



International
Association
of Oil & Gas
Producers

Line of Fire

Raising Awareness of Line of Fire
FPI Hazards

IOGP Life-Saving Rules Supporting Materials



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- The 10 Line of Fire hazard categories
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 - Questions
 - Actions

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to view more information on
IOGP Life-Saving Rules
and additional Line of Fire materials



or visit
www.iogp.org/life-savingrules/

Introduction

- The IOGP Safety Committee's core objective is to eliminate fatal and life changing injuries.
- People being in the line of fire is often the difference between a high potential situation and an actual Fatality or Permanent Impairment (FPI) injury outcome.
- This package of materials supports the implementation of the Line of Fire (LoF) Life-Saving Rule (LSR).

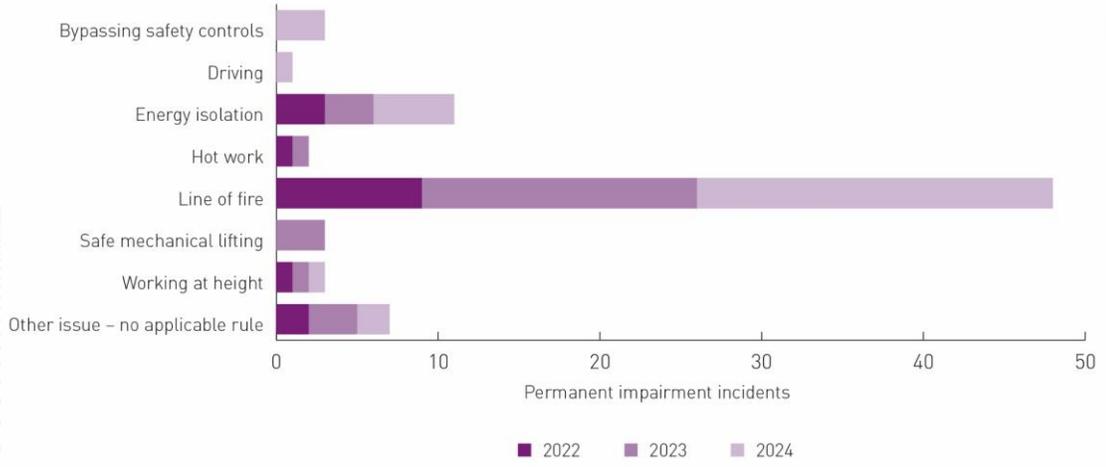
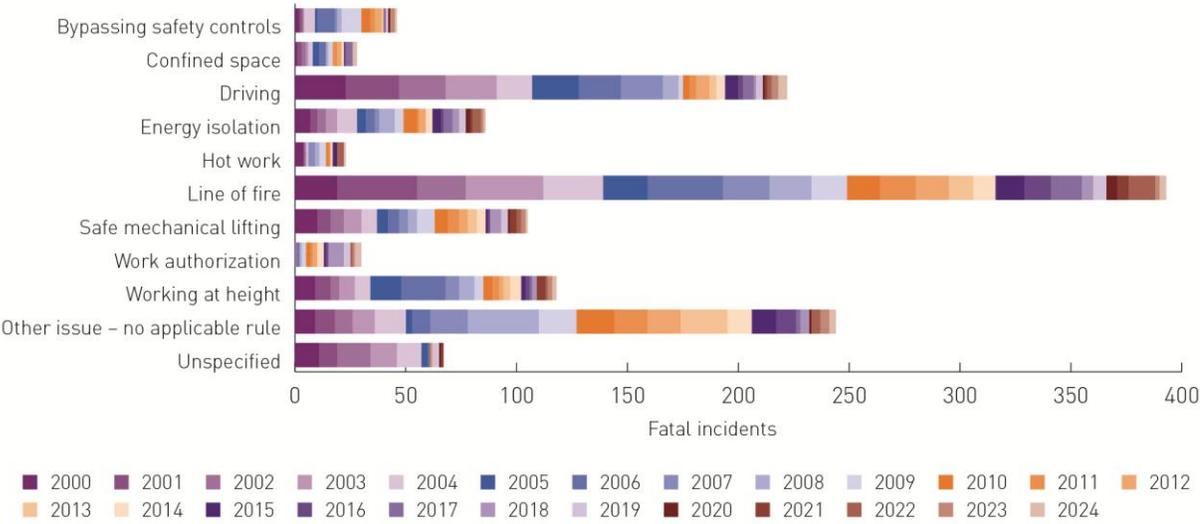
Keep yourself and others out of the line of fire

- I position myself to avoid:
 - moving objects
 - vehicles
 - pressure releases
 - dropped objects
- I establish and obey barriers and exclusion zones
- I take action to secure loose objects and report potential dropped objects



Data Analysis - LSR Allocated to Reported FPI Incidents

IOGP data shows that LoF is the LSR that was most frequently assigned to FPI incidents.

