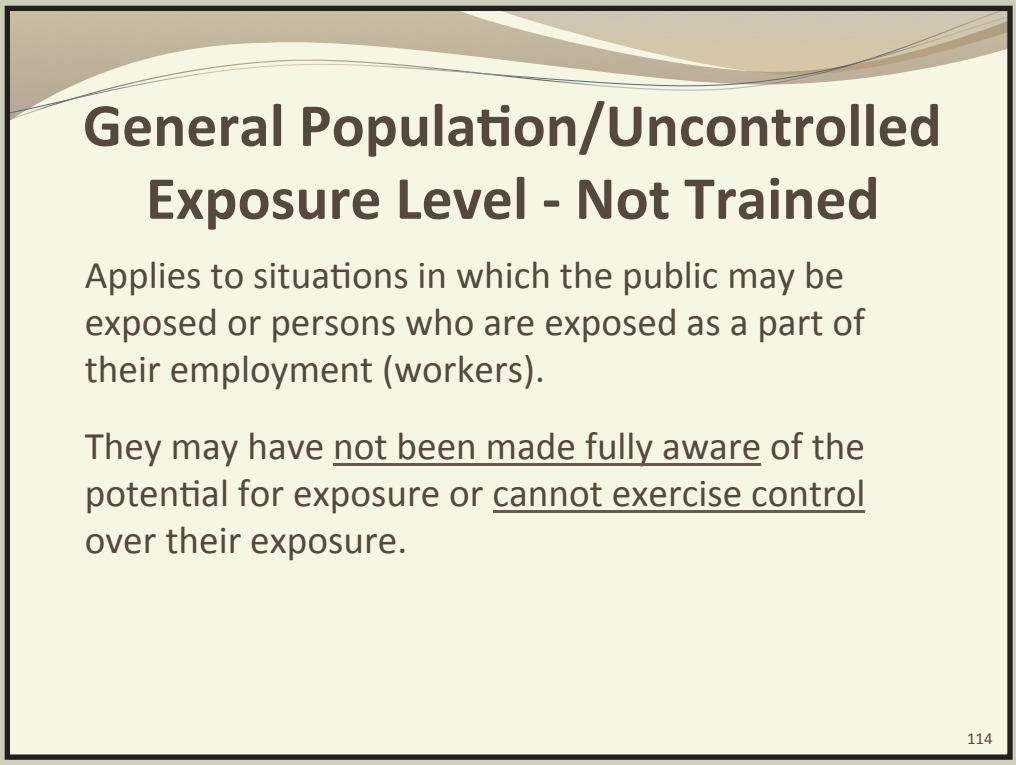


112



You will see this chart often. What you need to know is there are two levels: Controlled/occupation and uncontrolled/general population. We will go into these further in this class. The 30-300 MHZ frequency is the most stringent as this frequency wave more closely resembles the height of a human so absorption is easier/faster.

All you need to know is what % of standard you are exposed to. Since you are trained you can now be exposed to 100% of the standard and work in that area all day. If you were not trained you could only be exposed to 20% of the controlled standard or the yellow line.



This includes workers. If the worker is not trained and provided with the ability to ensure, they are not being overexposed.

Controlled Exposure

Controlled Environments: locations where there is exposure that may be incurred by persons who are made **"fully aware"** of the potential for exposure **and can exercise control** over their exposure.

115

This means the trained worker can now work all day in the area between the yellow and red lines as shown on the FCC MPE chart.

Antenna Identification

- Antenna identification is a critical part of assessing RF hazards.
- Different antennas radiate varying frequencies and power levels.
- High power broadcast antennas for FM radio and TV are often the most dangerous.
  - These antennas operate at frequencies that will heat body tissue and they operate at very high levels of power.

116

Course are available on Antenna ID. You **MUST** know what you are encountering in order to stay safe.

117

Radiation Risks

Non-Ionizing Radiation

RF energy that only causes vibrations or oscillations of the atoms which result in **heat** but do not strip electrons from atoms.

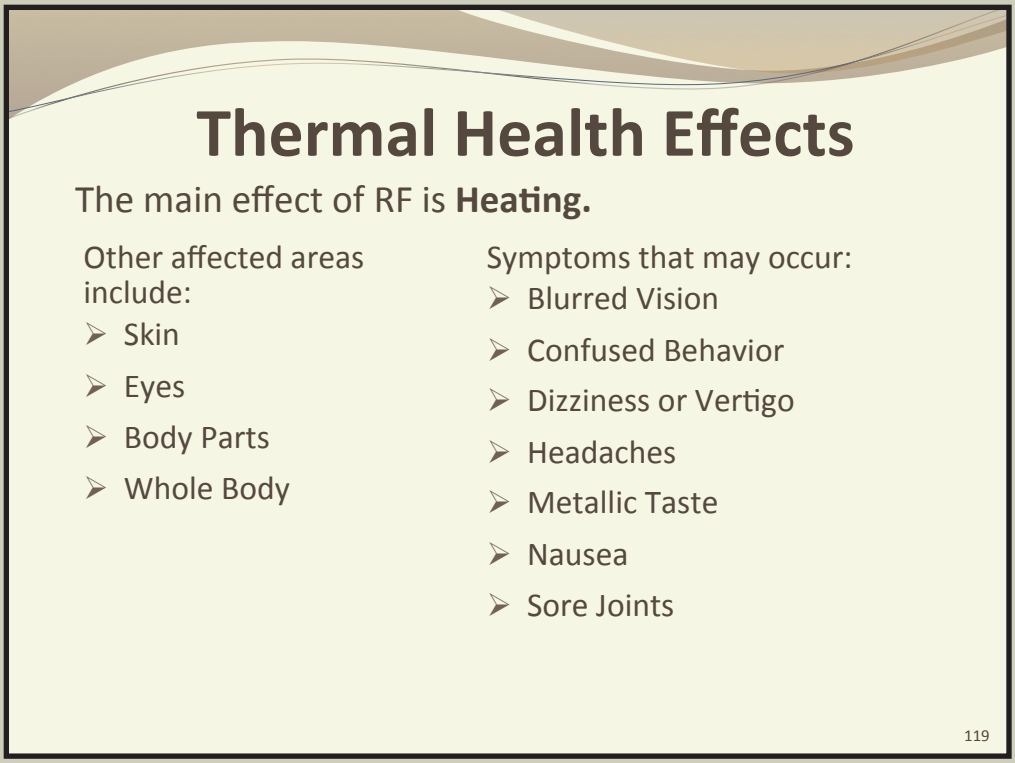
Ionizing Radiation

Which is much higher in **frequency** and with energy to cause electrons to be stripped from atoms "ionizing" the atom and changing its characteristics.

The person's tissue is no longer as it was.

118

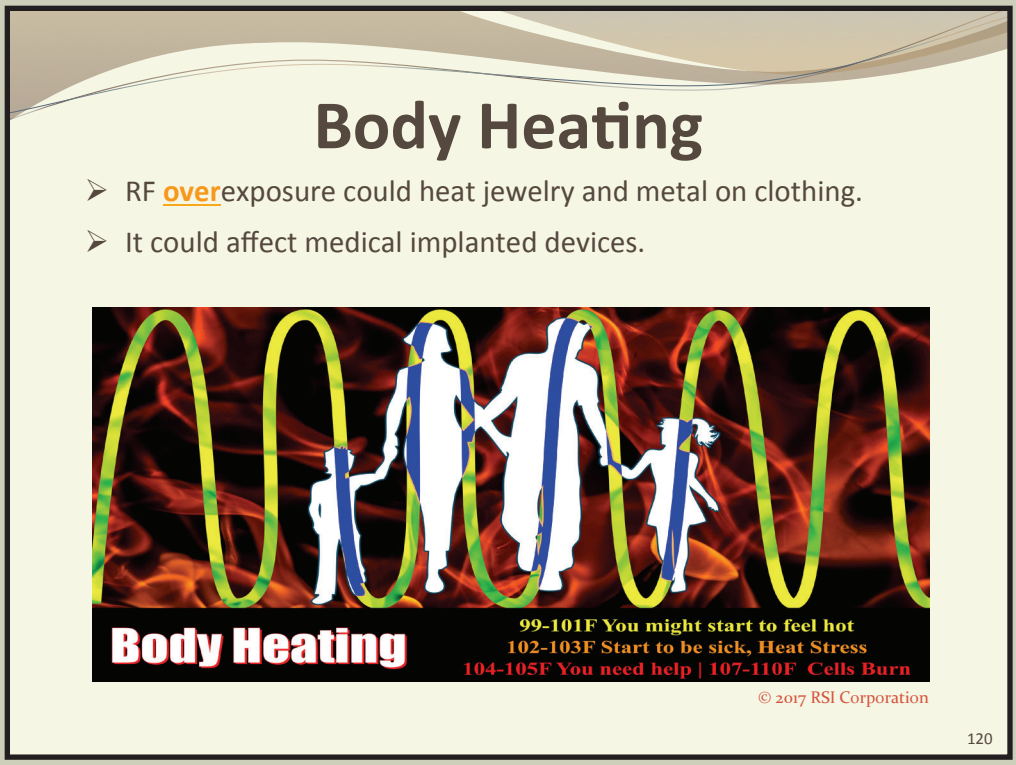
Have students rapidly rub hands together. Get full class participation. Then have them STOP: Are your hands warm? This is what RF does: heats.



Body parts: eyes, ears, male reproductive organs, knees. Usually in microwave and due to water content as these have high water content and low blood flow and blood flow is what our body uses to cool us down. These are also external organs so there's no shielding.

Also symptoms of the flu or cold or running a fever. Our body can't tell us why we are heating up our body just knows it happening so we need to sit down and rehydrate.

Electronic medical devices RF can interfere with them.



A tower tech was telling us a story about his tattoo turning into a brand. He was climbing the tower and his tattoo began to itch. Then it got red and finally it started to blister. Evidently it had iron in the dye and on a hot RF site it was heating the iron. The black outline blistered and he now has a tattoo with a scar in the area of the outline.

Electromagnetic Energy Exposure (EME)

EME exposure is **non-accumulative,** if exposure is kept below the body heating damage range and the 6 minute time limit.

This means EME exposure does not build up in the body the way ionizing radiation can.

Depending on frequency, the ability of RF energy to heat varies greatly. Even in the cases of severe exposure to high energy levels, if the individual **removes him or herself** from the RF environment, the human body which is an excellent "radiator" **will cool itself** through biological processes in a short period of time.

121

I have seen 3000% on a meter, but I also didn't stay there very long. I felt no ill effects.

RF Hot Spots

When working at a site, attention should be given to the possibility that conductive objects may distort RF fields in their vicinity even though they are not actively energized by a transmitter and may produce RF hot spots exceeding the MPE's and may have possible high current.

Many sources of RF fields may exist in the form of **metallic structures** found near active RF sources that can **reflect and scatter fields** into areas not anticipated.

122

Induced Current

Has a strong potential to induce electrical current in nearby conductive or metal objects.

NOTE: The tower could also be a mile or more from your site.

Crane is close to an AM tower, when they lowered the hook and it got to a certain point the trolley took off, goes to the end of the boom and hits the e-stop. The operator does not know what was wrong but found the trolley contacts welded closed. They fix them and start up again, lower the hook, the trolley takes off and goes to the end of the boom.

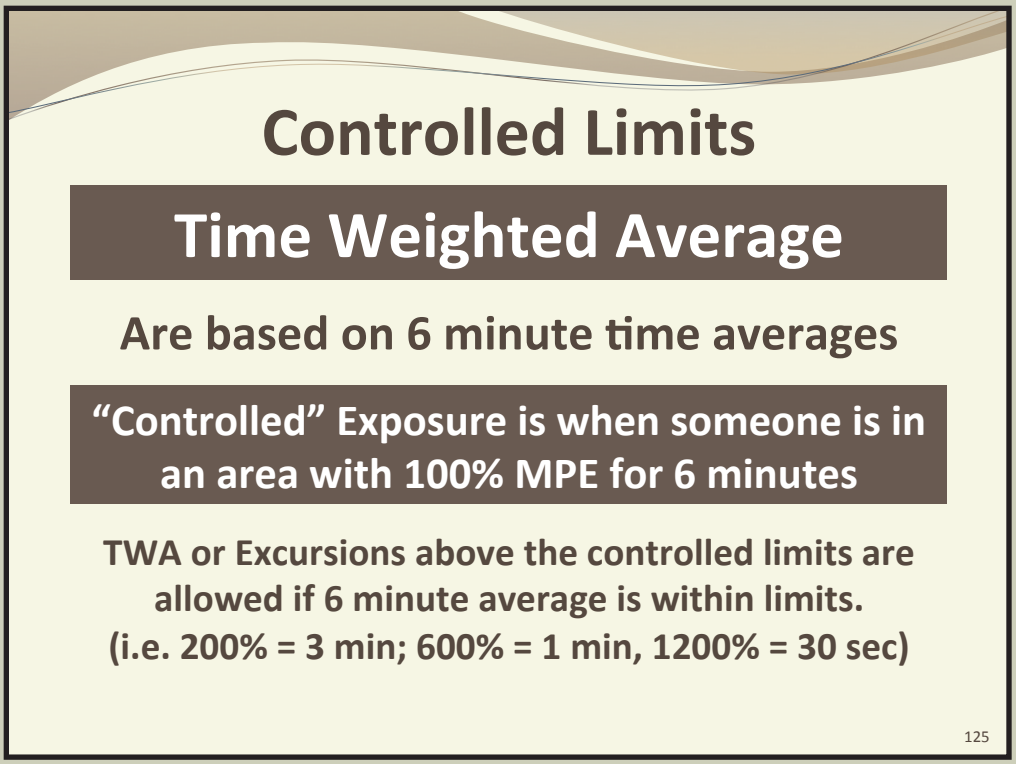
When the cables get to a point they resonate with the AM station the crane has an induced current strong enough to weld the contacts together. The crane actually becomes a passive repeater.

124

The crane is close to an AM tower, when they lower the hook and it gets to a certain point the trolley takes off, goes to the end of the boom and hits the e-stop. They don't know what is wrong but they find the trolley contacts welded closed. They fix them and start up again, lower the hook, the trolley takes of and goes to the end of the boom.

The issue is that when the cables get to a point they resonate with the AM station the crane has an induced current strong enough to weld the contacts together. The crane actually becomes a passive repeater.

CFR 1926.1501a15vii any conductive (metal) object in close proximity of a high power RF field can exhibit the potential for a strong shock or burn. You must do testing in order to verify that there is not a build up of current that could pose a shock or burn hazard. Close proximity is within 3 KM is 1.8 miles.



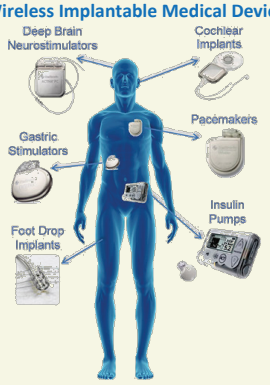
Best practices are if you are in an area and the monitor goes off at 100% and there is another alert about the 100% (for example the 200%) then you can be in that area for the time allowed based on the next level of the alert which is not showing. For example your monitor goes off at 100%. You have a monitor that goes up to 200%; however, the 200% is NOT alerting. You can be in that area for 3 MINUTES. Because we don't know if the level is 100 or 199%. If the monitor tells us specific RF levels and the specific level was 100% you could be there for 6 minutes. At 200% you can only be there for 3 minutes. With a monitor that goes from 100 to 200% you are only allowed to stay in the area for 3 minutes as we don't know what the exact or specific level is. Does this make sense?

FCC allows for working but OSHA doesn't. OSHA allows for pass through but NOT for working. Must reduce power to under controlled limits if work needs to be done.

You might see people working in an area that is above the controlled standards. This is accepted. However, a higher level of training is required and PPM data must be saved and kept in employee medical records.

Cardiac Pacemakers, Defibrillators, and Drug Delivery Systems

Wireless Implantable Medical Devices



These can exhibit **improper** operation when subjected to RF fields. Devices and systems that are used external to the body can be substantially more susceptible to interference.

For personnel who use electronic medical devices or systems and may need access to areas near RF sources, a request for an evaluation of the potential interference can be referred to the manufacturer for the manufacturer's own evaluation and guidance on electromagnetic compatibility (EMC).

This may require contact with the device manufacturer and/or appropriate regulatory authorities and an evaluation of the RF fields where the subject employee may need access.

It is important to note that device interference may occur at RF field strengths that are substantially less than human exposure limits.

126

Radio Frequency Safety Plan (RFSP) Controls

- Engineering
  - Shielding, site configuration, barriers
- Administrative
  - Signs, floor markings, work practices, lockout/tagout, time averaging, personal monitors
- PPE
  - Gloves, protective clothing
- Training
  - General awareness, limits, controls, medical devices, over-exposures, electro-explosives, ancillary hazards

127

PPE for RF Safety

- RF Suits
- Electrically rated hard hats
- High Voltage Gear
  - Arc-Flash
  - HV gloves
  - Hot Sticks/Grounding
  - Flame retardant clothing
  - Eye protection

128

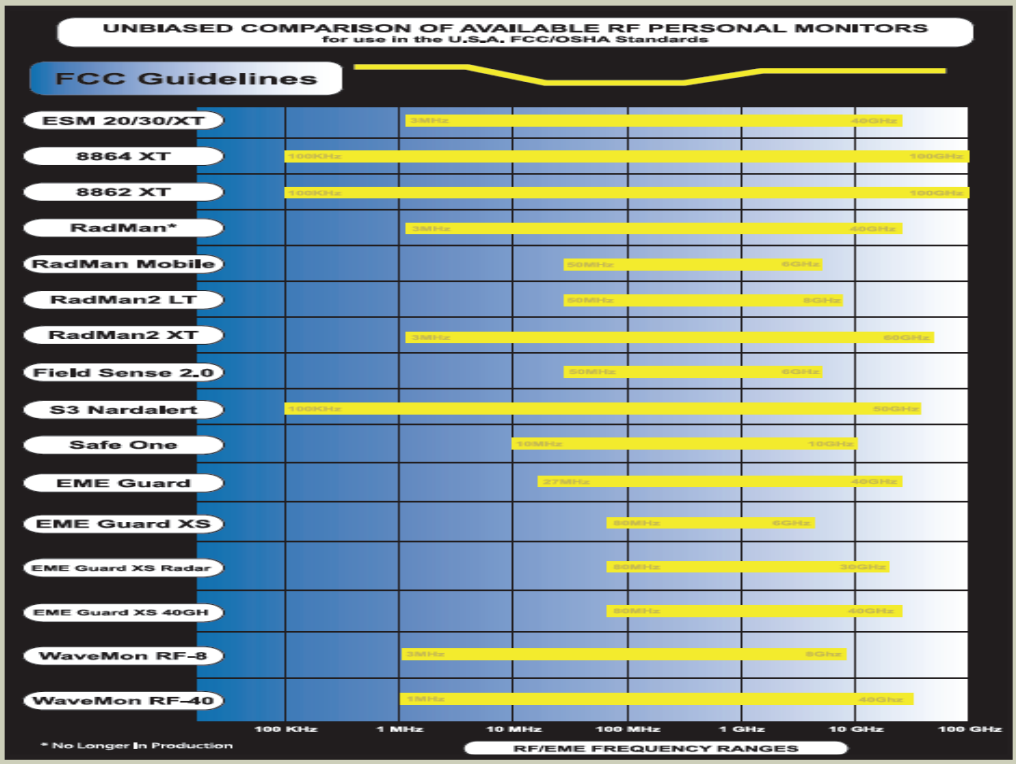
Personal Protection Monitors (PPM)

- Provide Personal Monitoring for areas where RF may be present. (PPM's)
- **Many** are narrow in bandwidth (with limited frequency response) and not fully isotropic (may not be accurate in near field).

