the human energy company™

MSW Initial/Refresher Training

Hazard Analysis

Introduction

- Eliminate or mitigate risks by identifying hazards, taking actions to reduce them and sharing what we know.
- Hazard Analyses must be conducted by qualified people for the type of work and its potential hazards. Analysis may include:
  - **Planning Phase Analysis** such as Job Hazard Analysis (JHA), Safety Plan, Safety Instructions, Operating Procedures (with a review equivalent to a Planning Hazard Analysis), instructions, review of safety plans, operator checklists or equivalent.
  - **Job Safety Analysis** (JSA) and JHA or equivalent including onsite review.
  - **Personal hazard assessment** tools, including Personal Safety Plan, Assess Hazard Analyze Safeguards (AHAS) or equivalent.

The first safeguard is **YOU.**

- address any factors that may interfere with your readiness to perform well and to react effectively to unexpected events or changes.
- Review and follow the procedure for the task.
- Question what you would do in an emergency and include that information in the JSA document.
- Discuss the JSA with your co-workers to ensure it addresses the hazards associated with the work, that you understand what you will be doing and that you know how to do it safely.
- If the job changes: Stop, evaluate and revise the JSA as needed. Don’t make snap decisions.

Objectives of Hazard Analysis

- Identify the hazards of a specific work activity
- Specify the safeguards/mitigations necessary to conduct the work safely
- Communicate the hazards and safeguards to the entire work team and any other potentially affected personnel
- The Hazard Analysis ensures:
  - The scope of the work is understood
  - Appropriate resources are available
  - Hazards are identified, safeguards are identified and are verified and validated
  - Affected workers understand their roles and responsibilities

Hazard Analysis

Identify and Classify Work

- The employee requesting that work be completed will need to adequately describe the work and clearly define the following:
  - **Location** (e.g. San Jose Terminal; Station No. 1892 -11453 Valley Blvd, EL Monte, CA)
  - **Equipment** (e.g. Tank 101-UG; Canopy Lighting)
  - **Time frame** (e.g. March 2019; 3rd week of April, 2019)
  - **Activity Limitations** (e.g. Tank can only be our of service for a maximum of 10-days, station to remain operational with only one pump/dispenser closure at a time)

The employee requesting the work will next obtain or create an initial work plan. The initial work plan should include an outline of work steps in enough detail to determine if any of the MSW requirement applies.

The work plan may be a combination of documents such as the work order, work permit and MSW tools.

Hazard Analysis

Identify and Classify Work

- Task classifications along with associated hazard analysis are outlined in the Task Consequence Catalog (TCC). Work/Task consequences are classified as **Low, High and Critical Consequence**.
- The TCC outlines minimum task consequence levels and types for listed tasks as well as additional work plans or approvals as required

Critical Consequence Plans (CPP) are required for critical consequence tasks. This is:

- A complete work plan that is developed and approved by site Management and subject matter experts on the topic.
- A form of PPHA.

Examples include Hot Tap Packages, Critical Lift Plans and Inert Entry Job Plans.

ID#	TASK	Consequence	TASK TYPE	Other Relevant Documents	Permit Issuer MUST attend Pre-job Briefing	Site Check Requirement	Approval Requirements	CCP Review Team
C51C	Confined space entry - Entry into process equipment without positive isolation. (e.g. vault entry, flow water seperators)	Critical	Task Dependent	Site generated CCP Confined Space Permit Rescue Plan	Yes	Yes	Terminal Manager	Safety SME, Engineering SME, Operations Management
C52C	Confined space entry - Entry into inert atmospheres	Critical	Task Dependent	Inert Entry CCP EC Inert Entry	Yes	Yes	Terminal Manager	Chevron Company Rep, Chevron Health & Safety Rep, Contract Service Provider SME
C53C	Confined space entry - Entry into potentially IDLH atmosphere	Critical	Task dependent	Site generated CCP Confined Space Permit Rescue Plan	Yes	Yes	Terminal Manager	Safety SME, Engineering SME, Operations Management
D10C	Diving - including underwater welding	Critical	Task Dependent	Site generated CCP Professional Certifications	Yes	No	Terminal Manager	
E08C	Energized electrical conductors:> 300v (within restricted approach boundary)	Critical	Non-Open Flame	Site generated CCP	Yes	No	Terminal Manager	Qualified Electrician
E23C	Excavation: > 20 ft. deep (6.1m) (Confined Space Entry)	Critical	Task Dependent	Site generated CCP Underground Drawings Engineered Drawing	Yes	Yes	Maintenance or Engineering Manager	Civil Engineering SME
H10C	Hot Tap	Critical	Non-Open Flame	Welding on Equipment in Service (WOES)/Hot Tap CCP EC WOES/Hot Tap	Yes	Yes	Terminal Manager	Engineering SME, Contract Service Provider SME, Operations Rep.

