



Additional Resources for **Fall Prevention**

AFPM thanks you for participating in our inaugural **Fall Prevention Week** in conjunction with the OSHA National Stand-Down. Fall Prevention is not just an annual activity, it is important to be aware and safe every time you work at height. While this week focused on five primary topics, there are many other elements and resources available to you around Fall Prevention. Since our members graciously shared the information, we are including additional resources for you. All materials can be found for AFPM Members on the [AFPM Safety Portal](#).

Learning from each other

It is in everyone's best interest to improve safety across the industry as one incident can affect us all. One way to learn is to learn from others. There are several resources that you can get knowledge from to help prevent falls.

Check them out here:
Toolbox from Energy Institute—
toolbox.energyinst.org/home

AFPM Resources

- Hazard Recognition and Mitigation
- Industry Alert—Fall From Height
- Swing Fall Hazards
- Swing Falls
- Aerial Lifts

Industry Resources

- Energy Institute: Working at Height
- Hazard Alert from CPWR: Aerial Lifts
- Falls from Roofs
- Fall Prevention Fact Sheet

Questions for Leaders and Supervisors

- How do you help ensure your workers understand the hazards around working at height?

Practice sharing documents are meant to share information on process or occupational safety practices in order to help improve safety performance and awareness throughout industry. The goal is to capture and share knowledge that could be used by other companies or sites when developing new safety practices or improving existing ones. The practices being shared have been used by an industry member, but this does not mean they should be used or that they will produce similar results at any other site. Rather, it is an option to consider when implementing or adjusting programs and practices at a site. This remains true even if a practice sharing document uses mandatory language, such as shall, must, never, etc., which only reflects a potential option to consider.

By themselves, the practice sharing documents are not standards or recommended practices. They are not intended to replace sound engineering judgment. They do not preclude the use of alternative methods that comply with legal requirements. A subject matter expert should be consulted prior to determining whether a practice sharing document can be used in any specific situation.



SAFETY *Toolbox*

Hazard Recognition and Mitigation

A Fall at Elevation

In 2017, a contractor required first aid after an incident while working from an elevated position (3.5' above grade) while standing on pipe. In making an adjustment to his footing, he slipped and fell across the pipe bruising his ribcage. Fortunately the injury was minor but the potential consequences could have been much more severe.



Most of our elevated walking and working surfaces are either fixed platforms or scaffold and are in place prior to conducting work, but there may come instances where access to a work activity is hampered by equipment such as piping and no work platform is readily available. What is the solution?

As this incident demonstrates, walking and working on piping is almost never the correct solution. The rounded surface of piping limits the amount of contact between the worker and the working surface making it easy to lose footing. The gap between piping can either allow a person to fall completely through or to allow a foot to become wedged. Depending on the height and circumstances of a fall of this nature the consequences can range from a minor first aid to a fatality.

In situations such as these it is the responsibility of all personnel performing the task to identify the hazards associated with the work, understand potential consequences and take the time to develop the best solution to mitigate the hazard. A simple scaffold structure or even scaffold planks secured to the top of piping can provide a stable platform from which to work. We are all empowered to stop unsafe situations. "You See It, You Own It" is not just a mantra, it is an expectation and value.

Discussion Starter:

What hazards are unique hazards you encounter in your workplace?

What can you do to mitigate those hazards?

What barriers are in your way that prevent you from implementing your mitigation solution?