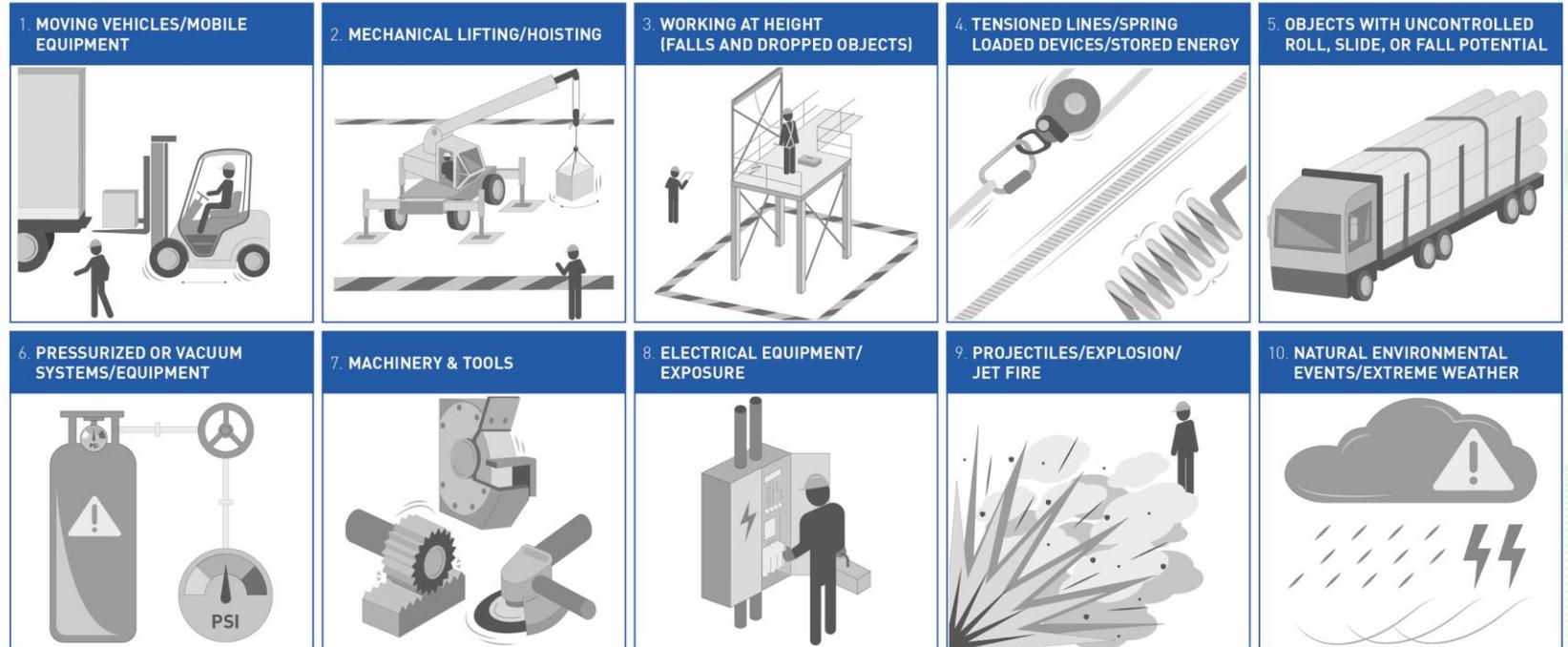


Fatal incidents (2000-2024)

Permanent impairment incidents (2022-2024)

Learning From Line of Fire FPI Data

- Derived from FPI incident data analysis:
 - 10 LoF hazard categories.
 - Supporting materials to enhance understanding and promote learning.
 - Questions and Actions to help prevent people being in the wrong place at the wrong time.



Line of Fire Hazard Categories – Questions and Actions

- LoF Questions and Actions can be used to support the risk management process at the worksite to:
 - Raise awareness
 - Promote worker engagement and stimulate conversations
 - Ensure verification and validation of effective control measures
 - Promote continuous improvement



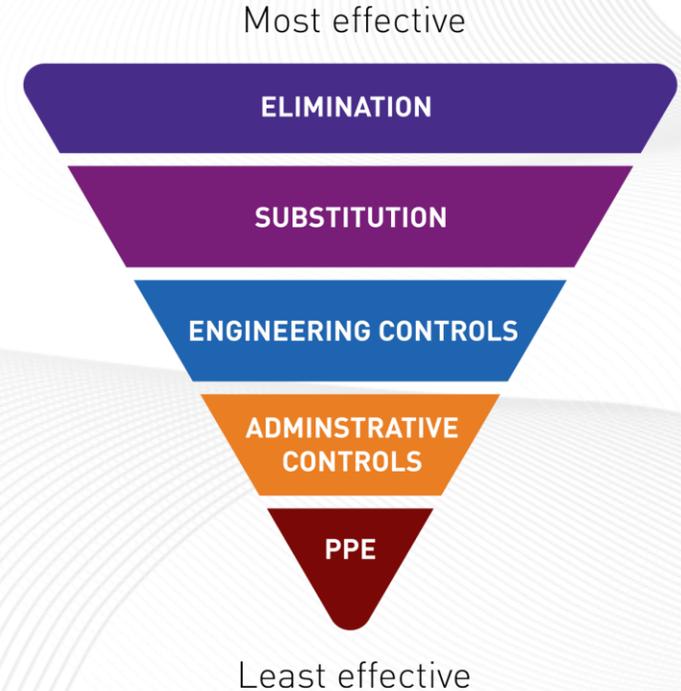
Worksite Implementation

- Life-Saving Rules provide actions individuals can take to protect themselves and others.
- LoF materials aim to help individuals and others avoid being in the line of fire. They are not intended to provide a fully comprehensive set of design requirements and controls.
- Context drives behaviour*. Controls need to be worksite-specific and should be prioritised based on the hierarchy of controls.
- Multiple LoF hazard categories and controls may apply.
- The organization managing the worksite is responsible for implementation of effective controls.