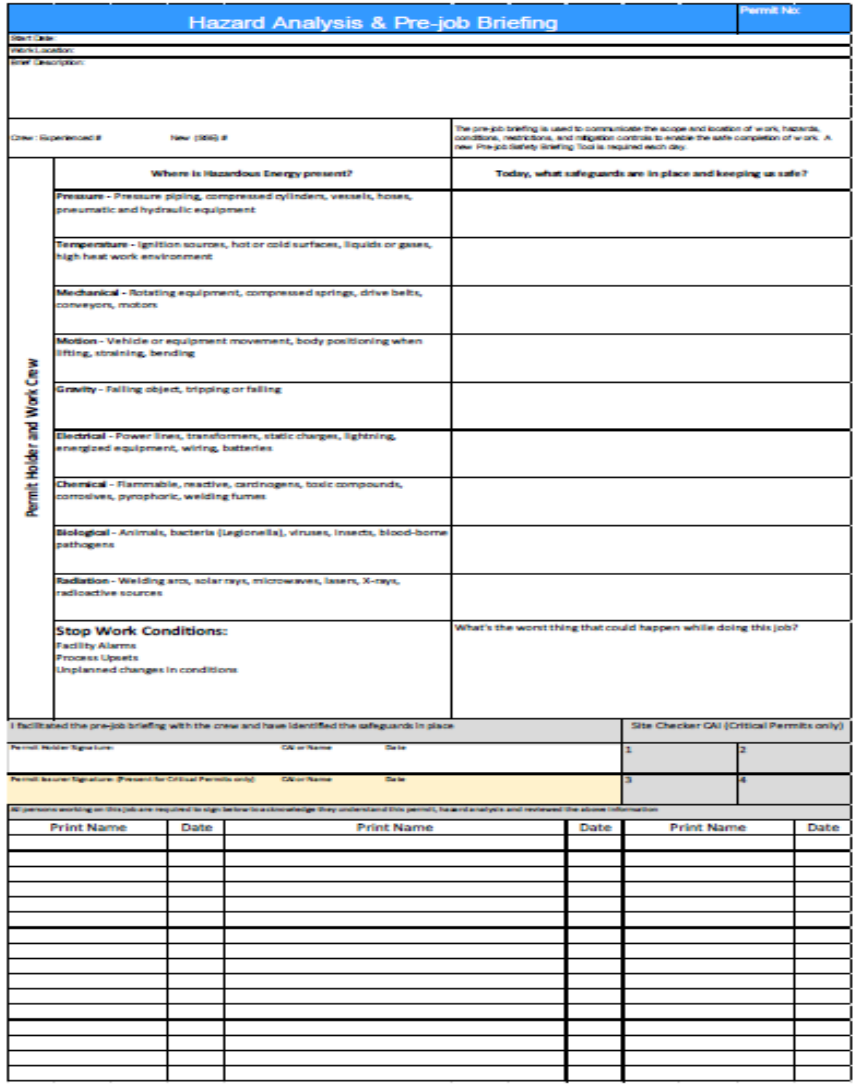
Hazard Analysis

Conduct an Assessment

- The Permit Holder must conduct a pre-job safety briefing with all workers at the job site whenever a PTW is issued, extended or renewed
- All those attending the Pre-job brief are required to sign the form
- The team will inspect the job site and take note of any hazards that may impact the performance of safe work.
- An existing or pre-developed JSA may be used; however, it must be thoroughly reviewed by the team to ensure it is still relevant and accurate to the site. The JSA must be modified as needed to reflect any changes in materials, equipment, conditions or procedures.

Hazard Analysis

Conduct an Assessment



Hazard Analysis & Pre-job Briefing

Permit No:

Work Date:
Work Location:
Brief Description:

Crew: Experienced # New (SWS) #

The pre-job briefing is used to communicate the scope and location of work, hazards, conditions, restrictions, and mitigation controls to enable the safe completion of work. A new Pre-job Safety Briefing Tool is required each day.