Industry Alert – Safety

Fall from Height Fatality

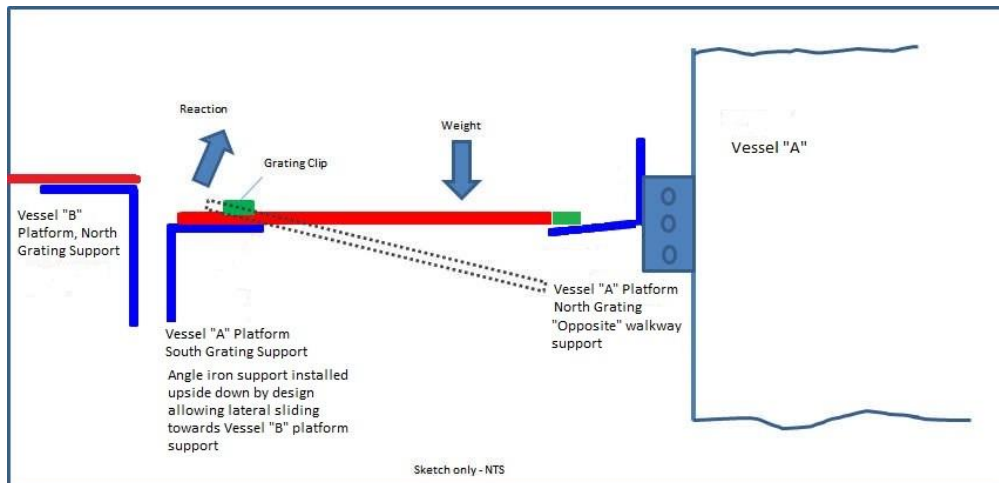


Incident Description

On January 12, 2015, a CITGO employee died following an unwitnessed fall from an upper level of a structure to a lower level at our Corpus Christi Refinery.

Incident Summary

A single piece of grating on the elevated walkway of the structure moved enough (slid sideways) along one of its walkway supports to lose contact with the edge of the opposite walkway support. When the employee applied his weight to the grating, it dislodged allowing the grating and the employee to fall through the opening. (see the diagram below)



Investigation Findings

- The original design and construction of the walkway allowed this particular grating to be built without a mechanical device, such as a toe-board or angle iron, to prevent the grating from sliding off the support. Specifically, the design called for the Vessel "A" Platform South Grating Support (angle iron depicted above) to be installed upside-down allowing the grate to gradually slide towards the Vessel "B" Platform North Grating Support.
- Only 3 of the 4 grating clips were holding the grating down. One clip was missing due to an apparently previously fractured bolt. The three clips alone were insufficient to prevent the grating from sliding off the support.
- Structural movement of Vessel "A" possibly contributed to loosening of the grating clips and/or the movement of the grating beyond the support.

Lessons Learned

To mitigate the risk from moving grates on elevated walkways the following actions may be considered:

- Review safety, operations and maintenance procedures for grating inspection to assess issues including, but not limited to: fit and finish field checks of grating installation, additional guidelines for attaching grating clips, and the importance of an outside bar or toe plate/keeper plate to prevent excessive grating movement.
- Enhance preventative maintenance and operator training that includes minimum requirements for grating inspection.
- Review engineering and construction standards for minimum acceptable grating sizing to prevent excessive horizontal movement.

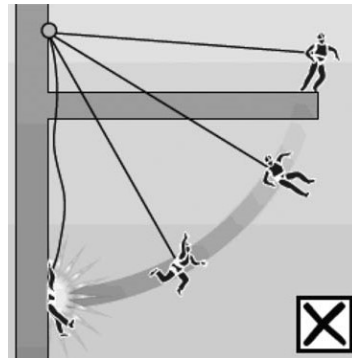
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SAFETY *Toolbox*

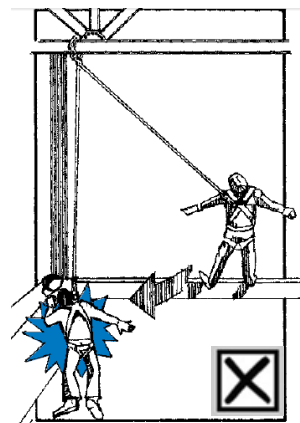
Swing Fall Hazards

When evaluating fall hazards and proper protective measures one thing to think about before implementing a fall arrest system is swing hazards. If an anchorage (tie-off) point is not positioned directly overhead, if a fall does occur, there will be a swing hazard. A swing fall is a pendulum-like motion that can occur when a worker moves in a horizontal direction away from a fixed anchorage, and then falls. While the force generated in a swing fall is the same as the force in a vertical fall, there is a potential hazard of colliding with a structure such as equipment or a platform.



Striking an object while swinging can lead to a serious injury. Since self-retracting lifelines allow for greater horizontal and vertical mobility than the standard six foot shock-absorbing lanyards, extra care should be taken to reduce swing falls.