129

You must choose a monitor with a wide frequency range to ensure you are covering all possible frequencies present at telecomm sites today. Without ensuring you have coverage you are providing a false sense of security for workers. Employees must also be trained on the monitor before using them and must be deemed competent and qualified to use it.

PPM doesn't protect you, it alerts you and you use your training to know that you move a few feet either way it will likely stop alerting because you are out of the hotter area. Training is key.



There are a variety of PPM available today. The company must decide which is appropriate for their usage. They then must provide to employees and train on usage.

Personal Protection Monitors

- Personal monitors can be useful tools.
- Care must be used in selecting a monitor that is **appropriate for the range of potential frequencies** of the exposure fields and which responds appropriately to the RF field.
- In addition, training on appropriate use of personal monitors and their limitations (such as **frequency response and detection angles**) is important if monitors are to be used effectively.

131

A best management practice (BMP) is that the RF Personal Protective Monitor (PPM) has precedence above all other things like signage and barriers as remember things change on telecom sites. It's critical to read the instruction manual on how to properly use the PPM. They should we worn on the front of the body, not in your back pocket, as your body is shielding the RF from the monitor is in the back pocket.

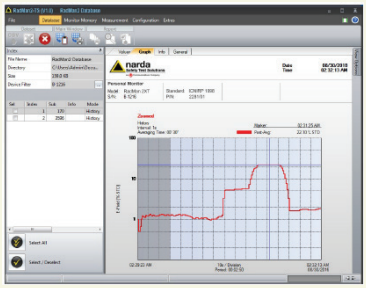
Calibration

Your group must make sure that the RF personal monitors have regular calibration as per the manufacturer requirements.

132

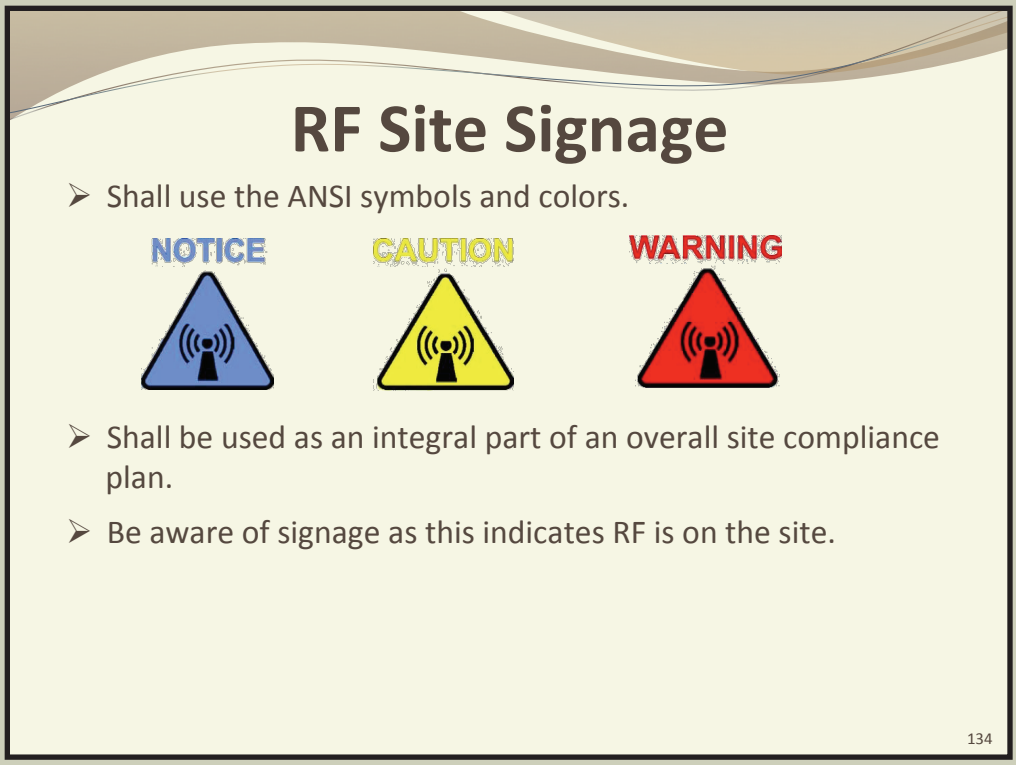
Documentation/Record Keeping

Personal Protection Monitor (PPM) exposure **data must be retained and put in the employees records** anytime an employee is in an area over the controlled standard.



All records should be filed and stored in a manner required by applicable national, federal, state, and/or local regulations and organization policies.

133



Requirements

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FEDERAL_REGISTER&p_id=23993

Blue: Under 20% of the controlled standard (under the uncontrolled standard).

Yellow: Between 20-99% of the controlled standard (the area between the yellow and red lines as shown in the MPE chart).

Red: Above the controlled standard.

We often see doors such as this with every color of sign. Obviously someone posted the signs incorrectly. There are two primary guidelines for signage posting currently used. It's critical to know that signage could represent two different levels of MPE depending upon the companies policy that is posting the signage.

The other posting policy which is used by many major carriers.

Blue: Between 20-99% of the controlled standard (the area between the yellow and red lines as shown in the MPE chart).

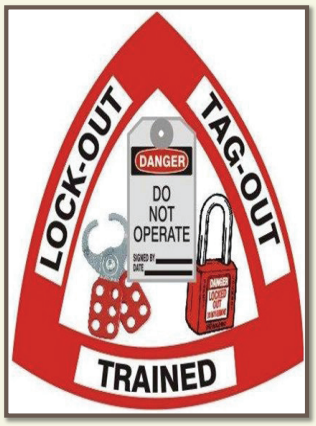
Yellow: Above the controlled standard up to ten times the occupational standard.

Red: At 10X of the occupational limits.

So the key with signage is you don't know what they are really representing. Therefore, use your monitor, understand what the alerts mean, and what to do when they alert.

Power Down

- Calibrated personal RF monitors can be valuable tools for ascertaining relevant transmitter status.
- Control of power will also require the use of Lock Out, Tag Out (LOTO) procedures.



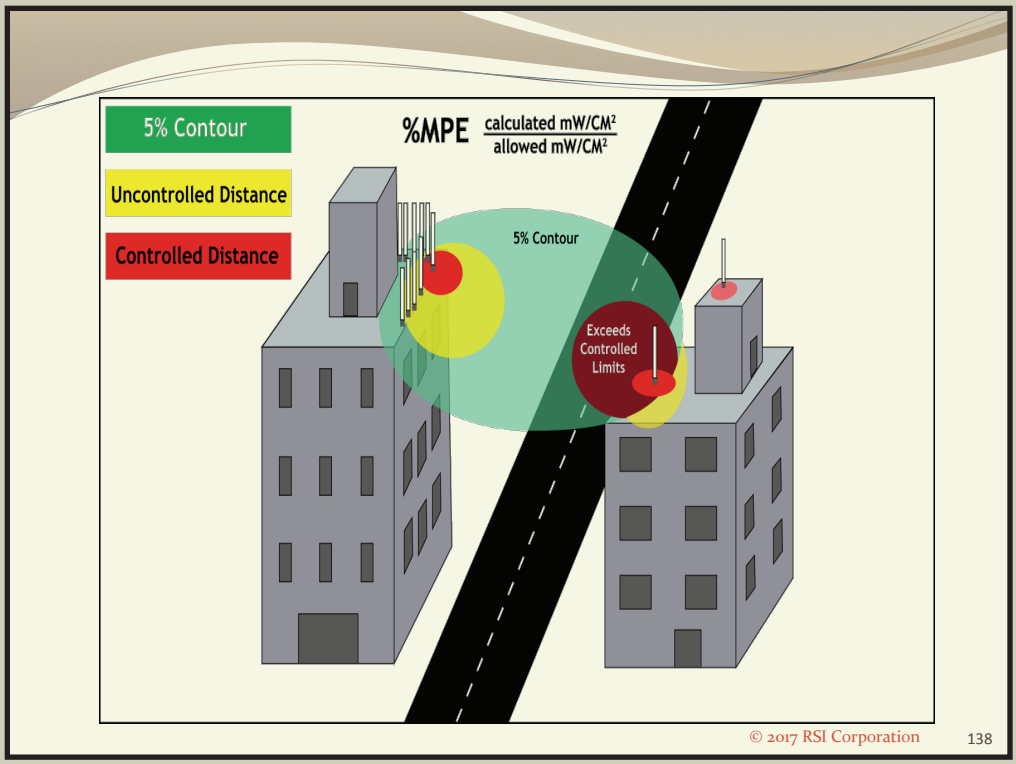
136

Power Down Administrative Controls

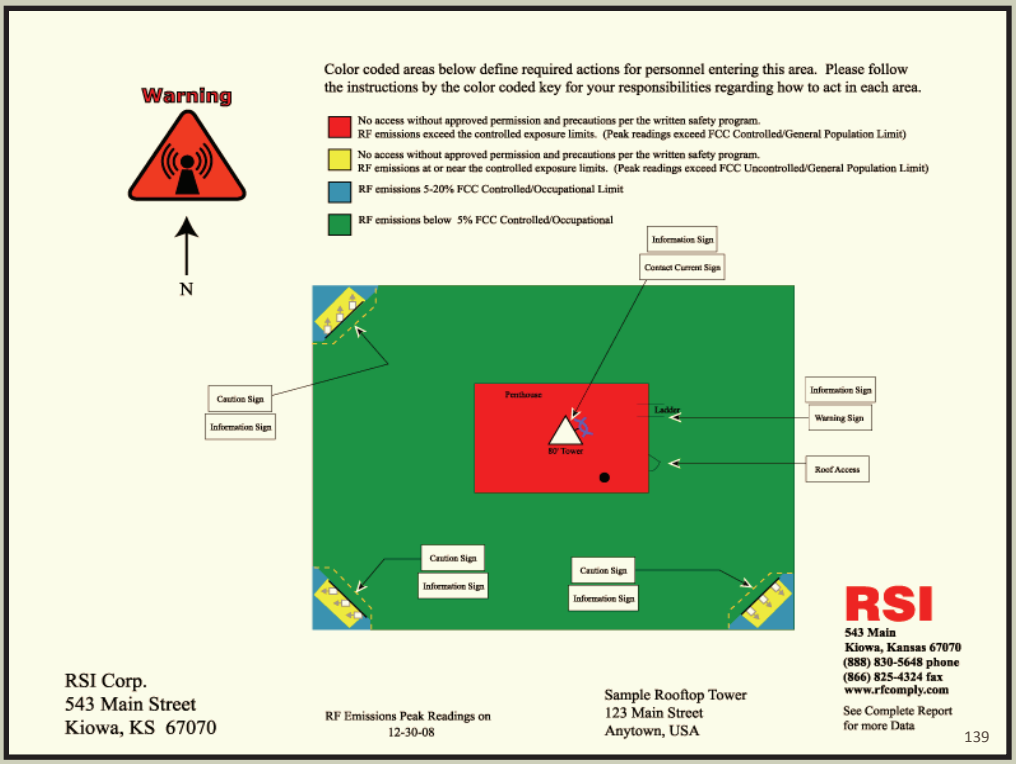
Are a crucial aspect of such power reduction schemes; however, **ensuring that the power reduction has, in fact, taken place** prior to personnel entering critical areas and that the **power reduction is maintained** until personnel have left the area.

137

Use of PPM



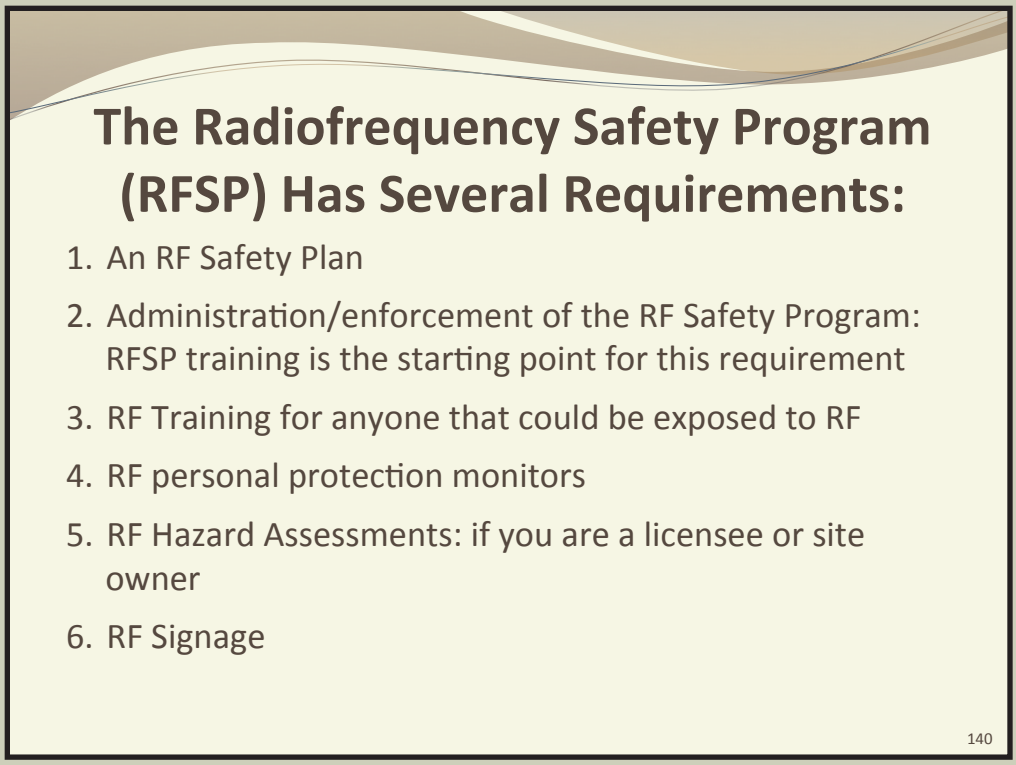
It's important to understand that other buildings and transmitters can affect the RF environment of the roof you are working on. In this photo it's showing that the roofs across the street are contributing to the RF levels of each other. This is important as if the transmitter is a 5% contributor they must ensure the rooftop is in compliance with RF MPE guidelines. As a result of the 5% contour line shown in this photo. Both transmitter owners on the lower level of the rooftop are responsible to ensure the other rooftop is in compliance. Does this actually occur, not usually. Typically they send out letters asking for compliance.



This is a color coded rooftop map. It was formulated by having a trained professional take real world reading on the roof. These readings were then put into the correlating colors on the map. It can be used as a tool to work safely and plan your work on a rooftop.

As you can see most of the roof is below 5% of the occupational levels. The blue area is 5-20% of the occupational level. This is still below the General Pollution level. The area directly in front of the transmitters on the main level is yellow. Yellow is 20-99% of the controlled standard. Or between the yellow and red line on the MPE chart. So on the entire main roof, a person that is trained, made fully aware and can exercise control over their exposure through usage of PPM and/or LOTO can work on that rooftop all day long according to these readings. Now remember, rooftop environments change, so one would always listen to their PPM as it's taking real time readings. By having the hazard assessment, workers can plan their activities on the roof. Assessments are not always available but asking for them can prove useful.

The red area is the area above the occupational limits. This is where TWA or LOTO/ power down would need to occur. In this case the red area is on a penthouse which is accessible by a ladder. So a ladder lock could control this area so untrained workers to not access. However, if you need to access the transmitters on the 80 foot tower on the penthouse, you would know some sort of control would probably be necessary to preform your work safely and be in compliance with MPE guidelines.



In conclusion, in order to be in compliance with OSHA and safely work on a rooftop with a transmitter you must have the above.

1) The first step is a RF safety plan: A RF safety plan is a plan that outlines the safety measures and procedures implemented in a workplace. It is also designed in accordance with the legislative requirements covering the roles and responsibilities of the staff, the emergency action plan, and so forth.

2) Someone within the company must have the ability to administer and enforce the RF program. This person should be qualified and would be accomplished through extensive training or real world experience, would be consider the Radiofrequency Safety Officer (RFSO).

3) Training is the most critical aspect of any health and safety program.

4) PPM is needed to control exposure. To make sure LOTO or power down has occurred and continues. Remember, monitors are just a tool and you must be sure you have a monitor with the appropriate frequency range.

5) This is the color coded map. Transmitter owners, building managers, and site owners may order the hazard assessment but workers should ask for this data as previously discussed it can be useful.