Permit Holder and Work Crew

Where is Hazardous Energy present?	Today, what safeguards are in place and keeping us safe?
Pressure - Pressure piping, compressed cylinders, vessels, hoses, pneumatic and hydraulic equipment	
Temperature - Ignition sources, hot or cold surfaces, liquids or gases, high heat work environment	
Mechanical - Rotating equipment, compressed springs, drive belts, conveyors, motors	
Motion - Vehicle or equipment movement, body positioning when lifting, straining, bending	
Gravity - Falling object, tripping or falling	
Electrical - Power lines, transformers, static charges, lightning, energized equipment, wiring, batteries	
Chemical - Flammable, reactive, cardinogens, toxic compounds, corrosives, pyrophoric, welding fumes	
Biological - Animals, bacteria (Legionella), viruses, insects, blood-borne pathogens	
Radiation - Welding arcs, solar rays, microwaves, lasers, X-rays, radioactive sources	
Stop Work Conditions: Facility Alarms Process Upsets Unplanned changes in conditions	What's the worst thing that could happen while doing this job?

I facilitated the pre-job briefing with the crew and have identified the safeguards in place

Site Checker QA (Critical Permits only)

Permit Holder Signature: OA or Name: Date:

Permit Issuer Signature: (Present for Critical Permits only) OA or Name: Date:

1 2 3 4

All persons working on this job are required to sign below to acknowledge they understand this permit, hazard analysis and reviewed the above information

Print Name	Date	Print Name	Date	Print Name	Date

- The Hazard Analysis will cover:
  - Scope of work
  - The conditions of the General Work Permit & associated documents
  - Potential hazards & risks associated to the work & the defined control measures
  - Advice that anybody can stop the work if it is felt unsafe to continue
  - Evacuation & emergency response plan requirements
  - Emergency action requirements, including assembly expectations
  - Location of emergency response & first aid equipment
  - PPE requirements
  - Conditions when Stop Work shall be used

Hazard Analysis

Identifying Potential Hazards

What to look for?

Physical Conditions
- Chemicals
- Equipment/Tools (e.g. availability of equipment)
- Work Space
- Other hazardous materials

Environmental Conditions
- Temperature
- Humidity
- Noise
- Lighting
- Weather

Other Factors
- Actions or behaviors
- Work experience levels (i.e. SSE)
- Human interface with equipment (i.e. extended reach to operate valve)
- PPE
- Time allotment (is there enough time to get the job done)
- Timing of task (schedule at optimal time)
- Communication tools
- Training or Certifications

What conditions would cause you to STOP WORK?