* IOGP Human Performance Principles

<https://www.iogp.org/workstreams/safety/safety/human-performance>

Hierarchy of Controls



Line of Fire Hazard Categories

- Questions



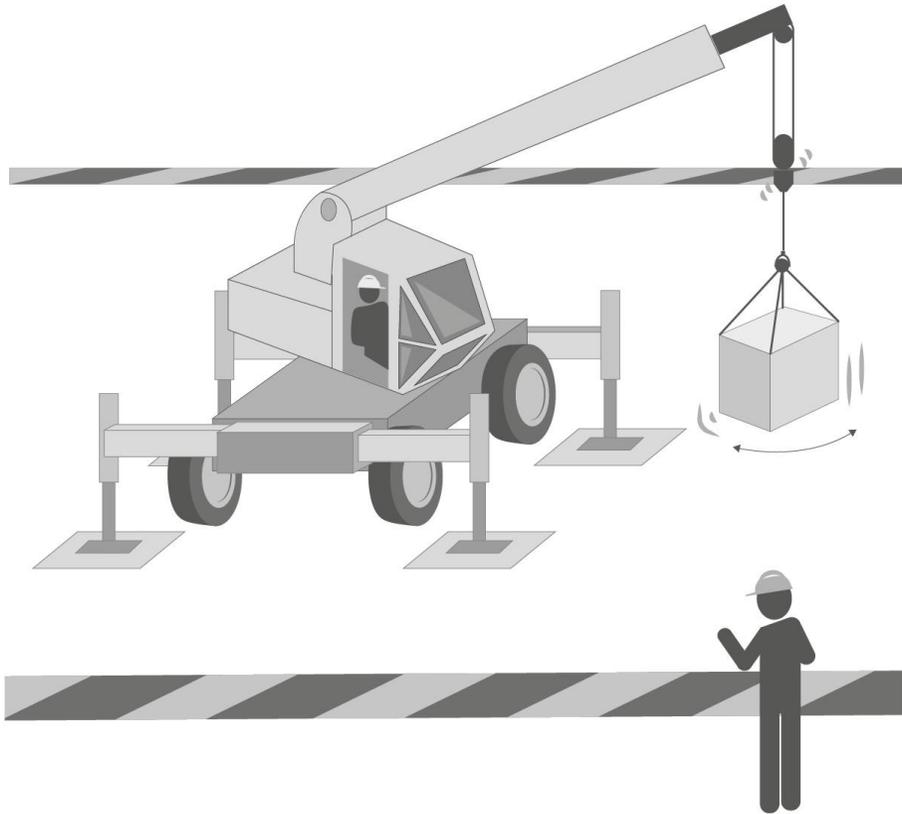
1. MOVING VEHICLES/MOBILE EQUIPMENT



- Are there designated routes and segregation between personnel and moving vehicles/mobile equipment in the workplace?
- Are systems in place to prevent unexpected movement? E.g., parking brakes and wheel chocks.
- When maneuvering or reversing, can proximity cameras/sensors be used instead of people being in the line of fire? E.g., signaler.
- Does the driver/operator have a clear view of personnel in the immediate area and understand where the blind spots are?

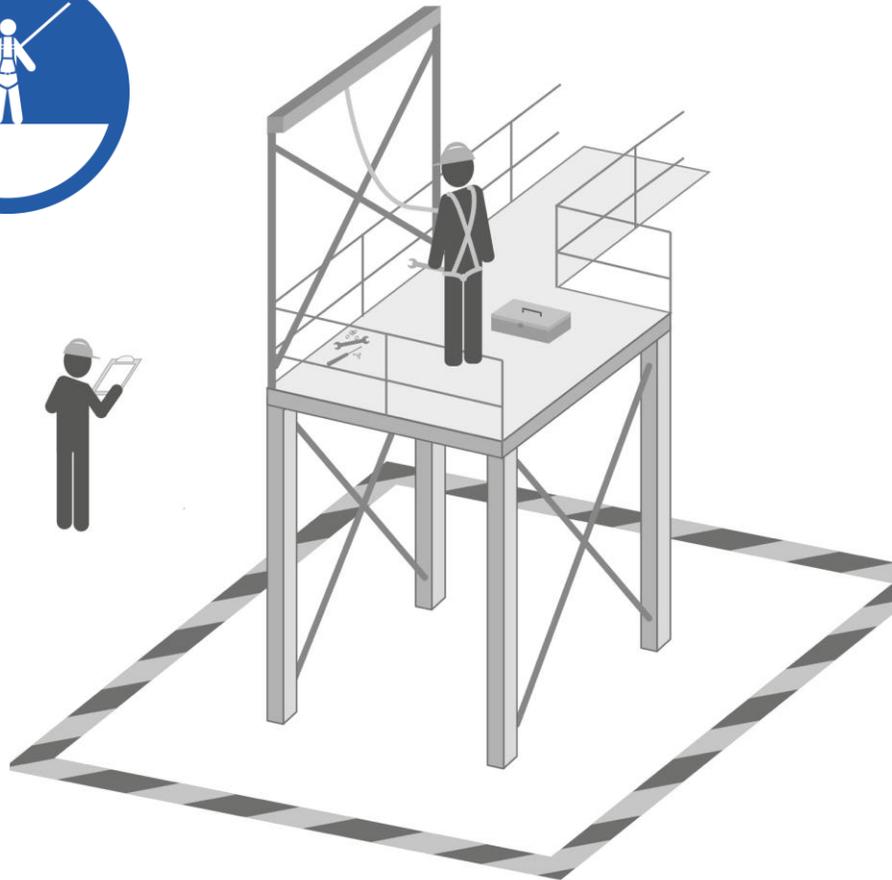
Note the principles for mobile equipment also apply to water vessels, boats, barges, railway rolling stock, and helicopters.

2. MECHANICAL LIFTING/HOISTING



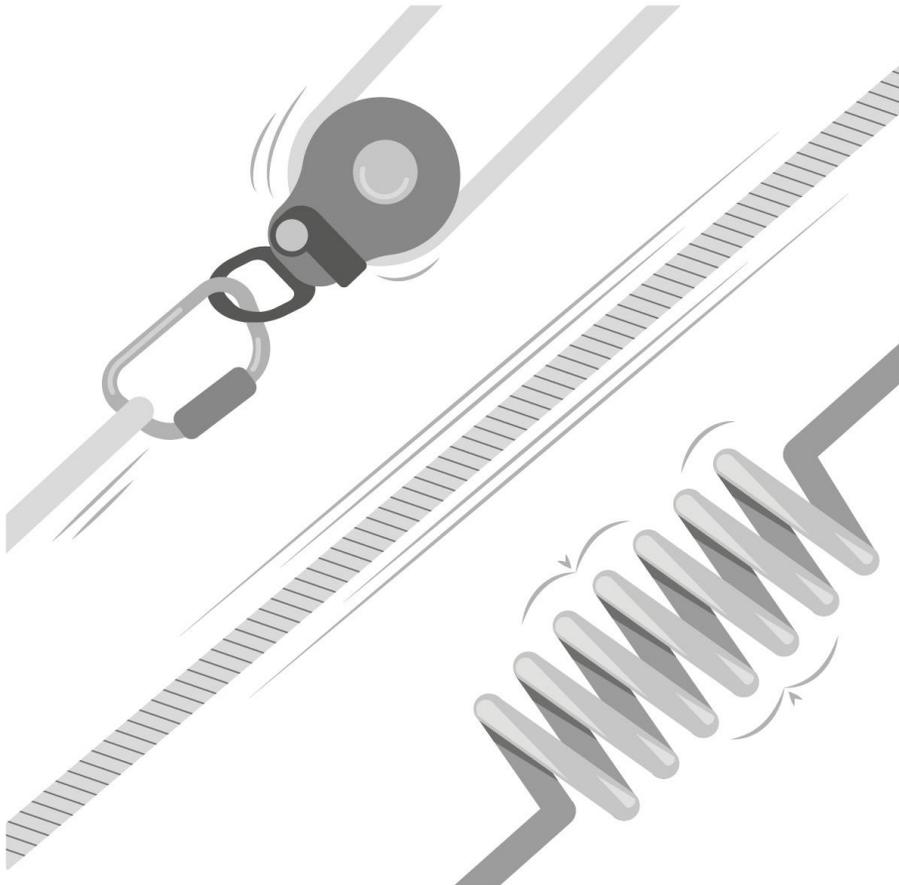
- Are unauthorized individuals restricted from entering exclusion/red zones, and are these zones access controlled during lifting and hoisting activities?
- Have you secured or removed loose objects prior to the lift?
- Could a load swing when being lifted or lowered?
- Has rigging equipment been loaded to more than its maximum safe limit?
- Are approved forklift lifting attachments used instead of free-rigging (direct loading onto the forks)?
- Are hands free tools used to avoid contact with the load? E.g., tag lines, push pull sticks.