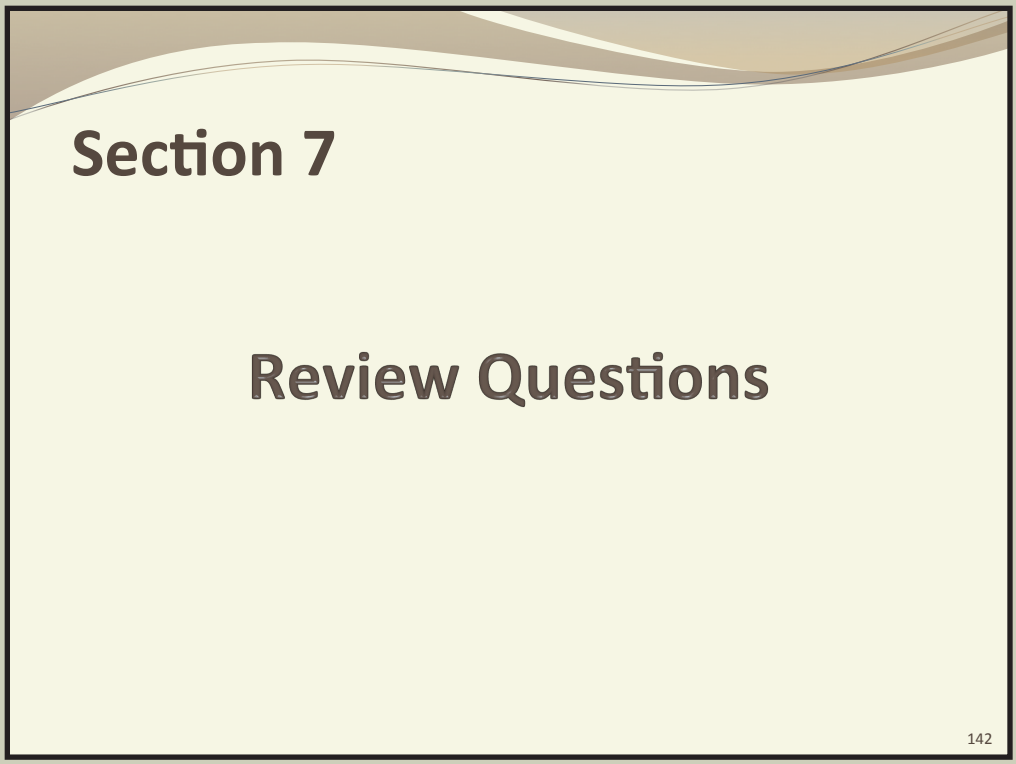
6) RF signage should be placed in the appropriate location but remember there are several policies for signage posting and they conflict with one another. So always listen to your PPM.

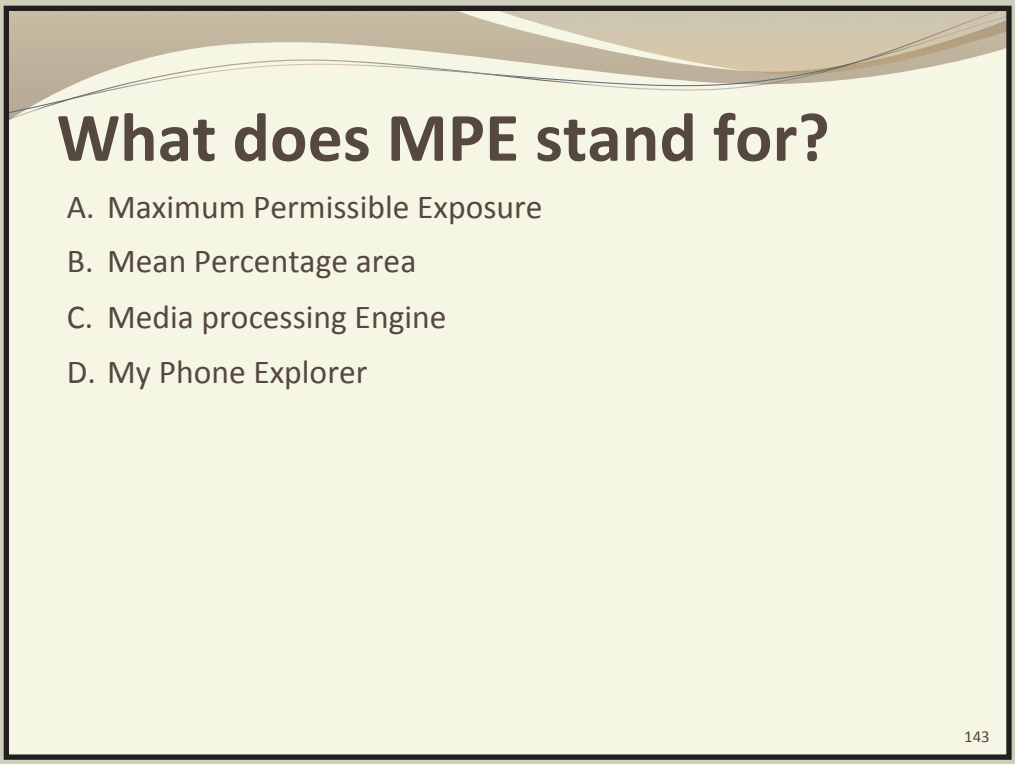
RF Mitigation Measures

- Elevate antennas
- Reduce power
- Relocate antennas
- Increase distance between antennas
- Install semi-permanent or permanent barriers

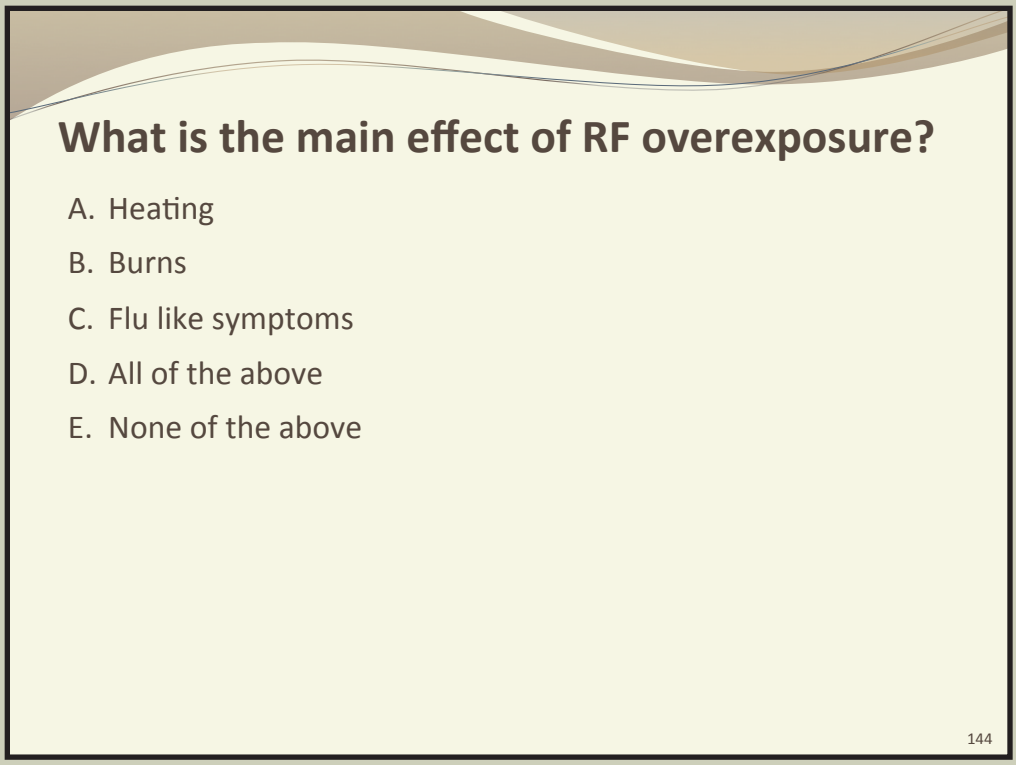
141

There are a number of ways to mitigate RF exposure. Engineering options such as elevating antennas, reducing power, relocating antennas, or increasing distance between antennas all can be done both pre and post build. This ensures the RF levels are within acceptable MPE limits. Administrative mitigation such as barriers and signage are also an option. Each rooftop is unique and mitigation should be done as necessary to ensure the safety of workers and the general public.

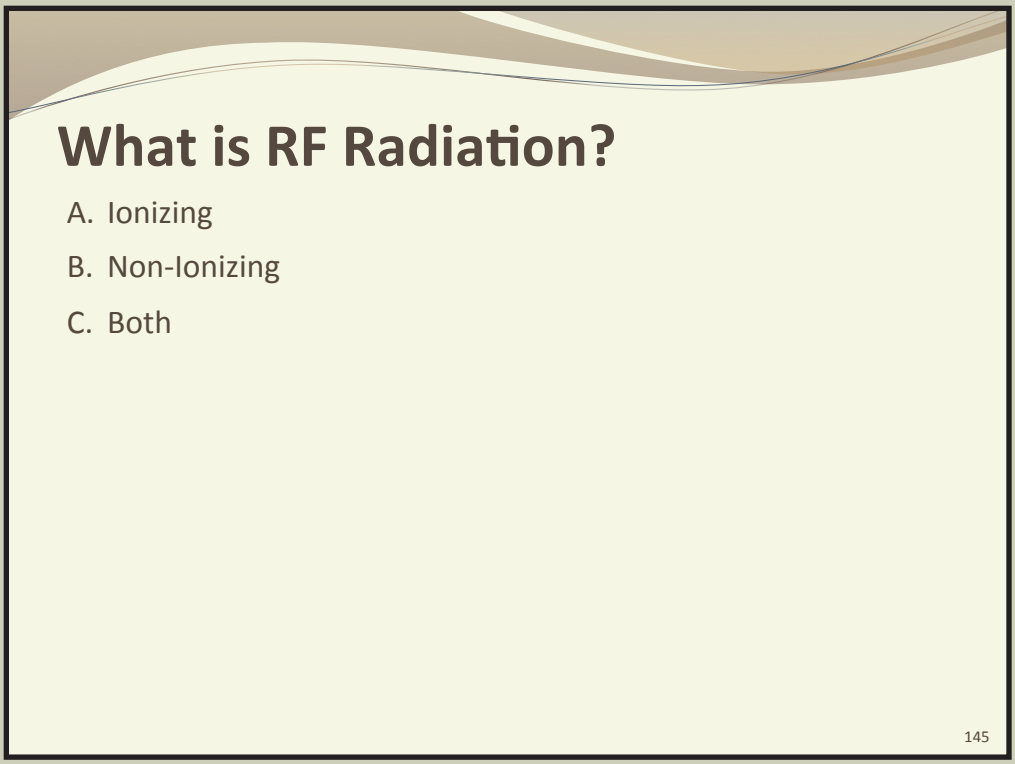

Section 7
Review Questions
142



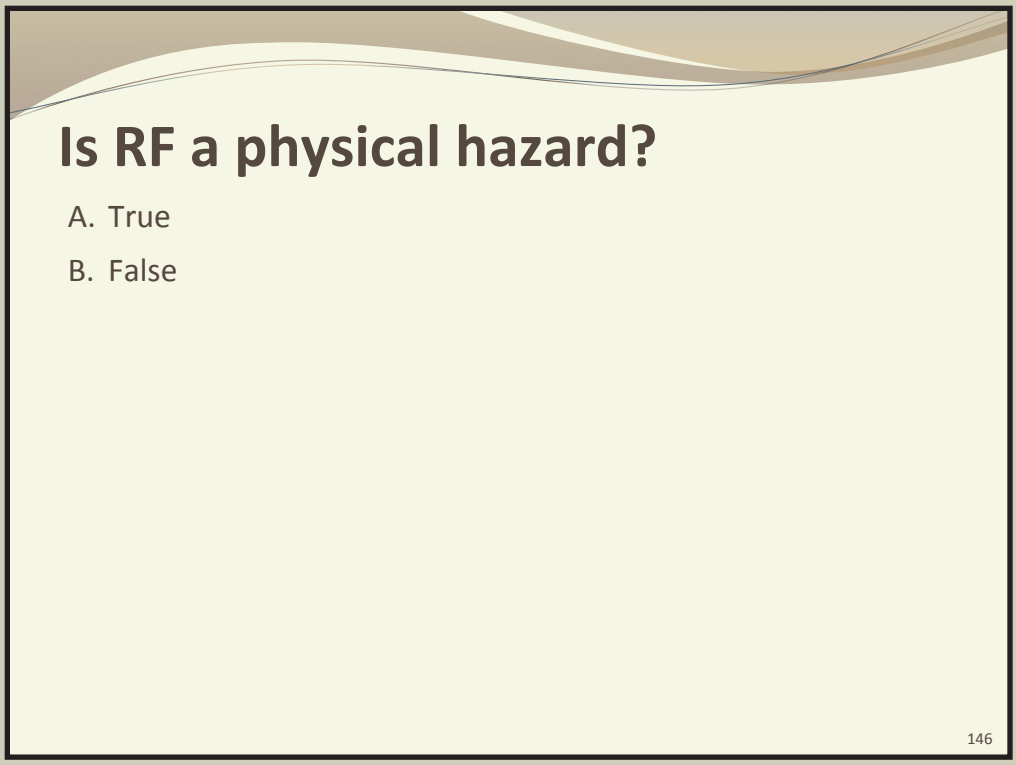
Answer: A (Maximum Permissible Exposure)



Answer: D (All of the above)



Answer: B (Non-Ionizing)

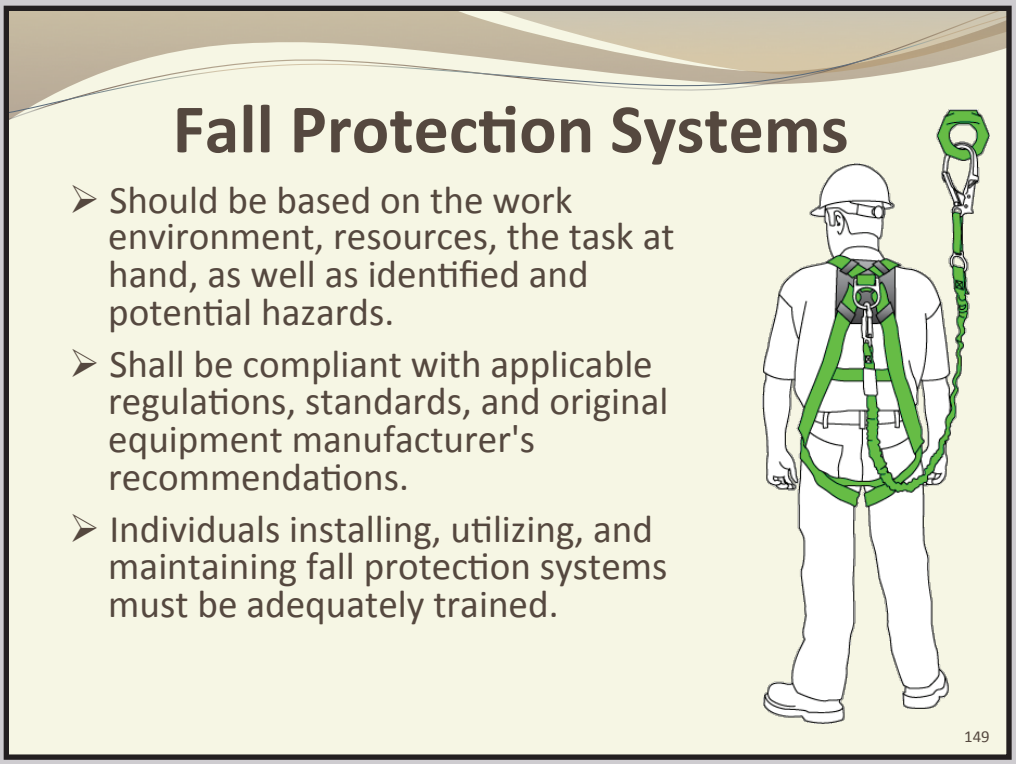


Answer: A (True)


Does an alarm by the RF personal monitor always have priority over posted signage?
A. Yes
B. No
C. Only on a rooftop site
D. Only on macro cell sites
147

Answer: A (Yes)


Section 8
Fall Protection
148



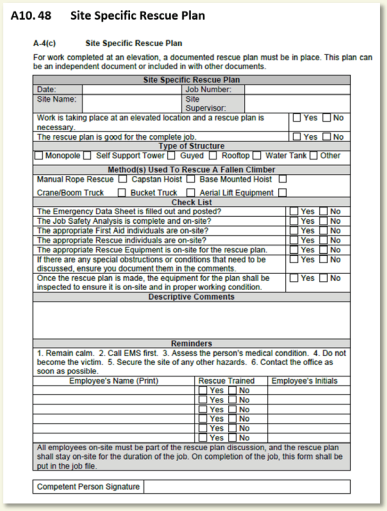
When addressing the need for fall protection looking at the hazards and the exposure to those hazards will dictate the need for fall protection.

A fall from any height where the possibility of injury is predictable then a fall protection system and written procedure for working with and/or around the hazard is required.

Before any employee uses a personal fall prevention or arrest system on a project, the employer is legally required to develop written procedures for rescuing someone whose fall has been arrested.

Site Specific

- A site-specific fall protection and rescue plan shall be written by a qualified person, documented, and adhered to.
- If any changes are made while on site, those changes must be documented on the appropriate plan.



A10. 48 Site Specific Rescue Plan

A-4(c) Site Specific Rescue Plan

For work completed at an elevation, a documented rescue plan must be in place. This plan can be an independent document or included in with other documents.

Site Specific Rescue Plan			
Date:		Job Number:	
Site Name:		Site Supervisor:	
Work is taking place at an elevated location and a rescue plan is necessary.			☐ Yes ☐ No
The rescue plan is good for the complete job.			☐ Yes ☐ No
Type of Structure			
☐ Monopole ☐ Self Support Tower ☐ Guyed ☐ Rooftop ☐ Water Tank ☐ Other			
Method(s) Used To Rescue A Fallen Climber			
Manual Rope Rescue ☐ Capstan Hoist ☐ Base Mounted Hoist ☐ Crane/Boom Truck ☐ Bucket Truck ☐ Aerial Lift Equipment ☐			
Check List			
The Emergency Data Sheet is filled out and posted?			☐ Yes ☐ No
The Job Safety Analysis is complete and on-site?			☐ Yes ☐ No
The appropriate First Aid individuals are on-site?			☐ Yes ☐ No
The appropriate Rescue individuals are on-site?			☐ Yes ☐ No
The appropriate Rescue Equipment is on-site for the rescue plan.			☐ Yes ☐ No
If there are any special obstructions or conditions that need to be discussed, ensure you document them in the comments.			☐ Yes ☐ No
Once the rescue plan is made, the equipment for the plan shall be inspected to ensure it is on-site and in proper working condition.			☐ Yes ☐ No
Descriptive Comments			
Reminders			
1. Remain calm. 2. Call EMS first. 3. Assess the person's medical condition. 4. Do not become the victim. 5. Secure the site of any other hazards. 6. Contact the office as soon as possible.			
Employee's Name (Print)		Rescue Trained	Employee's Initials
		☐ Yes ☐ No	
		☐ Yes ☐ No	
		☐ Yes ☐ No	
		☐ Yes ☐ No	
		☐ Yes ☐ No	
		☐ Yes ☐ No	
All employees on-site must be part of the rescue plan discussion, and the rescue plan shall stay on-site for the duration of the job. On completion of the job, this form shall be put in the job file.			
Competent Person Signature			

150

Company policy on working at heights rescues should be a documented component within the company IIPP.