Whether using shock-absorbing lanyards or self-retracting lifelines, it is very important to position your anchorage point directly overhead whenever possible to minimize swing falls. The farther you move sideways from your anchor point, the greater the chance of swinging if you fall. And the more you swing, the greater the force with which you'll strike columns, walls or other objects in your path.



What steps do you take to evaluate and eliminate swing fall hazards?



Module: Working at Heights
Topic: Swing Fall

Objective:

This lesson will discuss the hazards of swing falls and how to avoid them.

Key learning objectives:

- What a swing fall is
- Hazards of swing falls
- How to avoid a swing fall

Group Discussion:

A swing fall is a pendulum-like motion that can occur when a worker moves in a horizontal direction away from a fixed anchorage, and then falls. The force generated in a swing fall is the same as the force in a vertical fall, however there is a potential hazard of colliding with a structure such as a building or platform. Swing falls occur when the attachment point is not directly overhead, but instead is located at the workers waist, ankle, or the worker has strayed more than 30° from an overhead attachment point. If the attachment point is directly overhead, no swinging occurs after the freefall.

To illustrate how a swing fall occurs, visualize a game of tetherball. Imagine that the worker is the ball and the attachment point is where the rope is tethered to the top of the pole. When the ball is held up at an angle from the top of the pole and dropped, it swings into an arc, and eventually the path of the swing brings the ball in contact with the pole. Conversely, if the ball is held directly under the tie off point, lifted up and dropped, instead of swinging, the ball will fall and rock back and forth until it comes to a rest next to the pole.



Remember swing falls can be avoided by ensuring that the worker's attachment point remains overhead, regardless of the area in which they are working.

Key learning knowledge check:

1. What is a swing fall?
2. How does a swing fall happen?
3. How can a swing fall be avoided?

“There is no place for spectators.” We will Break the Trend!

Answers: 1. A pendulum-like motion that can occur after a fall; 2. When a worker moves in a horizontal direction away from a fixed anchorage, and then falls; 3. By ensuring that the worker's attachment point remains overhead.



Module: Working at Heights
Topic: Aerial Lifts

Objective:

This lesson will discuss preventing falls during the use of aerial lifts.

Key learning objectives:

- Safe operation of Aerial Lifts
- How accidents occur
- Fall prevention practices

Group Discussion:

Aerial lifts are designed to position workers and handle materials when a work surface isn't easy to reach.

Most accidents involving aerial lifts can be traced to untrained or improperly trained workers. Reasons for falls:

- A hydraulic cylinder fails and causes the boom to drop.
- Outriggers are not used or improperly placed and the lift vehicle overturns.
- Workers are not tied off while they are in the bucket.
- Workers fall or are pulled off the platform when the lift is struck by a vehicle or moves unexpectedly.



Keep in mind the following when you use an aerial lift:

- Use the lift only for its intended purpose.
- Keep the operating manual with the lift.
- Keep the lift level and stable; use outriggers and stabilizers.
- Never move the lift when the boom is up and workers are on the platform.
- Don't sit or climb on the edge of the basket, guardrail, or midrail.
- Be sure to close the access gate while you're working from the platform.
- Inspect the lift before using it to make sure that it's working properly and it's in good condition.
- Know the lift's rated load capacity and don't exceed it.
- Use warning signs or barricades to keep others out of the work area.
- Never tie off to other equipment or to a structure next to the platform.

Key learning knowledge check:

1. What can most accidents involving aerial lifts be traced to?
2. Workers not being tied off while they are in the bucket are responsible for what?
3. What should never be done when the boom is up and workers are on the platform?

“There is no place for spectators.” We will Break the Trend!

Answers: 1. Untrained or improperly trained workers; 2. Falls 3. The lift should never be moved



Hazards of working at height



Working at height typically means working above 1.8m/6ft. This can include use of ladders, working over water, rope access, or working around floor openings, access hatches and inspection pits.

When working at height outside a protected area (such as an elevated work area not enclosed by hand rails), use approved fall protection equipment secured to an approved anchor point. Floor openings should be protected with physical barriers to prevent falls. Scaffolds should be properly constructed, inspected, and certified.