3. WORKING AT HEIGHT (FALLS AND DROPPED OBJECTS)



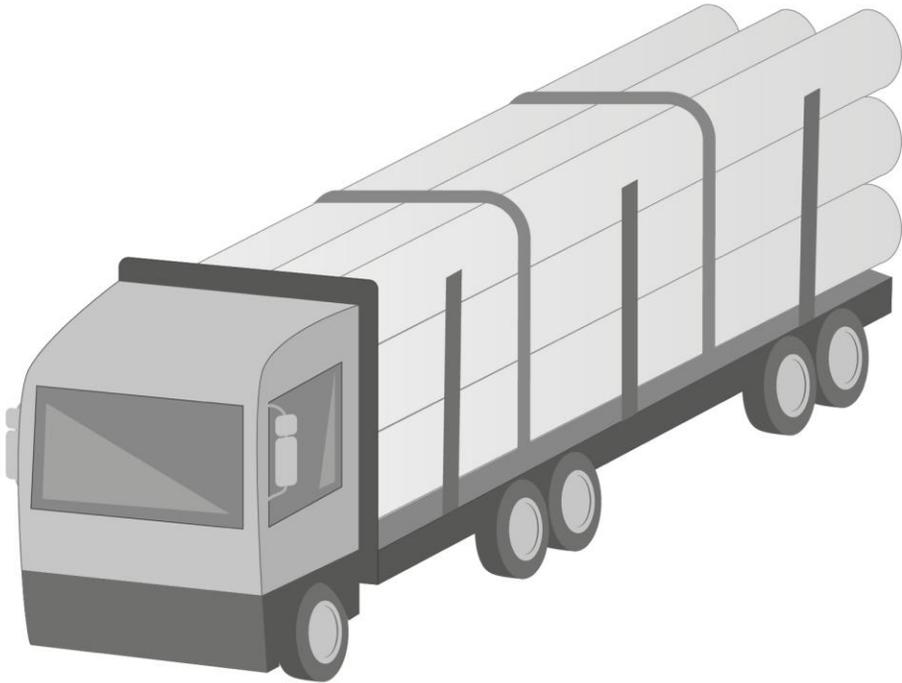
- Are work areas at height protected by guard rails, or are people adequately secured when working at height? E.g., harness, lanyard.
- Are people adequately protected from falling through a working surface to a lower level? E.g., openings in grating surfaces, or roof work on fragile walking/working surfaces.
- Has a drop zone been established under any work being performed at height?
- During use or transfer, have all tools, equipment and materials been secured or prevented from falling? E.g., tool lanyards, netting, or tool bags.
- Are your anchor points approved for the intended purpose?

4. TENSIONED LINES/SPRING LOADED DEVICES/STORED ENERGY



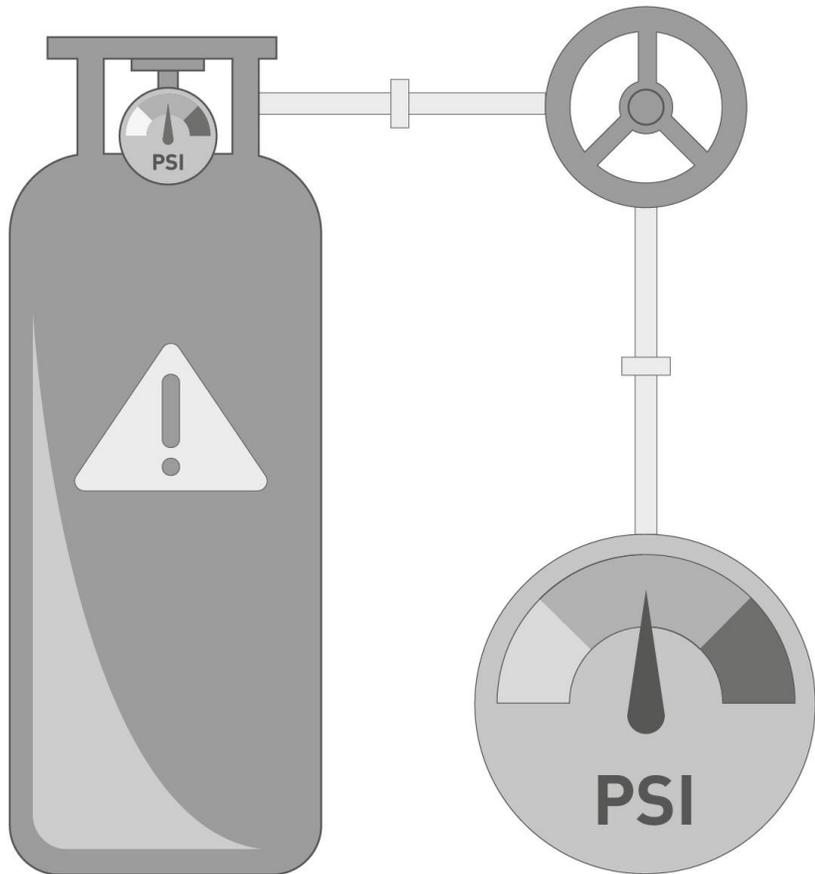
- Are you aware of, and stay clear of, tensioned lines (e.g., chain, cable, mooring line, rope), strapping, coiled tubing, and coiled or spring-loaded devices?
- Are your hands and body clear of rigging equipment? E.g., cables and shackles.
- Have you considered the potential for pipe/equipment/sheeting movement when cutting, unbolting, or releasing items under tension or compression?
- Have you established exclusion/red zones where there is a potential for stored energy release? E.g., 'snap back' zones.