This document is intended to provide guidance for developing site-specific working at heights rescue plans.

The fall protection plans should outline the policy and procedures involved in assembling/dismantling, using, and care for “at height fall protection systems, equipment (ladders temporary guardrails, etc.).

The plans must be specific to each site where workers are at heights.

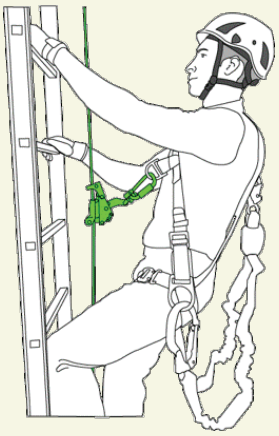
Address the emergency requirements necessary in the event of an incident.

The three main parts of work and rescue at height planning are:
1 Training.
2 Creating the work and emergency plan.
3 Outlining all access and rescue procedures.

The rescue plan component itself should address:
- Roof top access and work area specifics;
- Method of rescue;
- Emergency contact information;
- Job hazard assessment;
- First aid individuals on site; and
- Rescue individuals on site.

Individual Identification

Individuals following a site-specific fall protection and rescue plan shall be identified as such:



- **Authorized Person:**
  - Demonstrates physical capabilities to perform tasks at height
  - Can identify hazards
  - Can inspect equipment
  - **Must** be supervised by a competent person
  - Should an individual be climbing a structure, authorized climber designation must be **required**.

151

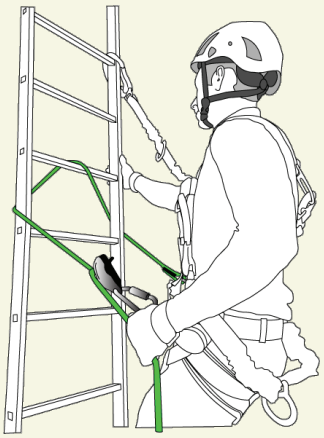
Individual Identification

- **Competent Person:**
  - Ensure fall protection plan and rescue plans are followed and reviewed with personnel on site.
  - Equipment is compliant and fit for purpose and inspected prior to each use.
  - Ensure supervision responsibilities are fulfilled.
  - Should an individual be climbing a structure, competent climber designation must be **required**.

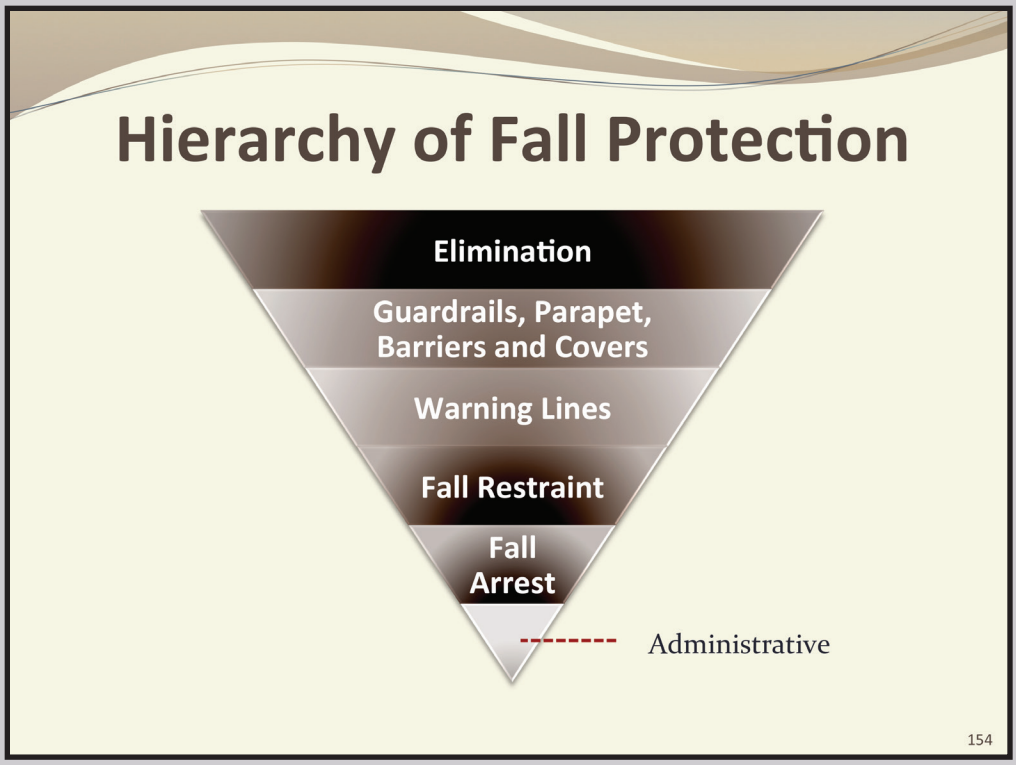
152

Individual Identification

- **Qualified Person:**
  - An individual who possesses a recognized degree, certificate, or through outstanding professional experience, can demonstrate the ability to solve or resolve problems relating to the subject matter, the work, or the project.



153

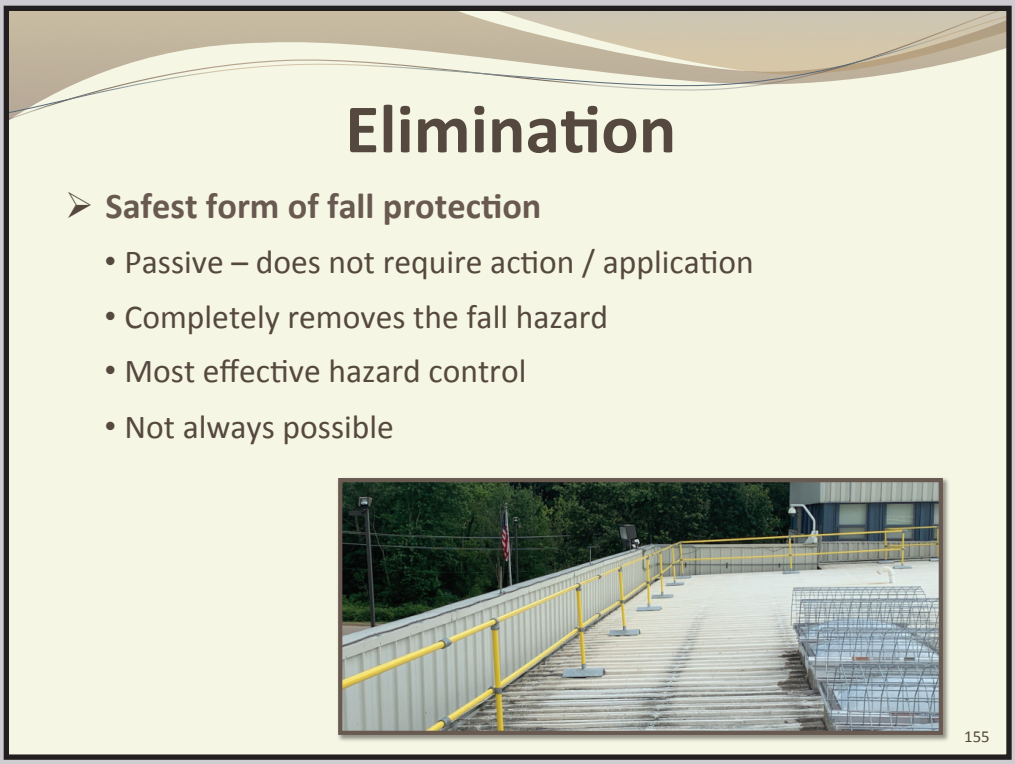


The Hierarchy of Fall Protection:
- Eliminate – Preferred solution
- Passive – Best non-elimination solution
- Fall Restraint – Best active system solution
- Fall Arrest – Post fall solution (high risk)
- Administrative – Limited application (Least Preferred)

The Hierarchy is a general rule as certain passive solutions still present the risk of a fall and certain active solutions eliminate the risk.

Administrative solutions within fall protection are very different to the administrative solutions within hazard mitigation. Hazard mitigation deals with change of work procedures to conform dangers like high heat or RF radiation. Administrative solutions for fall protection offer no means of fall protection outside of heightened awareness.

Under the hierarchical controls of fall protection “fall arrest systems” should be avoided as much as possible (especially when working alone).



The first step look to passive solutions:
- Can the work be relocated to a place where a fall hazard does not exist?
- Can a guardrail system be used?
- Can floor or roof openings be covered?

When does fall protection apply?
Employers are to provide for each employee exposed a height of
- 6 ft. for Construction
- 4 ft. General Industry

Guardrails and Parapet

- **Guardrails**
  - Top rails: 42 inches plus or minus 3 inches.
  - Mid-rails: Height midway.
  - Guardrail systems must be capable of withstanding a force of at least 200 pounds.
  - When guardrail systems are used at hoisting areas, a chain, gate, or removable guardrail section must be placed across the access opening between guardrail sections during those times when hoisting operations are not taking place.
- **Parapet**
  - Minimum height requirement: 39 inches.

156

Barriers and Covers

- **Barriers and Covers**
  - Covers shall be strong enough to hold twice the intended force that will be applied.
  - Secured when installed.
  - Color coded or marked “hole” or “cover.”
  - Reference 1926.501(i).

157

1926.502(i)
“Covers.” Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

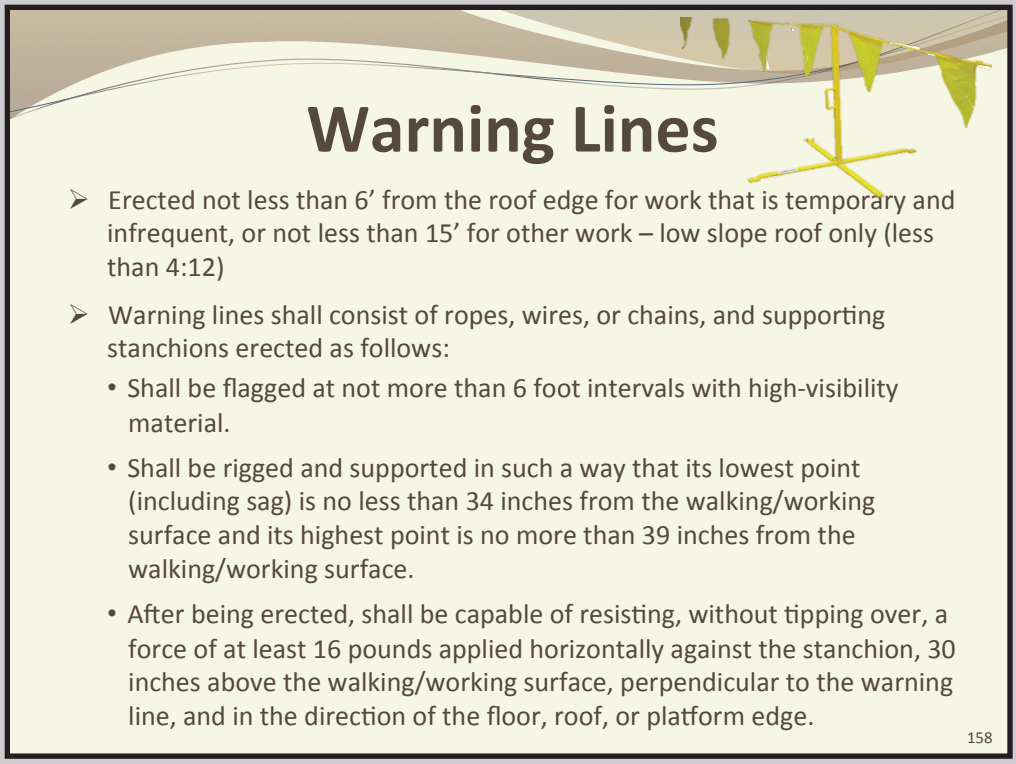
1926.502(i)(1)
Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.

1926.502(i)(2)
All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

1926.502(i)(3)
All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

1926.502(i)(4)
All covers shall be color coded or they shall be marked with the word “HOLE” or “COVER” to provide warning of the hazard.

Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.



Depending on the scope of work, will determine the distance of the warning line from the unprotected edge. For example, if the scope of work being performed is considered maintenance, then we need to follow General Industry Regulation, (1910.29(d)(2)(vi). By following this regulation the warning line must not be less than 6' from the roof edge for work that is both temporary and infrequent, or not less than 15' for other work. Below are the warning line regulations for General Industry.

1910.29(d)(2)The employer must ensure each warning line:

1910.29(d)(2)(i)Has a minimum breaking strength of 200 pounds (0.89 kN);

1910.29(d)(2)(ii)Is installed so its lowest point, including sag, is not less than 34 inches (86 cm) and not more than 39 inches (99 cm) above the walking-working surface;

1910.29(d)(2)(iii)Is supported in such a manner that pulling on one section of the line will not result in slack being taken up in adjacent sections causing the line to fall below the limits specified in paragraph (d)(2)(ii) of this section;

1910.29(d)(2)(iv)Is clearly visible from a distance of 25 feet (7.6 m) away, and anywhere within the designated area;

1910.29(d)(2)(v)Is erected as close to the work area as the task permits; and

1910.29(d)(2)(vi)Is erected not less than 6 feet (1.8 m) from the roof edge for work that is both temporary and infrequent, or not less than 15 feet (4.6 m) for other work.

1910.29(d)(3)When mobile mechanical equipment is used to perform work that is both temporary and infrequent in a designated area, the employer must ensure the warning line is erected not less than 6 feet (1.8 m) from the unprotected side or edge that is parallel to the direction in which the mechanical equipment is operated, and not less than 10 feet (3 m) from the unprotected side or edge that is perpendicular to the direction in which the mechanical equipment is operated.

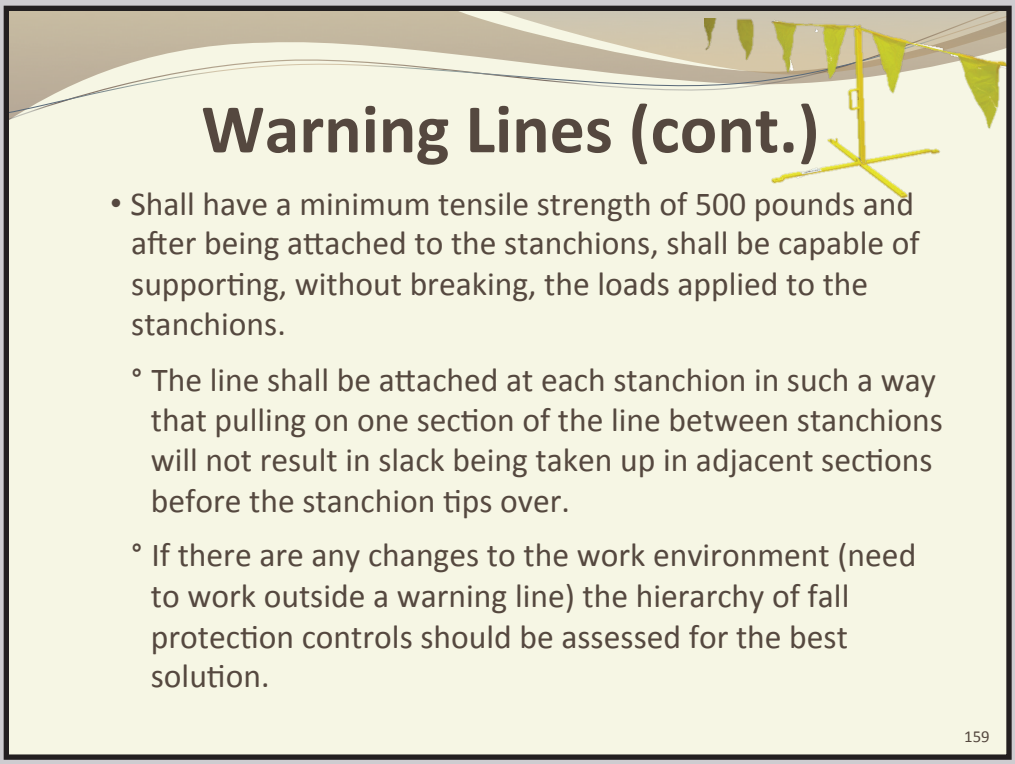
If the scope of work being performed is considered construction, then we need to follow Construction Regulation, (1926.502(f)(1)(i) and1926.502(f)(1)(ii). By following these regulations, the warning line must be erected not less then 6' from the roof edge. Below are the warning line regulations for the Construction Industry.

1926.502(f)"Warning line systems." Warning line systems [See 1926.501(b)(10)] and their use shall comply with the following provisions:

1926.502(f)(1)The warning line shall be erected around all sides of the roof work area.

1926.502(f)(1)(i)When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge.

Continued to page 159...



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1926.502(f)(1)(ii)When mechanical equipment is being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet (3.1 m) from the roof edge which is perpendicular to the direction of mechanical equipment operation.

1926.502(f)(1)(iii)Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.

1926.502(f)(1)(iv)When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.

1926.502(f)(2)Warning lines shall consist of ropes, wires, or chains, and supporting stanchions erected as follows:

1926.502(f)(2)(i)The rope, wire, or chain shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material;

1926.502(f)(2)(ii)The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches (.9 m) from the walking/working surface and its highest point is no more than 39 inches (1.0 m) from the walking/working surface;

1926.502(f)(2)(iii)After being erected, with the rope, wire, or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion, 30 inches (.8 m) above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof, or platform edge;

1926.502(f)(2)(iv)The rope, wire, or chain shall have a minimum tensile strength of 500 pounds (2.22 kN), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in paragraph (f)(2)(iii) of this section; and

1926.502(f)(2)(v)The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

1926.502(f)(3)No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.

1926.502(f)(4)Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.

Fall Protection - Administrative

Passive System

Administrative fall protection

"Employer mandated safe work practices or procedures that are designed to prevent exposure to a fall by signaling or warning an authorized person to avoid approaching a fall hazard." – *ANSI Z359.0*

160

Instructor: Administrative is the least preferred method of fall protection as there is no physical means of fall protection employed.

General approach - When at height where it does not need fall protection (example large commercial roof) then administrative controls (signs) point out areas that are potentially dangerous.

Administrative controls are not acceptable if other methods of fall protection are feasible.

What is a safe distance to an unprotected roof edge?
- Less than 6 ft, conventional means of protection (guardrail, PFAS, etc.),
- From 6-15 ft, designated for infrequent or temporary work, warning required at 6 ft.,
- More than 15 ft, protection not required, designated for infrequent or temporary work, warning signs.