Preventing objects from falling from height and using physical barriers below the working area can keep you and people working below you safe.

Working at Height

Protect yourself against a fall when working at height



- I inspect my fall protection equipment before use
- I secure tools and work materials to prevent dropped objects
- I tie off 100% to approved anchor points while outside a protected area

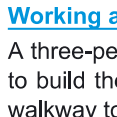
Source: IOGP, Report 459 IOGP Life-Saving Rules

Here are some incidents that have happened to people working at height:



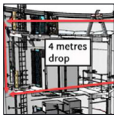
Hazards of using mobile elevated work platforms

Dangers of mobile elevated work platforms including overhead lines, crushing, falling from height, and dropped objects. What keeps you awake at night?



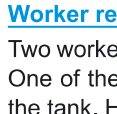
Working at height

A three-person team was erecting a piling against shuttering boards to build the last wall of a control room. A worker fell 4 m (13ft) from the walkway to the floor of the bracket below. He suffered a wrist fracture...



Non-compliance during pre-assembly on turbine tower

During up-ending pre-assembly tasks on a turbine tower sections, a team of technicians were in the process of de-mobilising and leaving the working area. As they climbed down the tower, a camera fell...



Worker receives serious injuries after fall from ladder

Two workers were entering a confined space, accessible through a ladder. One of the workers fell during the transition from the ladder to the top of the tank. He sustained serious injuries and was transported to hospital.



Fall from caged ladder

A worker was climbing down a caged ladder. He fell down the ladder and over the guardrail of the landing below, seriously injuring himself.

Q toolbox.energyinst.org





HAZARD ALERT

CPWR 
 THE CENTER FOR CONSTRUCTION
 RESEARCH AND TRAINING

AERIAL LIFTS



If used right...

An aerial lift can prevent falls and reduce the risks for back, neck and shoulder injuries caused by working at or above shoulder level by positioning you where you need to work.



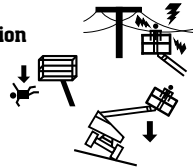
A scissor lift (left), a cherry picker (middle), and a bucket truck (right).

But there are different types of aerial lifts including scissor lifts, bucket trucks, and cherry pickers. The down lever on one can be the up lever on another model.

If not used right, the results can be deadly.

Major causes of deaths are...

- **Electrocution**
- **Falls**
- **Tipovers**



Construction workers die each year while using aerial lifts.

If you think you are in danger:
 Contact your supervisor.
 Contact your union.
 Call OSHA
1-800-321-OSHA

To learn more:

- ▶ Visit www.StopConstructionFalls.org
- ▶ Download the NIOSH Aerial Lift Hazard Recognition Simulator
<https://www.cdc.gov/niosh/topics/falls/aeriallift.html>



To receive copies of this Hazard Alert and cards on other topics:

call **301-578-8500** or visit **www.cpwr.com**

Before you use the lift ...



PHOTO COURTESY OF SUNBELT RENTALS

1 Get training

Your employer must make sure every authorized lift operator is trained by a qualified person* experienced with the model of aerial lift being used. Once trained, follow manufacturer instructions.

*A qualified person is someone who by knowledge, training and experience has successfully demonstrated their ability to resolve problems relating to the project. (Source: OSHA)



PHOTO COURTESY OF KEWIT POWER CONSTRUCTORS

2 Wear a full body harness

If your lift is struck by another vehicle, you can be thrown from the lift. Using proper fall protection will keep you from a serious or fatal fall. You must use a lanyard attached to an engineered anchor in the basket or on the boom. Do not attach it to the guardrail.



3 Check for overhead power lines

Do a pre-job walk-through to look for power lines. Ask your supervisor if the electrical wires or power lines have been de-energized. Unless you are a qualified electrical worker, stay a **minimum of 10 ft away from all power lines.***

* OSHA FactSheet - Aerial Lifts
<https://www.osha.gov/Publications/aerial-lifts-factsheet.html>

Before operating an aerial lift...

- Check operating and emergency controls.
- Make sure the base controls are working so that someone on the ground can lower the lift if you are unable to work the controls.
- Look for potential hazards such as potholes, bumps, or debris.
- Set out riggers, brakes, and wheel chocks—even if on a level surface.