5. OBJECTS WITH UNCONTROLLED ROLL, SLIDE, OR FALL POTENTIAL



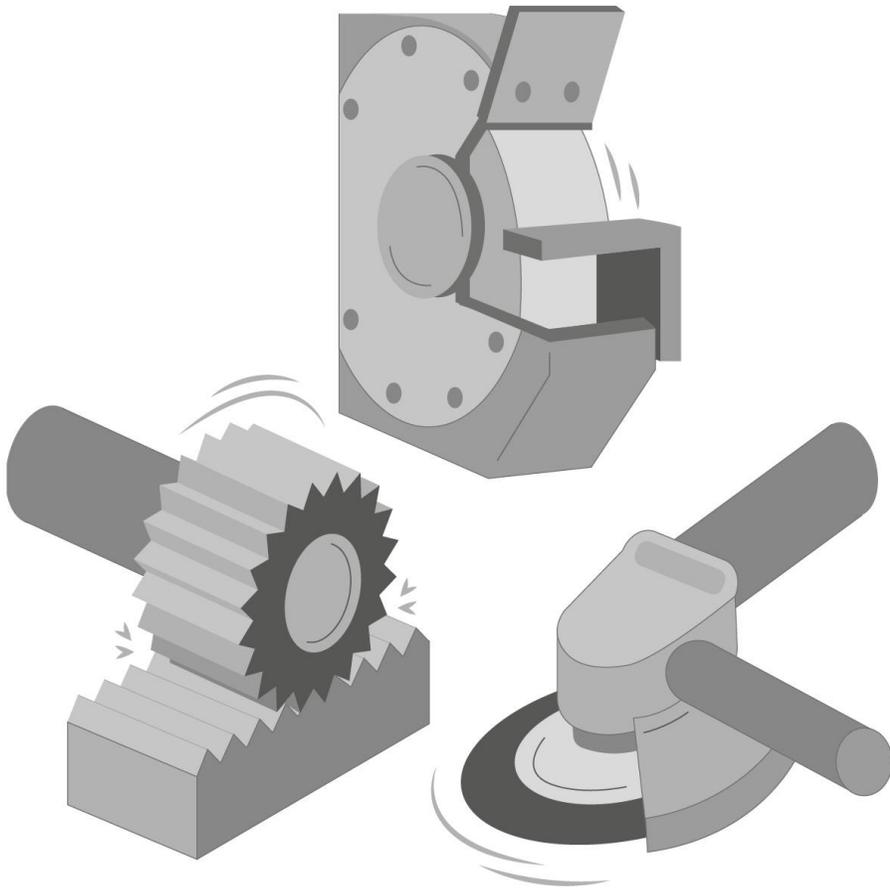
- Are any items or objects that can roll, slide, or fall adequately secured or restrained? E.g., top heavy pipes, steel sheets, items installed/stored at height, trench walls, or transported items.
- Are exclusion/red zones in place and access controlled where there is potential for drops or uncontrolled movement? E.g., by barriers.
- Do exclusion/red zones consider dropped objects that could potentially bounce, ricochet, or roll after first impact?
- Are loads adequately secured before lifting, loading, unloading, or transporting, on land or by water? E.g., transport head boards, side stanchions.
- Are items to be transported properly packaged to prevent uncontrolled movement? E.g., baskets, cradles, pipe chocks, support saddles, load securing devices.

6. PRESSURIZED OR VACUUM SYSTEMS/EQUIPMENT



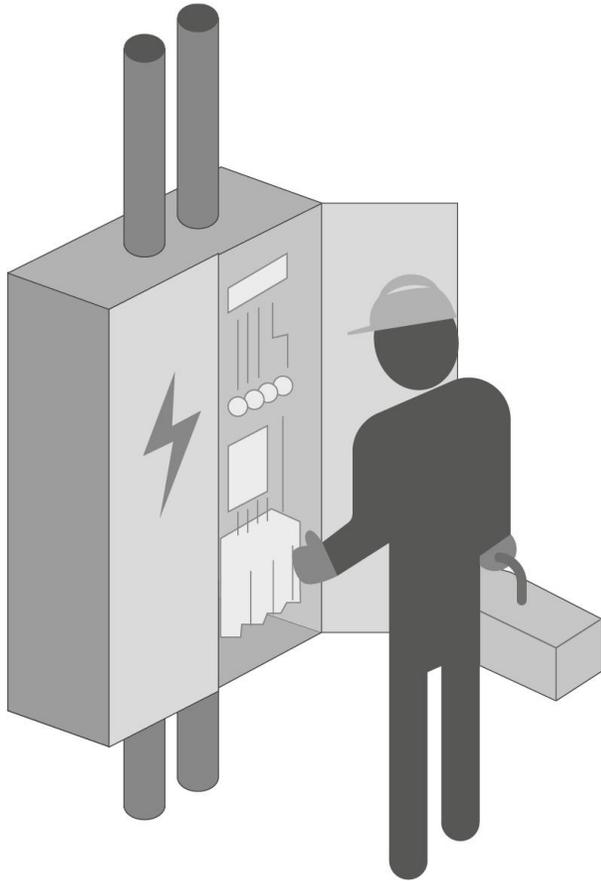
- Before breaking containment, e.g., cutting into or opening equipment or pipeline, have you verified zero energy?
- Have you double checked that the isolation was effective for the correct piece of equipment or pipeline?
- Even after verification of zero energy, do you keep your body out of the line of fire?
- Are all compressed gas cylinders secured and upright with caps installed?
- Are you aware of line of fire risks when working with pressurized equipment or tools? E.g., pressurized hoses, pressure testing, or tyres.
- Are there areas where vacuum or suction can impact people? E.g., divers near seawater pump suction.

7. MACHINERY & TOOLS



- When working near equipment with moving parts or machinery that can move unexpectedly, can clothing or body parts (e.g., hands/fingers) be trapped?
- Are the safety devices designed for your tools/equipment in place and working effectively? E.g., dead man's switch, guards, sensors, and/or interlocks.
- Could equipment move or rotate unexpectedly, or continue to move when de-energized?
- When pushing, pulling, or hammering, can you and others remain out of the line of fire? E.g., when using a wrench or cart.
- Can you remain out of the line of fire, considering the potential for equipment to become loose or unstable, when dismantling or unbolting?