The new rule of 1910 has standardized with 1926 OSHA's previous stance that there is no safe distance can be seen as further defined.

Safety Monitoring
The safety monitor system is a method of preventing workers from falling when they are working, without other types of fall protection.
- Low Pitched Roofs only
- Work between control zone and unprotected edge
- Safe Weather conditions
- 8 or less workers

Fall Restraint (travel restraint) uses active fall protection equipment to prevent a worker from accessing an unprotected edge or opening. If a fall restraint system cannot prevent access to a fall hazard a fall arrest system is required.

Fall restraint requires training of the user however, there is no need to provide for prompt rescue under §1926.502(d)(20), since there would not be an arrested fall. It is the only passive individual fall protection system.

Note: A belt is permissible for restraint however it may not be compatible with other work at height tasks and rescue solutions.

Fall Restraint (cont.)

- Anchor requirements: must be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds, whichever is greater. ANSI Z359 requirement is 1,000 pounds or 4 times the maximum intended load.
  - Anchor Types
    - Engineered/Certified
    - Improvised

162

Note: Fed OSHA does not have a specific regulation for fall restraint systems. Because of this, we must follow the positioning device regulation located in 1926.502(e).

You can also reference, 1926.502(d)(15) that states Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed.

Many freestanding rooftop anchors are designed for fall arrest (one-person use) and fall restraint (two-person use).

Anchorage Devices provide a secure point of attachment for a lifeline, lanyard, deceleration device or any other fall arrest or rescue system.

Used within a restraint application the anchorage needs only to meet the strength requirement of two times the potential impact force or 3000 pounds or whichever is greater. (OSHA recommendation)

Fall Restraint Equipment

- Equipment required:
  - Synthetic rope
  - Carabiners
  - Anchorage straps if using improvised anchor
  - Positive stop device (rope grab)
  - Restraint belt or full body harness

163

All equipment must meet the requirements of the ANSI Z359 Standard.

Rope strength includes terminations.

The positive locking device must be managed correctly to ensure zero possibility of a fall.

Rope strength requirements may vary from Fed OSHA to state run programs.

Justification – What is the reason for the controlled descent? Is it the location of the sector? Would it be costly to get a crane or another piece of equipment to reach the sector?

Proposed anchor points – What are the anchor points? Where are the anchor points? Are there certified anchor points available? An example of certified anchor points for rooftops usually are for window washing and maintenance. Will non-certified anchor points be used? Examples of non-certified anchor points can be I-beams on the building, steel from platforms, penthouses. It's imperative to get creative on rooftops.

Rope types – What are the rope specifications? 7/16" / ½" / 5/8". MBS. SLL

Rigging overview – Below are some considerations for rigging:
- Do the ropes have manufactured eye terminations?
- Will there be a knot tied in order to create a termination?
- Consider rope reduction with knots
- Connecting means – carabiner, anchorage strap, figure 8 with a follow through
- Connector compatibility
- Rope re-directing

Descent hardware – what is the descent device? Is it compatible with the rope size? Panic features? Can you ascend the control descent line with the descent device?

Control Descent (cont.)

- Rope abrasion protection
- Secondary systems
- Edge negotiation
- Rescue plan
- Training

165

Rope abrasion – Ropes running over leading edges need protection. Make sure the ropes are protected from damage of the leading edge. Examples – rollers, softeners, etc.

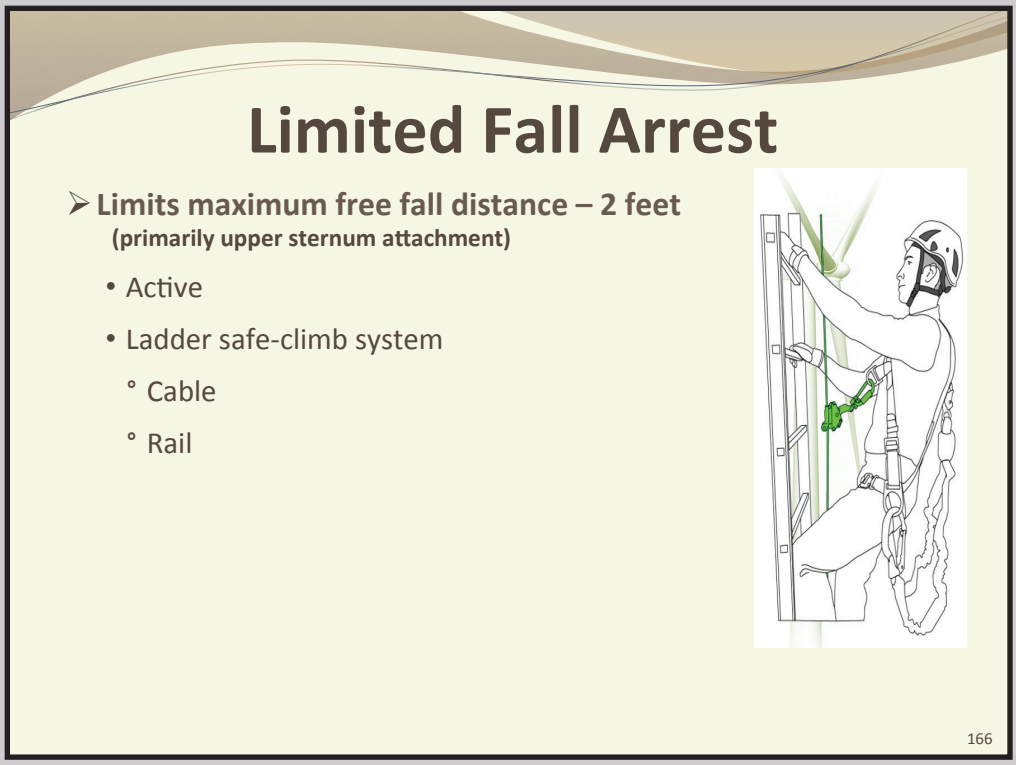
Secondary systems – Professionals performing control descent must have a back up fall arrest system. Examples – SRD's, Vertical lifelines.

Edge negotiation – The professional must negotiate how they are going to transition from the rooftop into position for working on the side of the building. This can be tricky. Examples – rope ladders, positioning lanyards, ascent devices, etc.

Rescue plan – A rescue plan must be developed should a rescue ensue. Considerations for a rescue are as follows:

- Rescue personnel identified
- Current certifications
- Rescue system – an AWP, suspended rescue (descent hardware, rope types, anchors, rigging, etc.

Training – The professionals who are engaged in control descents and rescues must be currently certified to industry standards.



Limited fall arrest systems like fall arrest systems comprise of the same four fundamental elements:

- Anchorage Device,
- Body Support,
- Connecting Device and require a work at height rescue solution,
- Descent (Rescue) System.

Reminder, that when climbing a means of rescue must be established.

A Limited Fall Arrest System limits the workers fall to a specified distance that reduces the risk of injury occurring.
LFAS are engineered performance-based systems working primarily within two fall distance categories:

- 18 inches (fixed ladder safe climb system) and
- 24 inches Class A Fall Arrest Devices (SRD's).

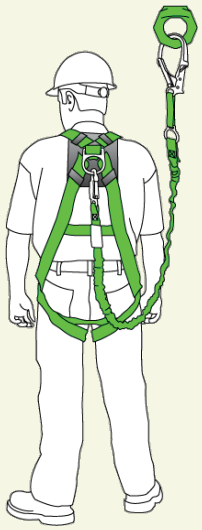
Limited Fall Arrest Systems are commonly employed on fix ladders, over hazards (moving machinery), or where total fall distance limitations are present (working less than 30 ft. from a walking working surface).

The engineering intention is to stop the fall within a specified distance while keeping the forces the body is subject to below the OSHA legal limit of 1,800 lbs. - SRD's are 1,350 lbs maximum arrest force.

Fall Arrest

ABC's:

- Anchor
- Body Harness
- Connector
- Lifeline or
- PEA Lanyard



Capacity 130 to 310 lbs.

OSHA standards allow for capacities to exceed 310 lbs. as long as the manufacturer ensures that their products will provide the proper protection for the weight listed.

167

Fall Arrest (cont.)

- **Most dangerous method of fall protection**
  - At risk of injury during a fall
    - Forces on the body - Maximum Arresting Force (MAF) allowed by OSHA = 1,800 lbs.
      - ANSI – 900 lbs.
    - Swing fall
  - At risk of injury after a fall
    - Possibility of suspension out of reach
    - Medical concerns

168

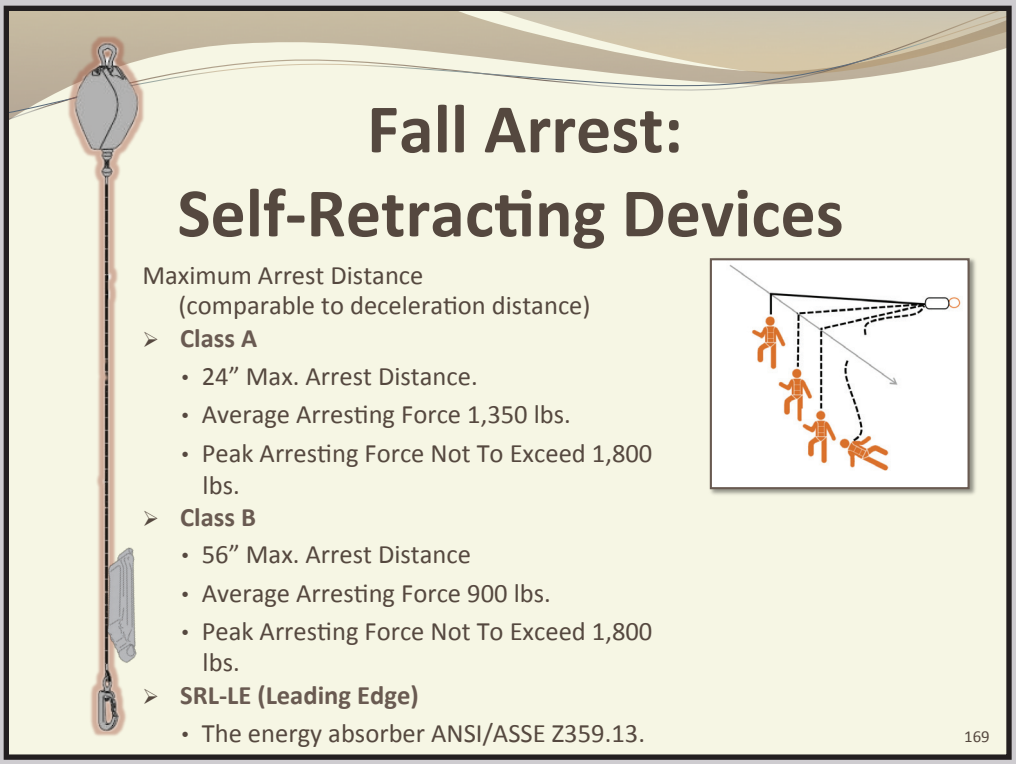
Fall Arrest as for fall restraint requires the user to receive training within the first principles of use (inspection, safe use, care and maintenance). Most work environments require the user to operate with twin leg personal energy absorbing lanyards to ensure 100% attachment when transitioning from one anchorage to the next.

Personal energy absorbing lanyard elements:
- legal requirements
- pre-use inspection
- correct attachment to the harness
- fall factor
- fall indicators
- twin sand single fall arrest lanyards
- approved anchor points for attachment
- importance of always using fall arrest systems

Personal energy absorbing lanyards are a connecting subsystem within a fall arrest system that secure the user's full body harness to the anchorage.

In the case of the image the rear attachment d-ring of the harness is connected to the ladder rails by the PEA lanyard. This method of access is very common within accessing rooftops via fixed ladder systems.

There are different types of connecting subsystems each with its strengths and advantages under specific applications.



A self-retracting device is a device containing a drum wound line that automatically locks at the onset of a fall to arrest the user.

They have a lock or activation speed of 6 ft per second (rate of walking).

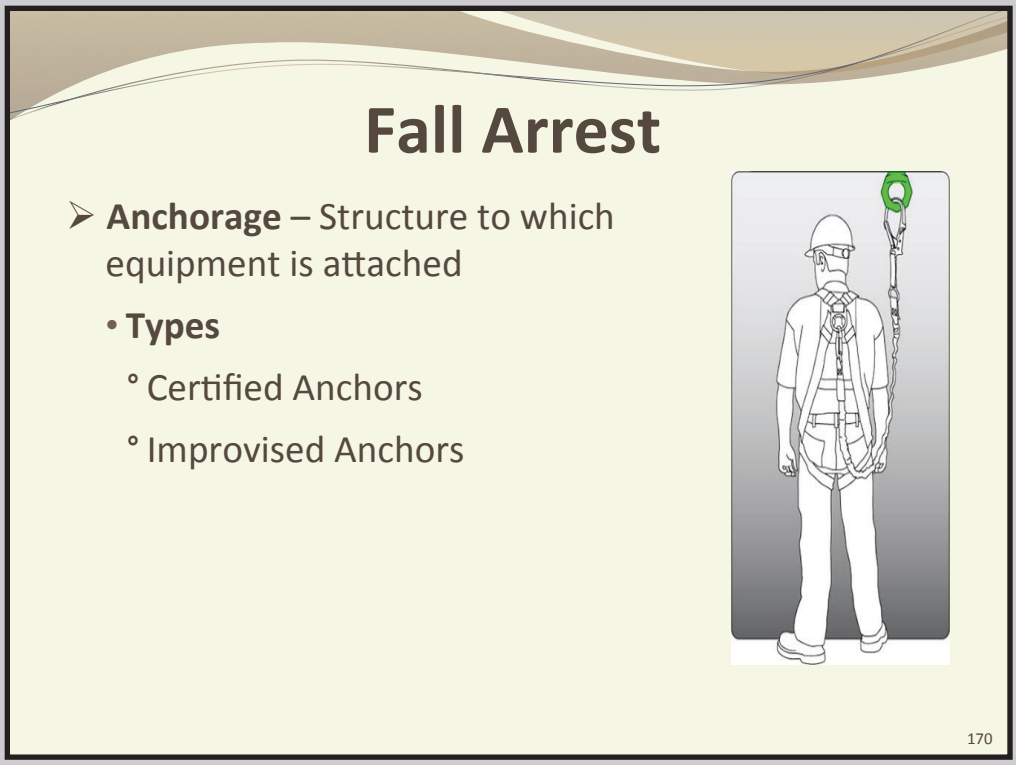
Unprotected Roof Edges
Point of the impact force of an over the edge fall will not transfer to the brake mechanism of the device, it will transfer directly onto the edge where the likelihood of failure is high as deceleration normally induced by the brake will not apply.

Working around unprotected rooftop edges requires a Class B SRL-LE (Leading Edge) manufactured with a shock absorber inline to transfer forces away from the edge.

When using an SRD work directly below the anchor point to avoid any introduction of a potential pendulum motion.

Working around unprotected rooftop edges requires a Class B SRL-LE (Leading Edge)
- Shock Absorber Inline (transfer the force away from the edge)
- Steel cable (best resistance to pendulum motion damage)

SRD Swing Falls
- Swing Drop Distance – Max. 4 ft.
- Further out – body picks up speed
- Body Impact Hazards
- Sloped falls – retard brake activation



Anchor and Anchorage Connector Definitions

Anchorage is typically a fixed structural member required for the stability and other purposes of the structure itself.

Anchorage connector is a component or subsystem that functions as an interface between the anchorage and an active fall protection system.

Although anchor requirements for communication structures are defined within A10.48, rooftop anchors are primarily defined within International Window Cleaning Association's ANSI/IWCA I-14.1-2001, which are now incorporated into OSHA 1910.27

OSHA also outlines an employer's responsibilities in 1910.27(b)(ii):
"The employer must ensure that no employee uses any anchorage before the employer has obtained written information from the building owner that each anchorage meets the requirements of paragraph (b)(1)(i) of this section. The employer must keep the information for the duration of the job."

Certified Anchors

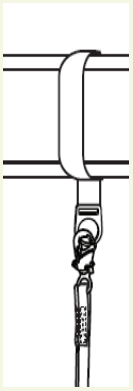
- Engineered by a qualified person
- Eliminates worker assessment – "human error"
- Must be at least 2 times the Maximum Arresting Force (MAF) of 1,800 lbs.
  - A 2:1 calculation equals **3,600 lbs.**

171

Permanent certified anchors on a horizontal travel system.