Hazard Analysis

Hazard Control

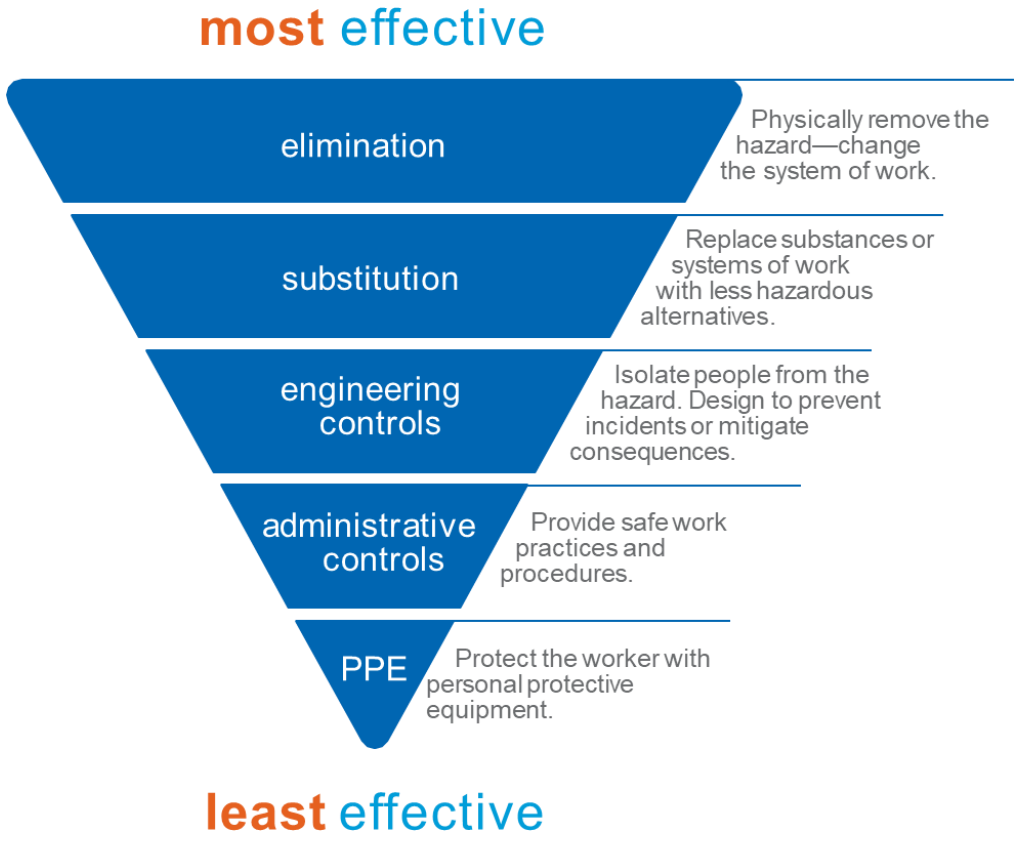
Establishing safeguards

- Selection of safeguards involves important decision points for long-term, effective risk management
- Hierarchy of controls guides selection of safeguards by recognizing variation in effectiveness
- Industry and company codes and standards form the basis for design of most safeguards

Sustaining and assuring safeguards

- Procedures, processes, and policies work together as an integrated structure to sustain presence and assure effectiveness of safeguards

hierarchy of controls illustrated for workforce safety and health risks



Hazard Analysis

Implement Safeguards

Safeguards are identified to control the hazards (STKY)

Am I ready to start this job?

- What is the worst thing that can happen?
- Are there safeguards in place to prevent me from getting hurt or killed?
- Do I understand what those safeguards are?
- Do I feel comfortable doing this job?

STKY

(Stuff That'll Kill You)

"Am I Ready" Checklist	
The "Am I Ready" checklist provides a less than 2-minute pre-job focus for the individual performing a job to hit each potential problem area before a job begins	
	Do I understand the task? (If we are not sure what we are to do, we should not be starting the task.)
	Can I do it safely? (Hazards, PPE, etc., including can I get hurt or hurt someone?)
	What error likely situation do I have?
	What error reduction tools will I use?
	What can go wrong? (How can I get into a situation that I shouldn't be in and what am I going to do about it?)
	What's the worst that can happen? (Significant credible consequence to people, equipment, or environment.)
	What conditions stop this task?
	Am I qualified and ready to start work?

Hazard Analysis – Confined Space

Potential Significant Hazards & Prevention

- **Emergency-related entry** can be hazardous without proper planning, training and equipment.
- **Lack of oxygen** due to N_2, CO_2 or other agents can incapacitate workers in a confined space.
- **Flammable vapors** may be present or build up during the work and create an explosive atmosphere.
- **Pyrophoric material** (ignites on exposure to oxygen) may exist in vessels or pipes.
- **Toxic gases** such as CO or H_2S can be hazardous in high concentrations.
- **Material in the space** could shift and trap workers.
- **Converging walls or sloping floors** can cause a fall onto unguarded equipment below.
- **Unguarded or exposed electrical equipment** in a confined space poses a risk for electrocution.
- **Inadequate entry/exit methods** (ladders, stairs and scaffolding) can cause falls and hinder evacuation.
- **Extreme temperatures** in a non-ventilated space can lead to heat stress, heat stroke and other hazards.

- Comply with permitting requirements.
- Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- Establish a job-specific rescue plan, including rescue personnel and equipment, before entering the confined space.
- Keep a trained, CPR-certified entry watch at the assigned post throughout entry and any emergencies.
- Maintain an entry log at all times.
- Ensure workers entering confined spaces are fit for duty and qualified to work in a confined space.
- Complete and verify the isolation checklist – following approved isolation procedures – before starting work.
- Assess and eliminate pyrophoric materials prior to opening equipment (using temperature monitoring and air samples to confirm elimination as the material dries).
- Use adequate ventilation equipment, and follow all gas testing and monitoring requirements and procedures.
- Provide two-way communication (radios, not cell
- phones) for operations group and rescuers.