8. ELECTRICAL EQUIPMENT EXPOSURE



- Have you verified zero energy and that isolation (lock out tag out) is in place and effective? E.g., test before touch.
- Do you know and maintain the safe distance from overhead or underground powerlines to avoid contact or potential for arcing?
- Are effective controls in place, when servicing energized equipment, or when switching a breaker into position? E.g., anti static/arc rated PPE, grounding/earthing mats.
- Do you consider your positioning when working on energized equipment, in relation to the equipment movement as well as the power source?
- Is access to electrical rooms, panels, switch gear, etc. restricted to authorized personnel only?

9. PROJECTILES/EXPLOSION/JET FIRE



- Can people and combustible materials be kept out of the line of fire during tasks in the workplace that generate sparks, flying debris, or projectiles? E.g., grinding, chipping, abrasive blasting, hydro-blasting, pigging, etc.
- Are effective controls in place to protect personnel from exposure to explosion/projectiles? E.g., barricade and restrict access, area containment, blast walls.
- Are safe pathways and shelter-in-place available, known, and their use practiced, in case of explosion or jet fire?
- Has hot work been adequately controlled, including gas test if required?

10. NATURAL ENVIRONMENTAL EVENTS/EXTREME WEATHER



- Have you considered the effects of weather conditions and natural events when determining how and when to conduct tasks? E.g., tides, waves, wind, earthquake, landslide, lightening, snow, ice, flooding, wild fire, storm.
- Are there controls in place to ensure people are not endangered by extreme weather conditions or natural events? E.g., stop work conditions, shelter available, securing loose items.
- Are permanent and temporary structures designed, effectively secured, and maintained, for natural events or extreme weather?
- Have natural hazards been identified, and response and recovery plans put in place to manage these?

Line of Fire Hazard Categories

- Actions



1. MOVING VEHICLES/MOBILE EQUIPMENT

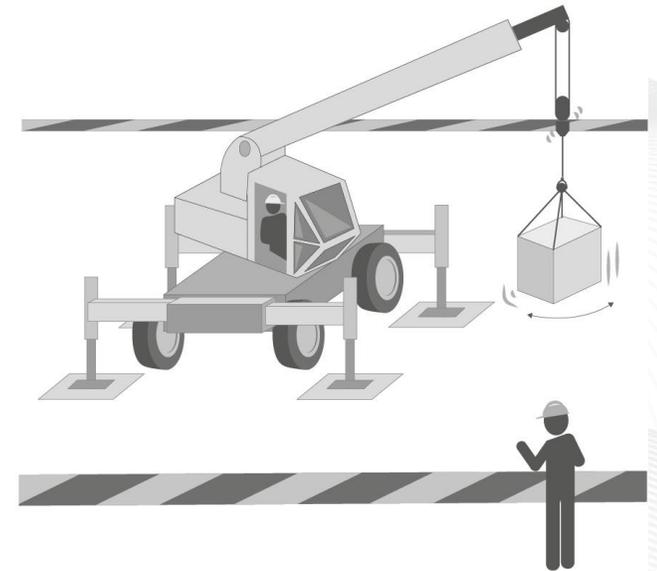
- **Designated Routes:**
Clearly mark routes to separate personnel from vehicles.
- **Unexpected Movement:**
Use parking brakes and wheel chocks.
- **Proximity Technology:**
Replace signalers with cameras or sensors for reversing and maneuvering.
- **Operator Awareness:**
Ensure operators have clear visibility and know blind spots.

Note the principles for mobile equipment also apply to water vessels, boats, barges, railway rolling stock, and helicopters.



2. MECHANICAL LIFTING/HOISTING

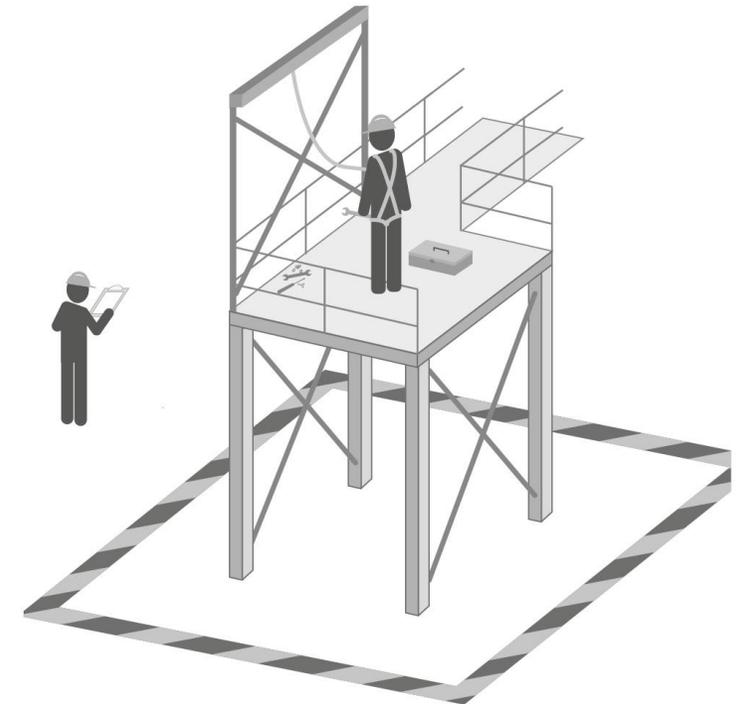
- **Access Control:**
Prevent unauthorized access to exclusion/red zones. Use barriers for access control.
- **Secure loose objects:**
Secure or remove loose objects prior to the lift.
- **Control Excessive Load Movement:**
Control load swing to prevent unexpected movement during lifting or lowering. Consider proper rigging center of gravity, wind, and motion.
- **Rigging Safety:**
Use rigging equipment within safe load limits.
- **Proper Attachments:**
Use approved forklift attachments; no free-rigging.
- **Hands Free Lifting:**
Use hands free tools to avoid contact with the load. E.g., tag lines, push pull sticks.