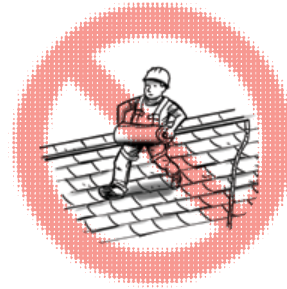
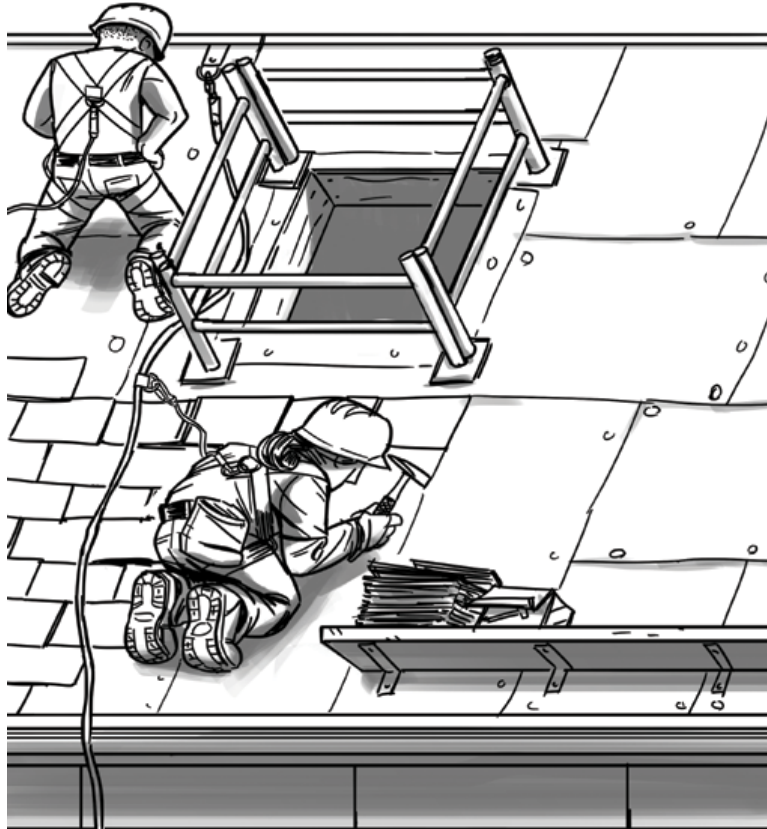
While operating an aerial lift...

- **Always** wear full fall protection.
- **Always** close lift-platform chains or doors, and check guardrails.
- **Do not** climb on or lean over guardrails.
- **Do not** exceed load limits.

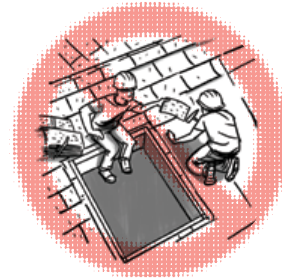


FALLS FROM ROOFS CAN BE PREVENTED!

- ✓ Wear a harness and always stay connected
- ✓ Make sure your harness fits
- ✓ Use guardrails or lifelines
- ✓ Inspect all fall protection equipment before use
- ✓ Guard or cover all holes, openings, and skylights



DON'T
 disconnect from
 the lifeline



DON'T
 work around unprotected
 openings or skylights



DON'T
 use defective equipment

PLAN ahead to get the job done safely.
PROVIDE the right roof equipment.
TRAIN everyone to use the equipment safely.



U.S. Department of Labor



Occupational Safety and Health Administration

1-800-321-OSHA (6742) • TTY 1-877-889-5627
www.osha.gov

NIOSH 2012-142 / OSHA 3533-04 2012



FALL PREVENTION FACT SHEET

I worked construction for 10 years before my fall. It shattered my body and my livelihood.

Work safely. Use the right equipment.



Safety Pays. Falls Cost.
www.osha.gov/stopfalls/

PLAN ahead to get the job done safely. **PROVIDE** the right equipment. **TRAIN** everyone to use the equipment safely.