Hazard Analysis – Hot Work

Potential Significant Hazards & Prevention

- **Inadequate surveillance of job site conditions** (for example, not monitoring for combustible gas) may put personnel at risk.
- **Flammable gases** can be present or build up during the work and create an explosive atmosphere.
- **Flammable and combustible materials** in the work area can ignite from transfer of heat, sparks or slag.
- **Uncontrolled entry into a restricted work site** by motor vehicles or other engine driven equipment (such as generators and welding machines) can ignite a fire or cause an explosion.
- **Explosive pockets of gas** can build up while performing underwater cutting or welding.
- **Compressed gas cylinders** may explode if hoses catch fire or may become missiles if pressure is suddenly released.

- Comply with permitting requirements.
- Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- Complete and verify the isolation checklist and follow approved isolation procedures before starting work.
- Make sure flammables can't be introduced during hot-work operations. Seal drain openings, tank vents and pressure safety valve (PSV) discharges.
- Clear hot-work area of combustibles and flammables.
- Cut vents in underwater equipment where necessary to allow flammable gases to escape.
- Adhere to all gas testing requirements. Test properly to be sure there are no pockets of flammable vapors.
- Have a dedicated fire watch onsite during the work and for at least 30 minutes after hot work.
- Inspect all equipment, and follow safe handling procedures for compressed gas cylinders and hoses.
- Secure and barricade the work site to prevent unauthorized access of vehicles and personnel.
- Enforce permits for motorized vehicles operating in classified hazardous areas.

Hazard Analysis - Electrical

Potential Significant Hazards & Prevention

- **Lapses in focus** while working on live electrical systems can present an electrocution hazard.
- **Electrically energized equipment and live electrical systems** can expose workers to electrocution or arc-flash burns.
- **Overhead power lines** can cause electrocution, especially near ladders, lifting and other tall equipment.
- **Underground electrical cables** can present hazards during any excavation, large or small.
- **Flammable vapor or material** may ignite from sparks generated during electrical work.
- **Static electricity** can ignite flammables during transfer operations.
- **Lightning is a potential hazard** to anyone working outdoors, especially when working at height or in an open area.
- **Electrically powered equipment (power tools, extension cords, etc.)** presents an electrocution hazard if it is improperly wired or if a short occurs.

- The first choice is to de-energize.
- Comply with permitting requirements and standards for Electrical Safe Work Practices.
- Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- Require that only qualified electrical persons work on systems rated 50 volts and above.
- Require a qualified electrical standby person and use of applicable arc-flash and shock PPE by everyone involved in interactions with exposed energized parts.
- De-energize/isolate, lock and tag, test, and ground (if applicable) electrical equipment.
- Address all points of isolation documented in the isolation checklist.
- Assume equipment is live — Test Before Touch every time!
- Ensure required clearance when working near overhead power lines. (Consider a crane's full extension radius.) Use Look up and Live flagging, warning cones and a spotter for work near overhead power lines.
- Contact utility providers to locate underground lines.
- Inspect equipment and power cords before each use.Require ground fault circuit interrupter (GFCI) or residual current device (RCD) outlets for outdoor work with portable electrical tools and lighting.
- Adhere to grounding, bonding and transfer rates to prevent static accumulation and discharge during flammable material transfer operations.
- Suspend work and seek safe refuge during threat of lightning.

Hazard Analysis - Excavation

Potential Significant Hazards & Prevention

- **Lack of situational awareness** while working in the trench can expose workers to significant hazards.
- **Underground electrical lines** can present a hazard during excavations, large or small.
- **Underground pipelines** may contain pressurized, flammable or toxic materials, creating a hazard if released during excavation.
- **Cave-ins** can crush or suffocate workers if proper preventive measures aren't taken.
- **Lack of oxygen** can incapacitate workers.
- **Flammable gases** can be present or build up during the work and create an explosive atmosphere.
- **Some toxic gases**, such as H2S, are heavier than air and can collect in low spots, resulting in dangerously high concentrations.
- **Drowning** is possible if there is a leak or if rain runoff fills the excavation.
- **Excavation equipment** can become a hazard when it is moved or if it tips over during the excavation work.

- Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- Provide a competent person to assess the soil, plan and permit, to inspect the excavation and to engage engineering professionals as needed.
- Use only qualified and authorized personnel to operate your excavation equipment.
- Contact utility providers to identify, locate and understand routing of underground utilities.
- Establish a job-specific rescue plan, including rescue personnel and equipment, before entering the excavation.
- Select and use appropriate shoring or benching methods as defined in the Safety in Designs manual.
- Provide appropriate means for entering and exiting excavations, such as ramps, ladders, etc.
- Store removed soil away from the edge (at least 2 ft/0.6 m) to avoid cave-ins or soil falling on workers.
- Secure and barricade the work site to prevent unauthorized access by vehicles and personnel.
- Prohibit standing or working under loads.
- Follow all gas testing and monitoring requirements and procedures, especially near running engines.
- Inspect the site at shift start and after any change or event (such as rain, new equipment or an earthquake).

Hazard Analysis - Work at Heights

Potential Significant Hazards & Prevention

- **Inadequate equipment, improper use or nonuse** of fall protection, barricades, ladders and scaffolding increases the risk of serious harm.
- **Falling to a lower level** without protection can lead to death or serious injury.
- **Falling objects (tools, equipment, etc.)** can create serious hazards.
- **Environmental conditions (wind, rain, etc.)** can present hazards when working at height.
- **Live electrical lines** can pose an electrocution hazard to staff working at heights or positioning ladders.
- **Inadequately supported surfaces** such as building or tank roofs, interior ceilings, decking and grating can lead to a fall.
- **Lightning is a potential hazard** when working at height in an open area.
- **Suspension trauma** is a hazard for any worker suspended too long in a fall-protection harness.

- Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- Use trained qualified personnel for working at heights.
- Inspect fall prevention (harnesses, ropes, anchor points, arrest systems) for wear and tear before use.
- Equip scaffolding and elevated platforms with appropriate guardrails, toe-boards and netting, and have a qualified person inspect daily.
- Barricade, cover or guard surface openings.
- Maintain an exclusion zone beneath the work area.
- Set ladders on a firm base, correctly angled and tied off. Avoid overhead lines — Look up and Live when moving ladders and scaffolding.
- Avoid storing tools in high places when not in use. If using elevated storage, tie off tools to prevent falling.
- Use mechanical assist devices like ropes and pulleys to securely transport tools from grade to work level.
- Use full-body harness protection with 100% tie-off. Never rely on just a fall-protection belt.
- Use anchor points that are strong enough and high enough so that a fall will clear any obstructions.
- Have a plan to quickly rescue fallen or suspended staff.
- Be aware of electrical lines and weather conditions; use Stop-Work Authority if necessary.

Hazard Analysis – Lifting & Rigging

Potential Significant Hazards & Prevention

- **Unclear communication** between crane operator and other personnel – including standing out of operator's line of sight – may increase the risk for incidents.
- **Complex lifts (dynamic, blind or on unstable seas)** increase the potential for all lift hazards.
- **Unchoked pipes** may become falling objects. **Improper rigging, misidentifying the load or equipment failure** may cause dropped loads.
- **Loads striking personnel, vehicles or equipment** can result in serious loss.
- **Equipment overloading, overextension and overturning** can result from crane malfunction, outrigger setup, heavy winds or the load exceeding capacity due to extended use or miscalculations.
- **Shifting loads** may cause overloading or falling objects.
- **High-voltage power lines** in a crane's working area can pose a potential electrocution hazard.
- **Congested work area** can limit rigger escape.

- Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- Use qualified or certified crane operators, riggers and signalmen with the required experience for the lift.
- Evaluate any potential to strike process equipment or to drop a load on it.
- Avoid blind lifts. If required, take extra precautions.
- Eliminate uncertified homemade lifting devices.
- Use approved binding and chocking equipment for loads and pipe racks.
- Keep signalmen in view of the crane operator, and make sure they Look up and Live to spot electrical lines and safely guide their operators.
- Use tag lines (non-conductive) to guide loads.
- Maintain required clearance when working near overhead power lines. Provide a separate spotter and warning cones to mark power lines. Allow for a crane's full extension radius in the clearance.
- Barricade and secure clear pick-up, lay-down and crane operating areas at all deck levels, and establish clear escape routes for riggers.
- Make sure to have enough space, proper ground conditions and proper outrigger deployment for mobile crane operations.
- Prohibit climbing on or walking under loads.

Short Quiz