3. WORKING AT HEIGHT (FALLS AND DROPPED OBJECTS)

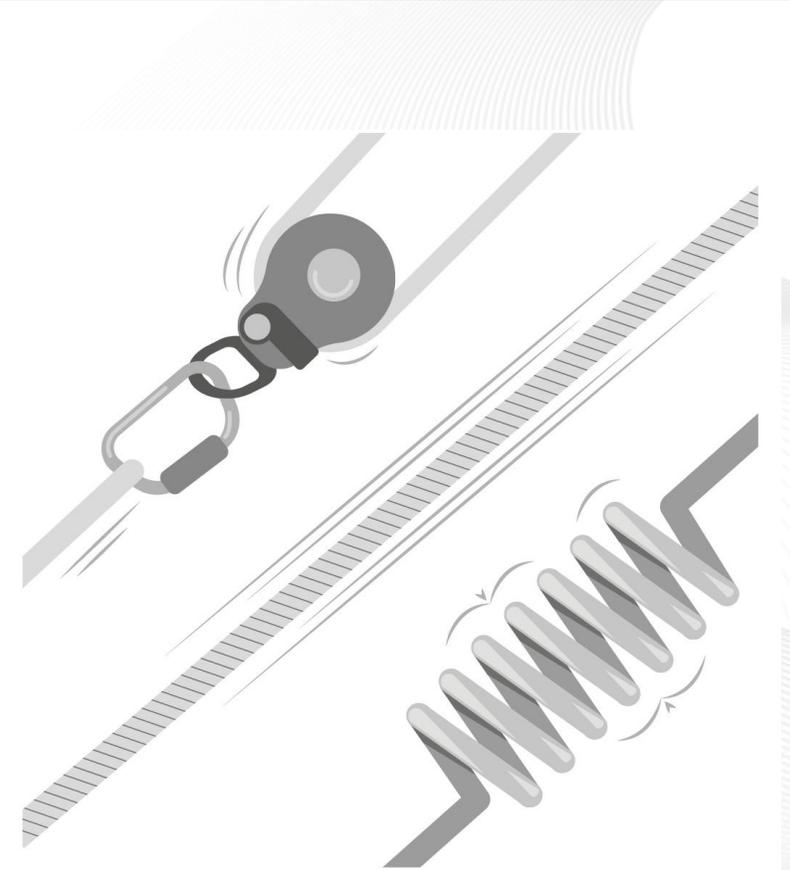


- **Fall Prevention or Protection:**
Prevent falls with guardrails or personal fall prevention/protection equipment.
- **Working Surface Safety:**
Protect against falling through fragile surfaces or openings.
- **Exclusion/Red Zone:**
Establish drop zones below working at height areas.
- **Secure Tools:**
Safely transfer tools and materials using bags or secured containment systems. Secure tools and equipment used while working at height.
- **Anchor Points:**
Only use approved anchor points for their intended purpose.



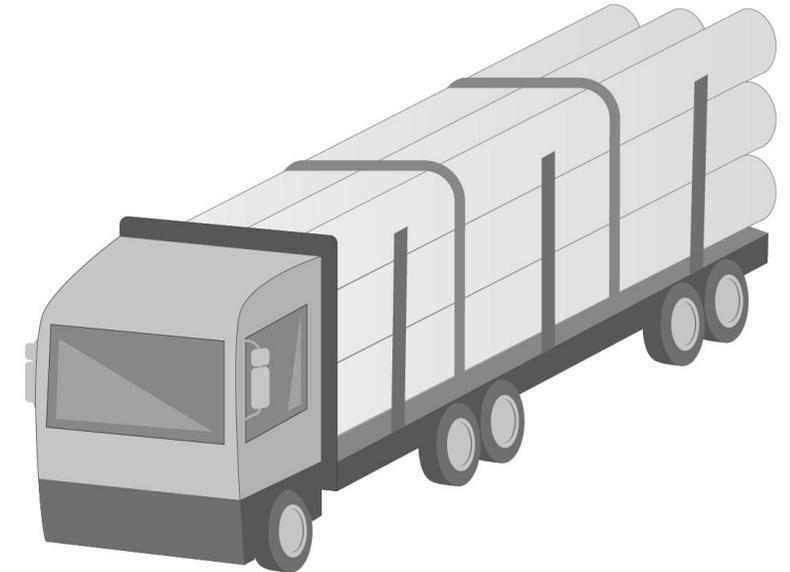
4. TENSIONED LINES/SPRING LOADED DEVICES/STORED ENERGY

- **Positioning:**
Stay clear of tensioned lines (chains, cables, mooring lines, ropes), strapping, coiled tubing, and spring-loaded devices.
- **Hands/Body Placement:**
Keep hands and body away from rigging, cables, and shackles.
- **Pipe/Equipment Movement:**
Prepare for movement when cutting or unbolting, or release of stored energy.
- **Exclusion/Red Zones:**
Establish exclusion/red zones where there is a potential for stored energy release. E.g., 'snap back' zones.



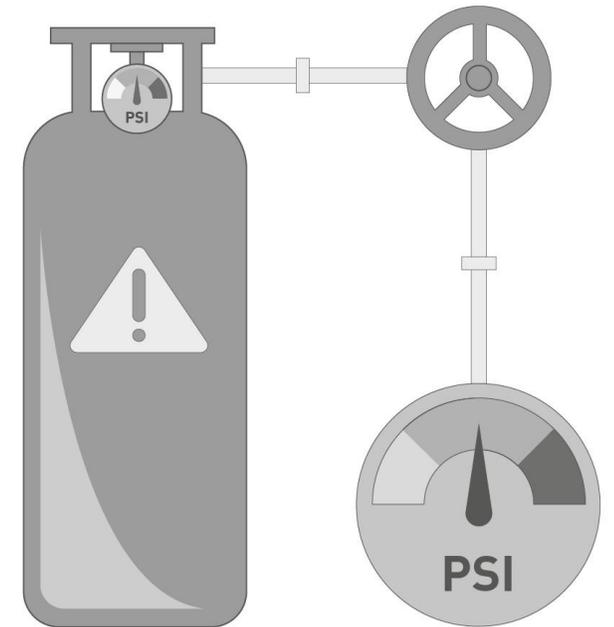
5. OBJECTS WITH UNCONTROLLED ROLL, SLIDE, OR FALL POTENTIAL

- **Secure/Restrain Items:**
Secure/restrain top heavy objects, pipes, steel sheets, items installed/stored at height, trench walls, or transported items that can roll, slide, or fall.
- **Exclusion/Red Zones:**
Use barriers to control and prevent unauthorized access, accounting for objects that might fall or bounce.
- **Load Security:**
Ensure loads are secure before lifting, loading, unloading, or transporting.
- **Packaging for Transport and Storage:**
Use baskets, cradles, chocks, support saddles, or load securing devices.