Improvised Anchors

- Workers MUST have an overwhelming evidence of strength when identifying a structure
- Assessed to be **5,000 lbs.** or greater
- Greatest potential for human error

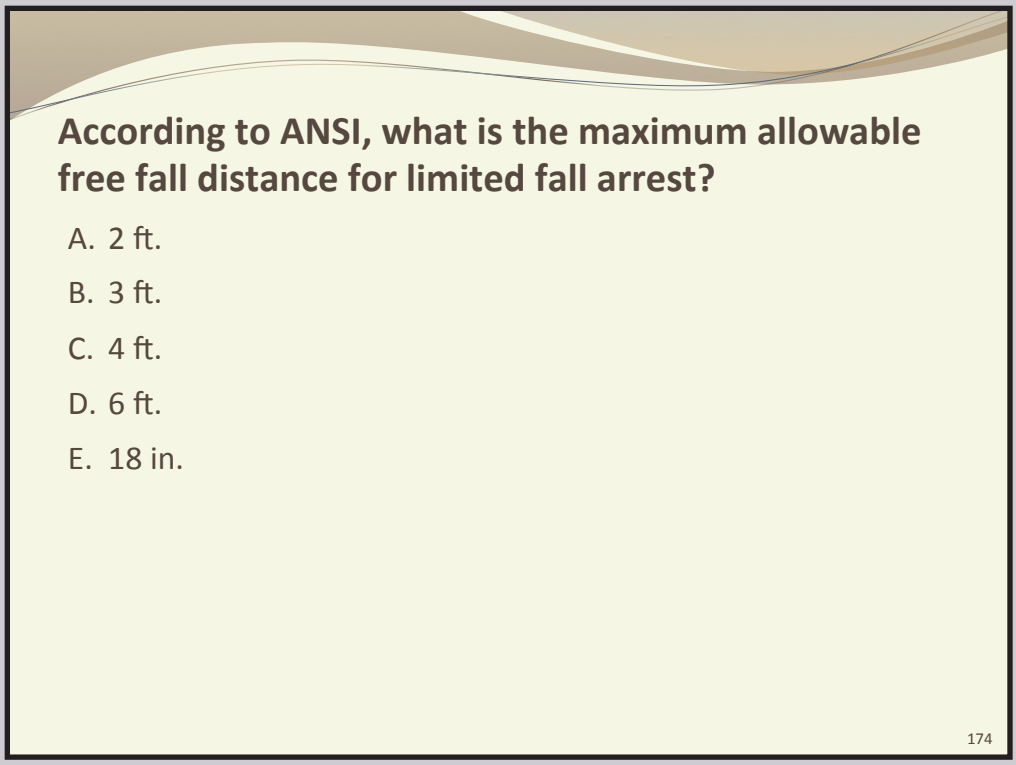


172

Section 8

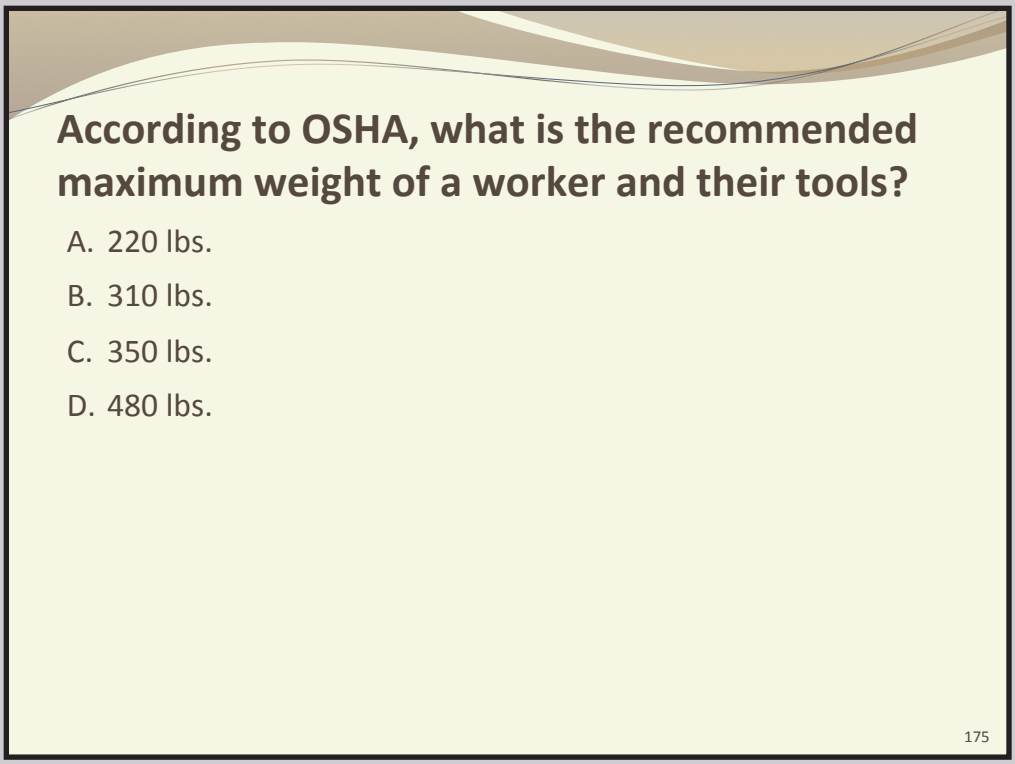
Review Questions

173



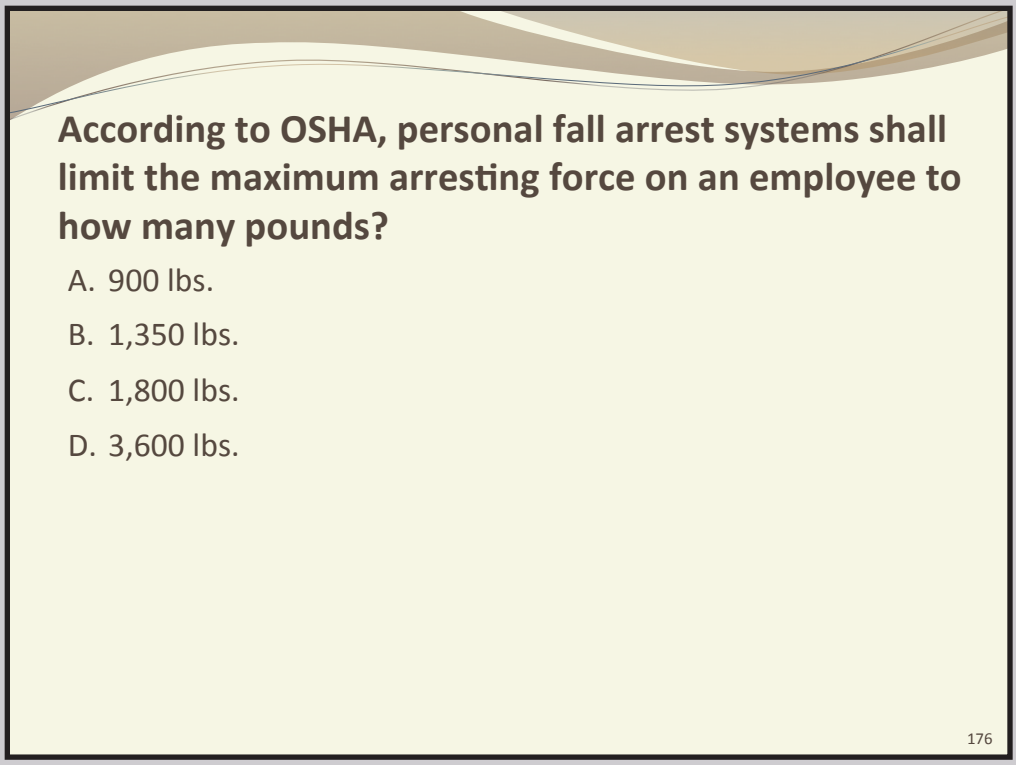
Answer: A (2 ft.)

is the maximum allowable free fall distance under limited fall arrest.



Answer: B (310 lbs.)

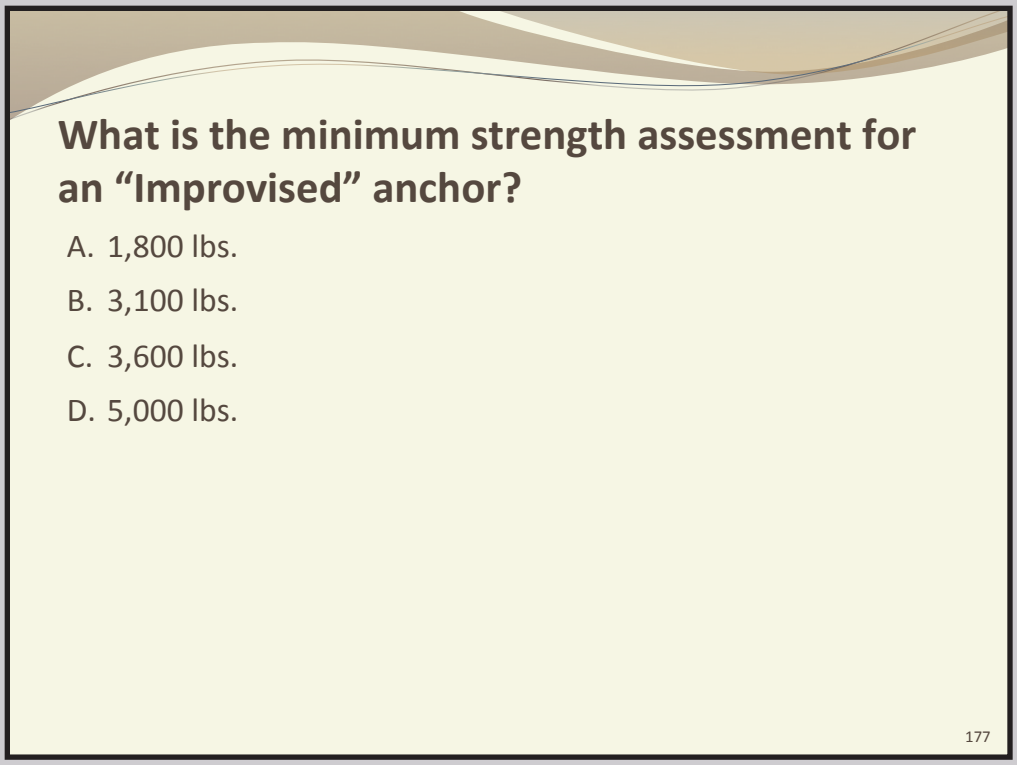
310 lbs. including tools and clothing.



Answer: C (1,800 lbs.)

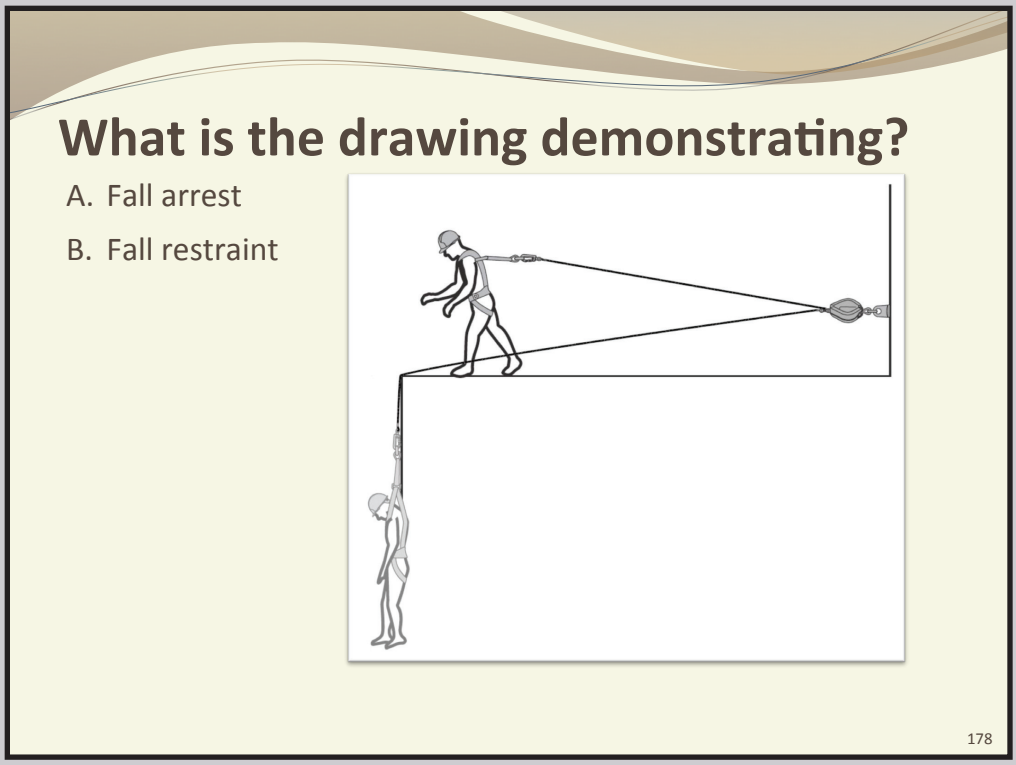
OSHA standard 1926.502(d)(16)(ii) states that the maximum arresting force for a worker in a body harness weighing up to 310 lbs. shall not be exposed to a maximum arresting force in excess of 1,800 lbs. (8 kN).

ANSI Standards under best practice establishes recommended impact forces to the body to be limited to 900 lbs. force for a fall factor 1 (maximum 6 foot free fall) and 1,350 lbs. force for a fall factor 2 (maximum 12 foot free fall).



Answer: D (5,000 lbs.)

5,000 lbs. is in place to ensure going above and beyond to reduce the chance that something is done incorrectly.

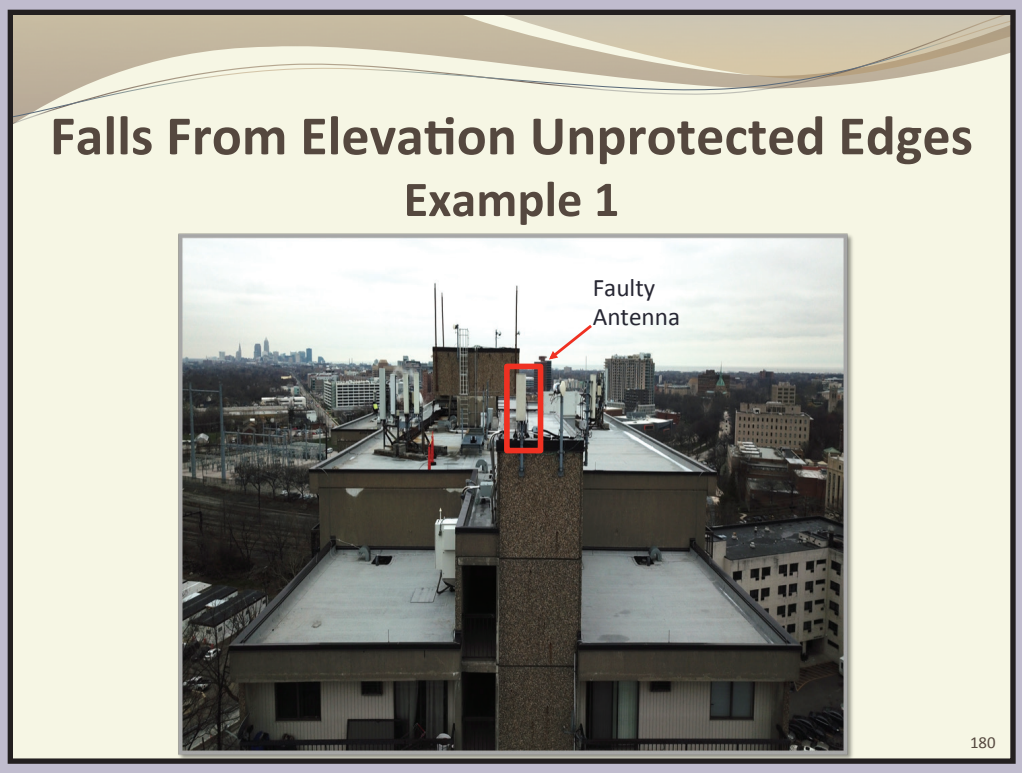


Answer: A (Fall Arrest)

Section 9

Practical Workshop

179



Falls from elevation / Unprotected edges

Understand the hierarchy of fall protection systems to achieve the best solution for the environment and task. Utilize the company's fall protection plan. Receive training on the specific fall protection systems required. A deeper dive into this topic will be covered in a later section.

Fall protection discussion scenario:

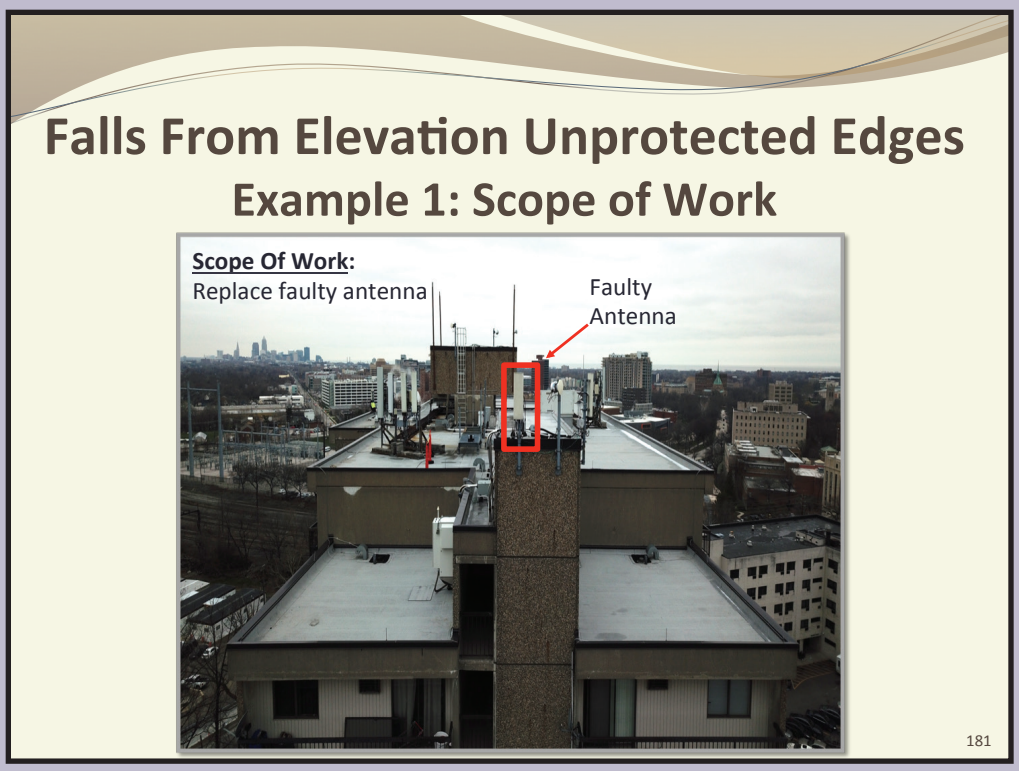
Scope Of Work: Replace faulty antenna.

Hazards: Fall from elevation.

Hierarchy of fall protection:

1. Can the hazard be eliminated? No, the antenna is fixed.
2. Can we implement a traditional fall protection system? We could set up a guardrail system around the fall hazard, but it would not be the best option due to the limited amount of time needed to perform the scope of work.
3. Can we implement a fall restraint system? Due to the topography of the rooftop a fall restraint system would not provide protection to the user while accessing the work location.
4. Can we implement a fall arrest system? A fall arrest system would not provide protection to the user while accessing the work location.

Alternate solutions: The safest and most efficient way to access the antenna would be to utilize an aerial work platform. Another potential solution would be use scaffolding to access the antenna.