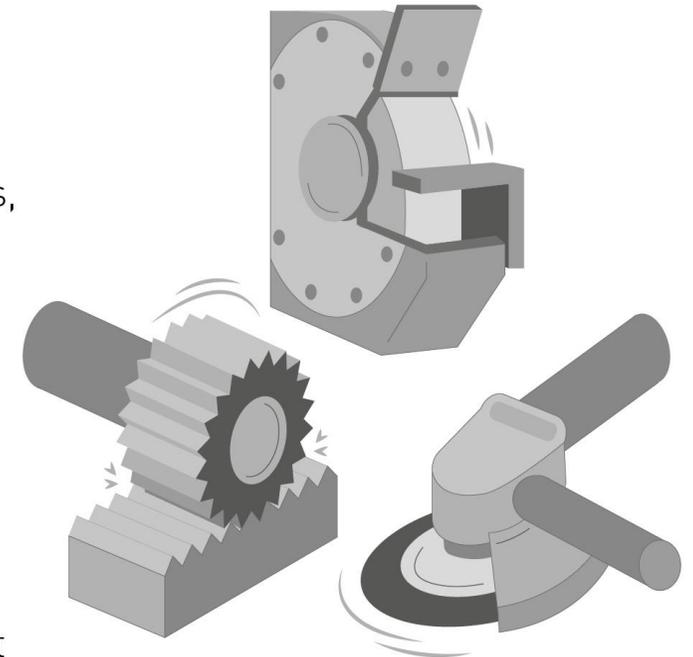
6. PRESSURIZED OR VACUUM SYSTEMS/EQUIPMENT

- **Zero Energy Check:**
Confirm zero energy including gas check before breaking containment. E.g., cutting or opening pipelines, or equipment.
- **Effective Isolation:**
Verify the isolation is effective for the correct piece of equipment or pipeline.
- **Stay Out of the Line of Fire:**
Maintain safe body positioning, even after zero energy is verified.
- **Compressed Gas Cylinders:**
Secure cylinders upright with caps installed.
- **Pressurized Equipment:**
Be alert to line-of-fire risks from pressurized equipment. E.g., tools, hoses, pressure testing, or tyres.
- **Vacuum/Suction Hazards:**
Identify risks to people from vacuum/suction systems. E.g., divers near seawater pump suction.



7. MACHINERY & TOOLS

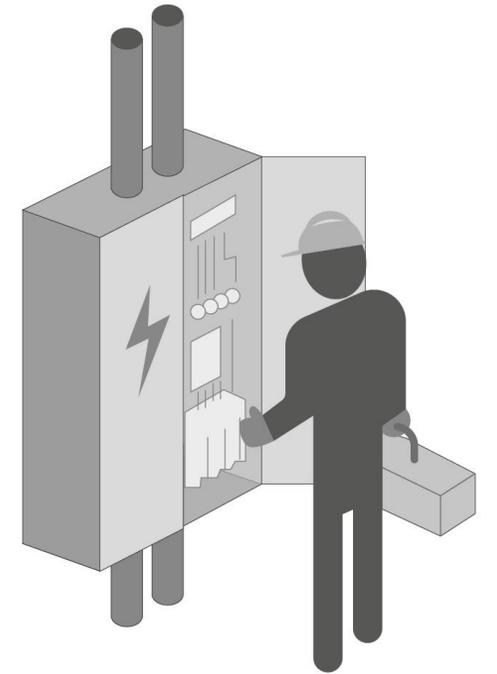
- **Moving Parts or Machinery:**
Keep clothing and body parts clear of equipment with moving parts or machinery that can move unexpectedly.
- **Safety Devices:**
Ensure safety features are in place and functional. E.g., dead man's switch, guards, sensors, and/or interlocks.
- **Unexpected Movement:**
Be prepared. Equipment or parts may move or rotate, even when de-energized.
- **Safe Positioning:**
Keep yourself and others out of the line of fire when pushing, pulling, or hammering. E.g., using a wrench or cart.
- **Stability During Dismantling:**
Confirm you can stay out of the line of fire, considering the potential for equipment to become loose or unstable, when dismantling or unbolting.



8. ELECTRICAL EQUIPMENT EXPOSURE



- **Zero Energy Check:**
Verify zero energy and effectiveness of isolation (lock out tag out), test before touch.
- **Powerlines - Maintain Safe Distance:**
Know and maintain the safe distance from overhead or underground powerlines to avoid contact or potential for arcing.
- **Energized Equipment:**
Implement effective controls when servicing energised equipment or when switching a breaker into position. E.g., anti static/arc rated PPE, grounding/earthing mats.
- **Safe Positioning:**
Consider your positioning when working on energized equipment, in relation to the equipment movement as well as the power source.
- **Restricted Access:**
Limit access to electrical rooms, panels, and switch gear to authorized personnel.



9. PROJECTILES/EXPLOSION/JET FIRE

- **Flying Debris:**
Keep people out of the line of fire during tasks like grinding, chipping, or blasting, that may create projectiles.
- **Protection from Projectiles and Explosions:**
Use barricades and controls to protect personnel from exposure and/or restrict access.
- **Protection from Jet Fires:**
Make sure safe pathways and shelter-in-place are available, known, and their use practiced.
- **Hot Work:**
Ensure adequate controls are in place, including gas test if required.



10. NATURAL ENVIRONMENTAL EVENTS/EXTREME WEATHER

- **Task Planning:**
Consider extreme weather and natural events when determining how and when to conduct tasks. E.g., tides, waves, wind, earthquake, landslide, lightening, snow, ice, flooding, wild fire, storm.
- **Safety Controls:**
Ensure controls are in place to protect people during extreme weather conditions or natural events.
E.g., stop work conditions, shelter available, securing loose items.
- **Structural Safety:**
Verify permanent and temporary structures are designed, effectively secured, and maintained, for extreme weather.
- **Hazard Management:**
Identify hazards from natural events and extreme weather, and establish response and recovery plans.





For more information please contact:

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