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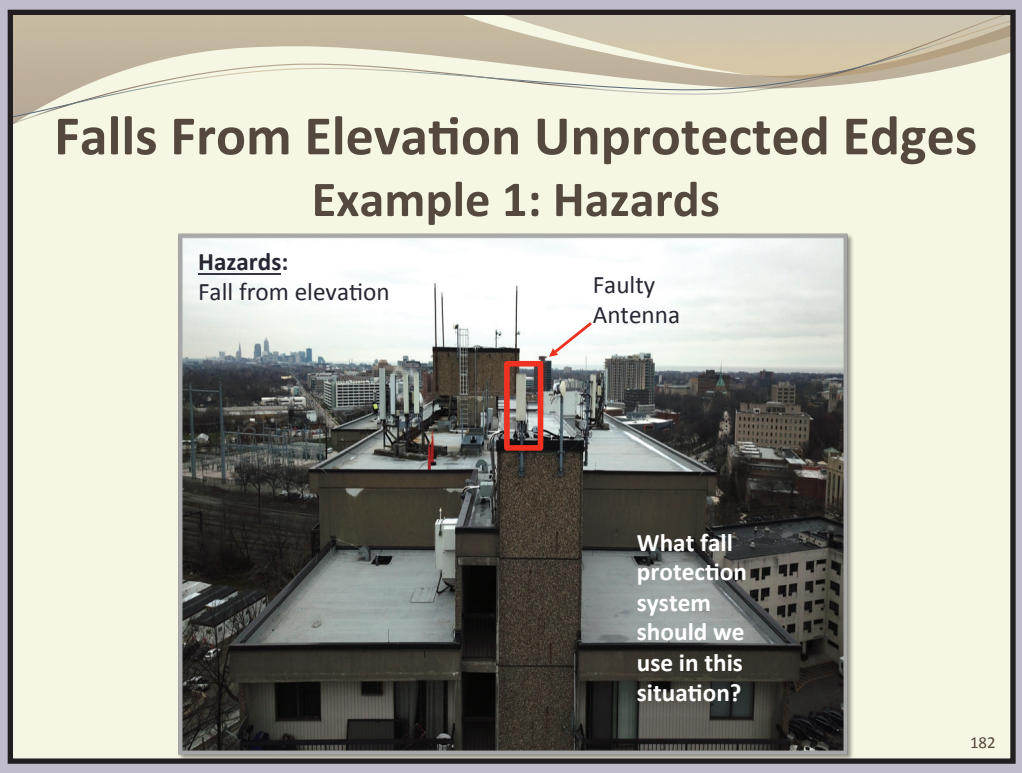

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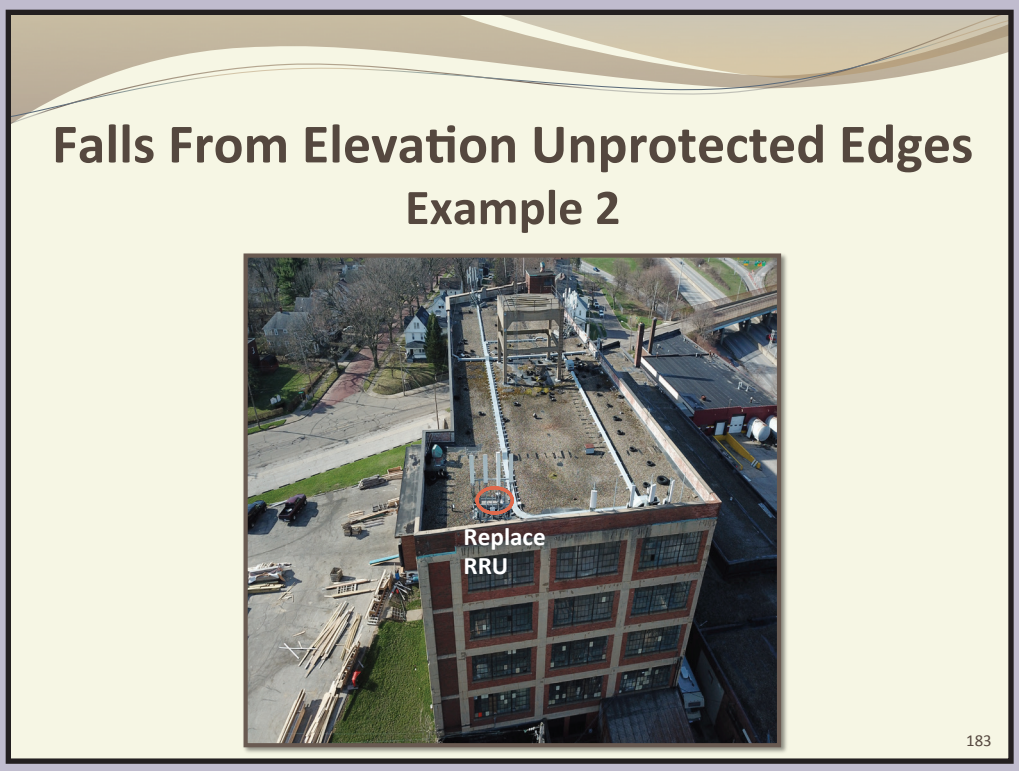

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Fall protection discussion scenario:

Scope Of Work: Replace RRU on sector in foreground of the picture. Projected time to complete task, 1 hour.

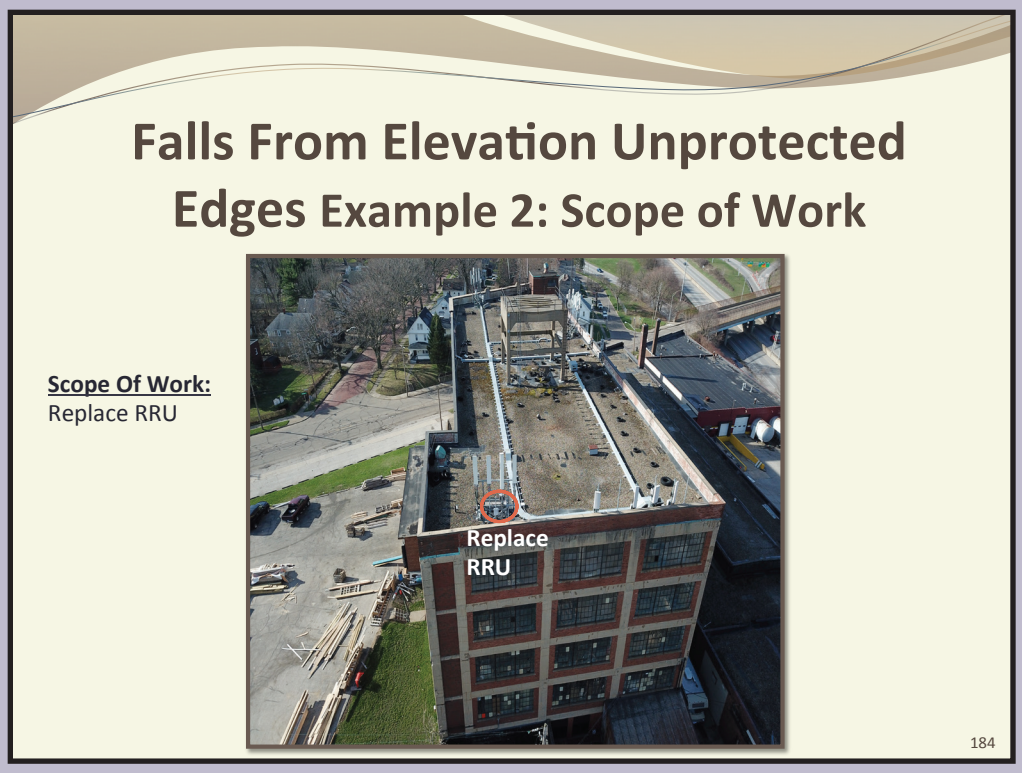
Hazards: Fall from elevation.

Hierarchy of fall protection:

1. Can the hazard be eliminated? No, removing the mount away from the unprotected edge would be the best scenario "eliminating the fall hazard," however its not be feasible.
2. Can we implement a traditional fall protection system? No, the parapet wall is only 35" tall. Due to the limited time needed for the scope of work, Setting up a guard rail would not be the most efficient system to employ.

Can we implement a fall restraint system? Yes, a fall restraint system would be the best fall protection measure in this scenario for the following reasons; It will be the fastest system to deploy and it will be much safer than implementing a fall arrest system.

***Note:** Red box will appear on first click. Yellow line and circle will appear on second click.



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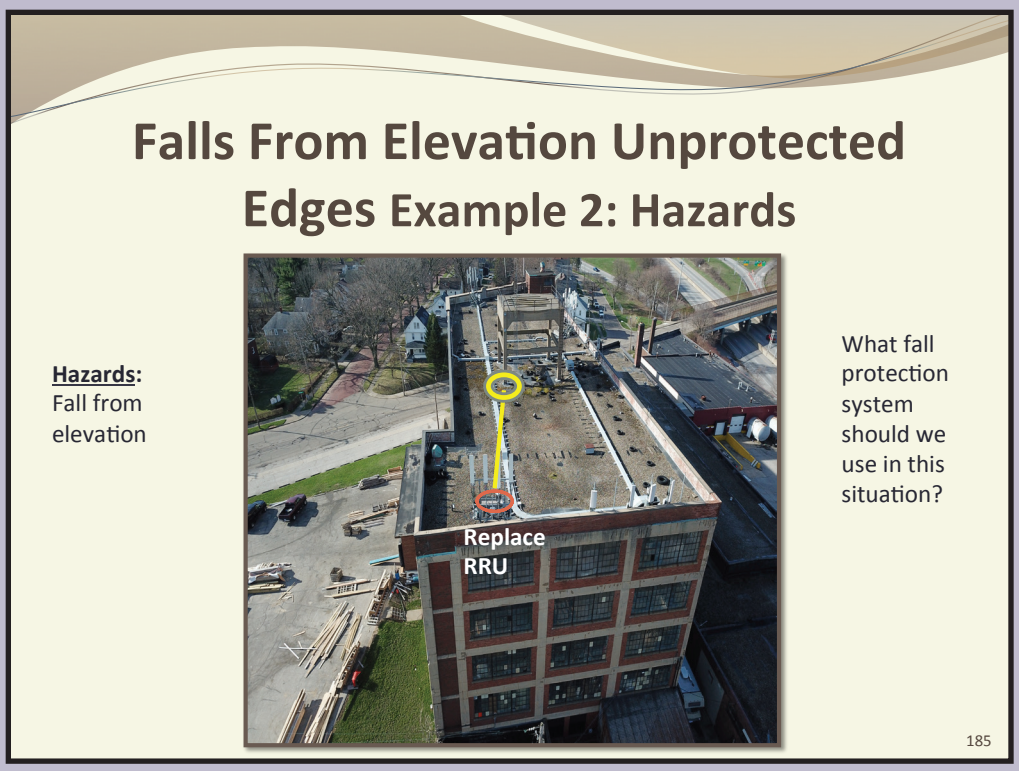

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Activity – At this time in the presentation you are to demonstrate how a fall restraint system works.

Equipment – The required equipment for this activity is as follows:
- Anchorage connector
- Carabiner
- Full body harness
- Synthetic rope
- Rope grab
- Tape

The instructor will lay tape on the floor to mimic a roof edge. The instructor will then use a prop, (table/chair, etc.) as an anchor point. The instructor will then install the anchorage connector to the prop. Then the instructor will attach the synthetic rope to the anchorage connector. The instructor will then don a full body harness. The instructor will attach the rope grab to the full body harness.

The instructor will demonstrate how the fall restraint system works. The instructor will identify appropriate location of anchor points. The instructor will discuss the limitations of the fall restraint system and fall restraint system requirements.


Thank You!
187

References

ANSI/ASSE A10.48, Criteria for Safety Practices with the Construction, Demolition, Modifi cation and Maintenance of Communication Structures

ANSI/ASME B30.10 Hook Inspection

ANSI/ASME B30.30 Ropes

ANSI/IEEE C95.1, Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic and Electromagnetic Fields, 0 Hz to 300 GHz

ANSI/ISEA 121 Standard for Dropped Objects Prevention Solutions

ANSI/ISEA Z87 Standard for Occupational and Educational Personal Eye and Face Protection Devices

ANSI/ISEA Z89.1 Standard for Industrial Head Protection

ANSI/TIA-222

ANSI/TIA-322, Loading Criteria, Analysis, and Design Related to the Installation, Alteration and Maintenance of Communication Structures

ANSI/ASSE Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training

ANSI/ASSE Z359.2, Minimum Requirements for a Comprehensive Managed Fall Protection Program

Federal Communications Commission (FCC), OET Bulletin 56 and 65

IBC – International Building Code (2018 Newest Edition)

ISO 45001: Occupational Heath and Safety Standard

National Association of Tower Erectors (NATE), Tower Climber Fall Protection Training Standard, Third Edition Revised 2013

OSHA 29 CFR 1910, Occupational Safety and Health Standards

OSHA 29 CFR 1926, Safety and Health Regulations for Construction

OSHA Construction Safety and Health Outreach Program U.S. Department of Labor May 1996

OSHA Demolition Factsheet

U.S. Department of Labor Division of Occupational Safety and Health (OSHA)

Other Industry References

ANSI/ASSE A10.5, Material Hoists

ANSI/ASSE A10.6, Safety Requirements for Demolition Operations

ANSI/ASSE A10.28, Work Platforms Suspended from Cranes or Derricks

ANSI/ASSE A10.32, Personal Fall Protection Systems for Construction and Demolition Operations

ANSI/ASSE A10.33, Safety and Health Program Requirements for Multi-Employer Projects

ANSI/ASSE A10.34, Protection of the Public on or Adjacent to Construction Sites

ANSI/ASSE A10.42, Safety Requirements for Rigging Qualifications and Responsibilities

ANSI/ASSE A10.44, Control of Energy Sources (Lockout/Tagout) for Construction & Demolition Operations

ANSI/ASSE Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training

AWS D1.1/D1/1M, Structural Welding Code-Steel

Cordage Institute International Guideline - CI 2001-2004: Fiber Rope Inspection and Retirement Criteria

Institute of Electrical and Electronic Engineers (IEEE) C95.1, Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

NFPA 10, Standard for Portable Fire Extinguishers

National Association of Tower Erectors (NATE), Resource Reference for RF Awareness

OSHA Construction Safety and Health Outreach Program U.S. Department of Labor May 1996

OSHA Demolition Factsheet

References

Current OSHA Website specific to telecommunications structures: https://www.google.com/search?q=osha+telecommunications+website&rlz=1C1CHBD_enUS818US818&oq=OSHA&aqs=chrome.3.69i57j69i60j69i59j35i39j0l2.3848j0j4&sourceid=chrome&ie=UTF-8

Reference page for NATE Climber Connection videos and Planning Advisory Notices: https://natehome.com/

Note: ASSE had a name change to ASSP during 2018. The American Society of Safety Engineers officially
changed their name to the American society of Safety Professionals during June of 2018. This name change
did not impact the ANSI (American National Standards Institute) accreditation. The change was intended to ensure that the organization stays at the forefront of workplace safety advancements.

The documents are supported by ASSP but are listed in this reference as ASSE to ensure access to the proper documents until the updates to the various standards occurs.

- **Record Type:** Instruction
- **Directive Number:** CPL 02-00-124
- **Old Directive Number:** CPL 2-0.124
- **Title:** Multi-Employer Citation Policy.
- **Information Date:** 12/10/1999

OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

DIRECTIVE NUMBER: CPL 2-0.124	**EFFECTIVE DATE:** December 10, 1999
SUBJECT: Multi-Employer Citation Policy	

ABSTRACT

Purpose: To Clarify the Agency's multi-employer citation policy

Scope: OSHA-wide

References: OSHA Instruction CPL 2.103 (the FIRM)

Suspensions: Chapter III, Paragraph C. 6. of the FIRM is suspended and replaced by this directive

State Impact: This Instruction describes a Federal Program Change. Notification of State intent is required, but adoption is not.

Action Offices: National, Regional, and Area Offices

Originating Office: Directorate of Compliance Programs

Contact: Carl Sall (202) 693-2345
Directorate of Construction
N3468 FPB
200 Constitution Ave., NW

Washington, DC 20210

By and Under the Authority of
R. Davis Layne
Deputy Assistant Secretary, OSHA

TABLE OF CONTENTS

I. Purpose. This Directive clarifies the Agency's multi-employer citation policy and suspends Chapter III. C. 6. of OSHA's Field Inspection Reference Manual (FIRM).

II. Scope. OSHA-Wide

III. Suspension. Chapter III. Paragraph C. 6. of the FIRM (CPL 2.103) is suspended and replaced by this Directive.

IV. References. OSHA Instructions:

- CPL 02-00.103; OSHA Field Inspection Reference Manual (FIRM), September 26, 1994.
- ADM 08-0.1C, OSHA Electronic Directive System, December 19,1997.

V. Action Information

- A. Responsible Office. Directorate of Construction.
- B. Action Offices. National, Regional and Area Offices
- C. Information Offices. State Plan Offices, Consultation Project Offices

VI. Federal Program Change. This Directive describes a Federal Program Change for which State adoption is not required. However, the States shall respond via the two-way memorandum to the Regional Office as soon as the State's intent regarding the multi-employer citation policy is known, but no later than 60 calendar days after the date of transmittal from the Directorate of Federal-State Operations.

VII. Force and Effect of Revised Policy. The revised policy provided in this Directive is in full force and effect from the date of its issuance. It is an official Agency

policy to be implemented OSHA-wide.

VIII. Changes in Web Version of FIRM. A note will be included at appropriate places in the FIRM as it appears on the Web indicating the suspension of Chapter III paragraph 6. C. and its replacement by this Directive, and a hypertext link will be provided connecting viewers with this Directive.

IX. Background. OSHA's Field Inspection Reference Manual (FIRM) of September 26, 1994 (CPL 2.103), states at Chapter III, paragraph 6. C., the Agency's citation policy for multi-employer worksites. The Agency has determined that this policy needs clarification. This directive describes the revised policy.

A. Continuation of Basic Policy. This revision continues OSHA's existing policy for issuing citations on multi-employer worksites. However, it gives clearer and more detailed guidance than did the earlier description of the policy in the FIRM, including new examples explaining when citations should and should not be issued to exposing, creating, correcting, and controlling employers. These examples, which address common situations and provide general policy guidance, are not intended to be exclusive. In all cases, the decision on whether to issue citations should be based on all of the relevant facts revealed by the inspection or investigation.

B. No Changes in Employer Duties. This revision neither imposes new duties on employers nor detracts from their existing duties under the OSH Act. Those duties continue to arise from the employers' statutory duty to comply with OSHA standards and their duty to exercise reasonable diligence to determine whether violations of those standards exist.

X. Multi-employer Worksite Policy. The following is the multi-employer citation policy:

A. Multi-employer Worksites. On multi-employer worksites (in all industry sectors), more than one employer may be citable for a hazardous condition that violates an OSHA standard. A two-step process must be followed in determining whether more than one employer is to be cited.

1. Step One. The first step is to determine whether the employer is a creating, exposing, correcting, or controlling employer. The definitions in paragraphs (B) - (E) below explain and give examples of each. Remember that an employer may have multiple roles (see paragraph H). Once you determine the role of the employer, go to Step Two to determine if a citation is appropriate (NOTE: only exposing employers can be cited for General Duty Clause violations).

2. Step Two. If the employer falls into one of these categories, it has obligations with respect to OSHA requirements. Step Two is to determine if the employer's actions were sufficient to meet those obligations. The extent of the actions required of employers varies based on which category applies. Note that the extent of the measures that a controlling employer must take to satisfy its duty to exercise reasonable care to prevent and detect violations is less than what is required of an employer with respect to protecting its own employees.

B. The Creating Employer

1. Step 1: Definition: The employer that caused a hazardous condition that violates an OSHA standard.

2. Step 2: Actions Taken: Employers must not create violative conditions. An employer that does so is citable even if the only employees exposed are those of other employers at the site.

a. **Example 1**: Employer Host operates a factory. It contracts with Company S to service machinery. Host fails to cover drums of a chemical despite S's repeated requests that it do so. This results in airborne levels of the chemical that exceed the Permissible Exposure Limit.

Analysis: **Step 1**: Host is a creating employer because it caused employees of S to be exposed to the air contaminant above the PEL. **Step 2**: Host failed to implement measures to prevent the accumulation of the air contaminant. It could have met its OSHA obligation by implementing the simple engineering control of covering the drums. Having failed to implement a feasible engineering control to meet the PEL, Host is citable for the hazard.

b. **Example 2:** Employer M hoists materials onto Floor 8, damaging perimeter guardrails. Neither its own employees nor employees of other employers are exposed to the hazard. It takes effective steps to keep all employees, including those of other employers, away from the unprotected edge and informs the controlling employer of the problem. Employer M lacks authority to fix the guardrails itself.

Analysis: **Step 1:** Employer M is a creating employer because it caused a hazardous condition by damaging the guardrails. **Step 2:** While it lacked the authority to fix the guardrails, it took immediate and effective steps to keep all employees away from the hazard and notified the controlling employer of the hazard. Employer M is not citable since it took effective measures to prevent employee exposure to the fall hazard.

C. The Exposing Employer

1. Step 1: Definition: An employer whose own employees are exposed to the hazard. See Chapter III, section (C)(1)(b) for a discussion of what constitutes exposure.

2. Step 2: Actions taken: If the exposing employer created the violation, it is citable for the violation as a creating employer. If the violation was created by another employer, the exposing employer is citable if it (1) knew of the hazardous condition or failed to exercise reasonable diligence to discover the condition, and (2) failed to take steps consistent with its authority to protect is employees. If the exposing employer has authority to correct the hazard, it must do so. If the exposing employer lacks the authority to correct the hazard, it is citable if it fails to do each of the following: (1) ask the creating and/or controlling employer to correct the hazard; (2) inform its employees of the hazard; and (3) take reasonable

alternative protective measures. In extreme circumstances (e.g., imminent danger situations), the exposing employer is citable for failing to remove its employees from the job to avoid the hazard.

a. **Example 3:** Employer Sub S is responsible for inspecting and cleaning a work area in Plant P around a large, permanent hole at the end of each day. An OSHA standard requires guardrails. There are no guardrails around the hole and Sub S employees do not use personal fall protection, although it would be feasible to do so. Sub S has no authority to install guardrails. However, it did ask Employer P, which operates the plant, to install them. P refused to install guardrails.

Analysis: **Step 1**: Sub S is an exposing employer because its employees are exposed to the fall hazard. **Step 2**: While Sub S has no authority to install guardrails, it is required to comply with OSHA requirements to the extent feasible. It must take steps to protect its employees and ask the employer that controls the hazard - Employer P - to correct it. Although Sub S asked for guardrails, since the hazard was not corrected, Sub S was responsible for taking reasonable alternative protective steps, such as providing personal fall protection. Because that was not done, Sub S is citable for the violation.

b. **Example 4:** Unprotected rebar on either side of an access ramp presents an impalement hazard. Sub E, an electrical subcontractor, does not have the authority to cover the rebar. However, several times Sub E asked the general contractor, Employer GC, to cover the rebar. In the meantime, Sub E instructed its employees to use a different access route that avoided most of the uncovered rebar and required them to keep as far from the rebar as possible.

Analysis: **Step 1**: Since Sub E employees were still exposed to some unprotected rebar, Sub E is an exposing employer. **Step 2**: Sub E made a good faith effort to get the general contractor to correct the hazard and took feasible measures within its control to protect its employees. Sub E is not citable for the rebar hazard.

D. The Correcting Employer

1. Step 1: Definition: An employer who is engaged in a common undertaking, on the same worksite, as the exposing employer and is responsible for correcting a hazard. This usually occurs where an employer is given the responsibility of installing and/or maintaining particular safety/health equipment or devices.

2. Step 2: Actions taken: The correcting employer must exercise reasonable care in preventing and discovering violations and meet its obligations of correcting the hazard.

a. **Example 5:** Employer C, a carpentry contractor, is hired to erect and maintain guardrails throughout a large, 15-story project. Work is proceeding on all floors. C inspects all floors in the morning and again in the afternoon each day. It also inspects areas where material is delivered to the perimeter once the material vendor is finished delivering material to that area. Other subcontractors are required to report damaged/missing guardrails to the general contractor, who forwards those reports to C. C repairs damaged guardrails immediately after finding them and immediately after they are reported. On this project few instances of damaged guardrails have occurred other than where material has been delivered. Shortly after the afternoon inspection of Floor 6, workers moving equipment accidentally damage a guardrail in one area. No one tells C of the damage and C has not seen it. An OSHA inspection occurs at the beginning of the next day, prior to the morning inspection of Floor 6. None of C's own employees are exposed to the hazard, but other employees are exposed.

Analysis: Step 1: C is a correcting employer since it is responsible for erecting and maintaining fall protection equipment. **Step 2:** The steps C implemented to discover and correct damaged guardrails were reasonable in light of the amount of activity and size of the project. It exercised reasonable care in preventing and discovering violations; it is not citable for the damaged guardrail since it could not reasonably have known of the violation.

E. The Controlling Employer

1. Step 1: Definition: An employer who has general supervisory authority over the worksite, including the power to correct safety and health violations itself or require others to correct them. Control can be established by contract or, in the absence of explicit contractual provisions, by the exercise of control in practice. Descriptions and examples of different kinds of controlling employers are given below.

2. Step 2: Actions Taken: A controlling employer must exercise reasonable care to prevent and detect violations on the site. The extent of the measures that a controlling employer must implement to satisfy this duty of reasonable care is less than what is required of an employer with respect to protecting its own employees. This means that the controlling employer is not normally required to inspect for hazards as frequently or to have the same level of knowledge of the applicable standards or of trade expertise as the employer it has hired.

3. Factors Relating to Reasonable Care Standard. Factors that affect how frequently and closely a controlling employer must inspect to meet its standard of reasonable care include:

a. The scale of the project;

b. The nature and pace of the work, including the frequency with which the number or types of hazards change as the work progresses;

c. How much the controlling employer knows both about the safety history and safety practices of the employer it controls and about that employer's level of expertise.

d. More frequent inspections are normally needed if the controlling employer knows that the other employer has a history of non-compliance. Greater inspection frequency may also be needed, especially at the beginning of the project, if the controlling employer had never before worked with this other employer and does not know its compliance history.

e. Less frequent inspections may be appropriate where the controlling employer sees strong indications that the other employer has implemented effective safety and health efforts. The most important indicator of an effective safety and health effort by the other employer is a consistently high level of compliance. Other indicators include the use of an effective, graduated system of enforcement for non-compliance with safety and health requirements coupled with regular jobsite safety meetings and safety training.

4. Evaluating Reasonable Care. In evaluating whether a controlling employer has exercised reasonable care in preventing and discovering violations, consider questions such as whether the controlling employer:

   a. Conducted periodic inspections of appropriate frequency (frequency should be based on the factors listed in G.3.);

   b. Implemented an effective system for promptly correcting hazards;

   c. Enforces the other employer's compliance with safety and health requirements with an effective, graduated system of enforcement and follow-up inspections.

5. Types of Controlling Employers

   a. Control Established by Contract. In this case, **the Employer Has a Specific Contract Right to Control Safety**: To be a controlling employer, the employer must itself be able to prevent or correct a violation or to require another employer to prevent or correct the violation. One source of this ability is explicit contract authority. This can take the form of a specific contract right to require another employer to adhere to safety and health requirements and to correct violations the controlling employer discovers.

   (1) **Example 6**: Employer GH contracts with Employer S to do sandblasting at GH's plant. Some of the work is regularly scheduled maintenance and so is general industry work; other parts of the project involve new work and are considered construction. Respiratory protection is required. Further, the contract explicitly requires S to comply with safety and health requirements. Under the contract GH has the right to take various actions against S for failing to meet contract requirements, including the right to have non-compliance corrected by using other workers and back-charging for that work. S is one of two employers under contract with GH at the work site, where a total of five employees work. All work is done within an existing building. The number and types of hazards involved in S's work do not significantly change as the work progresses. Further, GH has worked with S over the course of several years. S provides periodic and other safety and health training and uses a graduated system of enforcement of safety and health rules. S has consistently had a high level of compliance at its previous jobs and at this site. GH monitors S by a combination of weekly inspections, telephone discussions and a weekly review of S's own inspection reports. GH has a system of graduated enforcement that it has applied to S for the few safety and health violations that had been committed by S in the past few years. Further, due to respirator equipment problems S violates respiratory protection requirements two days before GH's next scheduled inspection of S. The next day there is an OSHA inspection. There is no notation of the equipment problems in S's inspection reports to GH and S made no mention of it in its telephone discussions.

   Analysis: Step 1: GH is a controlling employer because it has general supervisory authority over the worksite, including contractual authority to correct safety and health violations. **Step 2:** GH has taken reasonable steps to try to make sure that S meets safety and health requirements. Its inspection frequency is appropriate in light of the low number of workers at the site, lack of significant changes in the nature of the work and types of hazards involved, GH's knowledge of S's history of compliance and its effective safety and health efforts on this job. GH has exercised reasonable care and is not citable for this condition.

   (2) **Example 7**: Employer GC contracts with Employer P to do painting work. GC has the same contract authority over P as Employer GH had in Example 6. GC has never before worked with P. GC conducts inspections that are sufficiently frequent in light of the factors listed above in (G)(3). Further, during a number of its inspections, GC finds that P has violated fall protection requirements. It points the violations out to P during each inspection but takes no further actions.

   Analysis: **Step 1**: GC is a controlling employer since it has general supervisory authority over the site, including a contractual right of control over P. **Step 2:** GC took adequate steps to meet its obligation to discover violations. However, it failed to take reasonable steps to require P to correct hazards since it lacked a graduated system of enforcement. A citation to GC for the fall protection violations is appropriate.

   (3) **Example 8**: Employer GC contracts with Sub E, an electrical subcontractor. GC has full contract authority over Sub E, as in Example 6. Sub E installs an electric panel box exposed to the weather and implements an assured equipment grounding conductor program, as required under the contract. It fails to connect a grounding wire inside the box to one of the outlets. This incomplete ground is not apparent from a visual inspection. Further, GC inspects the site with a frequency appropriate for the site in light of the factors discussed above in (G)(3). It saw the panel box but did not test the outlets to determine if they were all grounded because Sub E represents that it is doing all of the required tests on all receptacles. GC knows that Sub E has implemented an effective safety and health program. From previous experience it also knows Sub E is familiar with the applicable safety requirements and is technically competent. GC had asked Sub E if the electrical equipment is OK for use and was assured that it is.

   Analysis: Step 1: GC is a controlling employer since it has general supervisory authority over the site, including a contractual right of control over Sub E. **Step 2:** GC exercised reasonable care. It had determined that Sub E had technical expertise, safety knowledge and had implemented safe work practices. It conducted inspections with appropriate frequency. It also made some basic inquiries into the safety of the

electrical equipment. Under these circumstances GC was not obligated to test the outlets itself to determine if they were all grounded. It is not citable for the grounding violation.

b. Control Established by a Combination of Other Contract Rights: Where there is no explicit contract provision granting the right to control safety, or where the contract says the employer does not have such a right, an employer may still be a controlling employer. The ability of an employer to control safety in this circumstance can result from a combination of contractual rights that, together, give it broad responsibility at the site involving almost all aspects of the job. Its responsibility is broad enough so that its contractual authority necessarily involves safety. The authority to resolve disputes between subcontractors, set schedules and determine construction sequencing are particularly significant because they are likely to affect safety. (NOTE: citations should only be issued in this type of case after consulting with the Regional Solicitor's office).

(1) **Example 9**: Construction manager M is contractually obligated to: set schedules and construction sequencing, require subcontractors to meet contract specifications, negotiate with trades, resolve disputes between subcontractors, direct work and make purchasing decisions, which affect safety. However, the contract states that M does not have a right to require compliance with safety and health requirements. Further, Subcontractor S asks M to alter the schedule so that S would not have to start work until Subcontractor G has completed installing guardrails. M is contractually responsible for deciding whether to approve S's request.

Analysis: **Step 1:** Even though its contract states that M does not have authority over safety, the combination of rights actually given in the contract provides broad responsibility over the site and results in the ability of M to direct actions that necessarily affect safety. For example, M's contractual obligation to determine whether to approve S's request to alter the schedule has direct safety implications. M's decision relates directly to whether S's employees will be protected from a fall hazard. M is a controlling employer. **Step 2:** In this example, if M refused to alter the schedule, it would be citable for the fall hazard violation.

(2) **Example 10**: Employer ML's contractual authority is limited to reporting on subcontractors' contract compliance to owner/developer O and making contract payments. Although it reports on the extent to which the subcontractors are complying with safety and health infractions to O, ML does not exercise any control over safety at the site.

Analysis: **Step 1:** ML is not a controlling employer because these contractual rights are insufficient to confer control over the subcontractors and ML did not exercise control over safety. Reporting safety and health infractions to another entity does not, by itself (or in combination with these very limited contract rights), constitute an exercise of control over safety. **Step 2:** Since it is not a controlling employer it had no duty under the OSH Act to exercise reasonable care with respect to enforcing the subcontractors' compliance with safety; there is therefore no need to go to Step 2.

c. Architects and Engineers: Architects, engineers, and other entities are controlling employers only if the breadth of their involvement in a construction project is sufficient to bring them within the parameters discussed above.

(1) **Example 11**: Architect A contracts with owner O to prepare contract drawings and specifications, inspect the work, report to O on contract compliance, and to certify completion of work. A has no authority or means to enforce compliance, no authority to approve/reject work and does not exercise any other authority at the site, although it does call the general contractor's attention to observed hazards noted during its inspections.

Analysis: Step 1: A's responsibilities are very limited in light of the numerous other administrative responsibilities necessary to complete the project. It is little more than a supplier of architectural services and conduit of information to O. Its responsibilities are insufficient to confer control over the subcontractors and it did not exercise control over safety. The responsibilities it does have are insufficient to make it a controlling employer. Merely pointing out safety violations did not make it a controlling employer. NOTE: In a circumstance such as this it is likely that broad control over the project rests with another entity. **Step 2:** Since A is not a controlling employer it had no duty under the OSH Act to exercise reasonable care with respect to enforcing the subcontractors' compliance with safety; there is therefore no need to go to Step 2.

(2) **Example 12**: Engineering firm E has the same contract authority and functions as in Example 9.

Analysis: **Step 1:** Under the facts in Example 9, E would be considered a controlling employer. **Step 2:** The same type of analysis described in Example 9 for Step 2 would apply here to determine if E should be cited.

d. Control Without Explicit Contractual Authority . Even where an employer has no explicit contract rights with respect to safety, an employer can still be a controlling employer if, in actual practice, it exercises broad control over subcontractors at the site (see Example 9). NOTE: Citations should only be issued in this type of case after consulting with the Regional Solicitor's office.

(1) **Example 13**: Construction manager MM does not have explicit contractual authority to require subcontractors to comply with safety requirements, nor does it explicitly have broad contractual authority at the site. However, it exercises control over most aspects of the subcontractors' work anyway, including aspects that relate to safety.

Analysis: Step 1: MM would be considered a controlling employer since it exercises control over most aspects of the subcontractor's work, including safety aspects. **Step 2:** The same type of analysis on reasonable care described in the examples in (G)(5)(a) would apply to determine if a citation should be issued to this type of controlling employer.

F. Multiple Roles

1. A creating, correcting or controlling employer will often also be an exposing employer. Consider whether the employer is an exposing employer before evaluating its status with respect to these other roles.
2. Exposing, creating and controlling employers can also be correcting employers if they are authorized to correct the hazard.

Directives - Table of Contents

Job Hazard Analysis

Date	
Project Name/Market	
Project No.	
Site No.	
Contractor Name	
Contractor Field Supervisor	

Identification of Rooftop Hazards

Can any of the work be performed on the ground? ☐	**Work location requires controlled descent to access?**	**Are certified anchor points being used?** ☐ No ☐ Yes
Is there a parapet wall? ☐ Yes ☐ No *Height: (<39" is considered unpr*	☐ No ☐ Yes: *Controlled descent plan required.*	**Has the certification been verified?** ☐ No ☐ Yes
Work within 15' of roof edge or skylight? **☐ Yes ☐ No:** ***Action****: Set up flagging minimum spacing 6', height >34", <39".*	**Does the work location require a ladder?** ☐ No☐ Yes *Ladder Height:* **RF has been identified?** ☐ Yes ☐ No	

Required PPE for Job Task

☐ Hard Hat	☐ Gloves (type)	☐ Other (specify):
☐ Safety Glasses	☐ RF Monitor	
☐ Ear Plugs	☐ RF Suit	

Fall Protection System	**Fall Protection Equipment**		
☐ Guardrails/Parapet wall >39".	☐ Full Body Harness	☐ Rope grab	☐ Fall Arrest Lanyard
☐ Fall Restraint	☐ Descent device	☐ Anchor straps	☐ Rope ☐ SRD
☐ Fall Arrest	☐ Work Positioning System		☐ Other (specify):

Roof Condition, Documentation and Protection

Mandatory Roof Protection Measures - Keeping on designated walkways whenever possible. - ABSOLUTELY no roof penetrations. - Tether all "sharp" tools to avoid any accidental punctures.	**Roof Condition:** ☐ Unsafe ☐ Poor ☐ Fair ☐ Good *Action: make detailed notes on any roof condition not rated "Good." Include photographs for any deficiencies found.*

Hazard Analysis (Hazards and PPE identified above should be addressed below)

Sequence of Job/Task	Potential Hazards	Hazard Mitigation Measures

Employee Acknowledgement of JHA (All personnel entering jobsite must read and sign, add additional to reverse side of this form)

Printed Name:	Signature:

Supervisor Acknowledgement of JSA and Site Personnel

Supervisor Name:	Supervisor Signature: