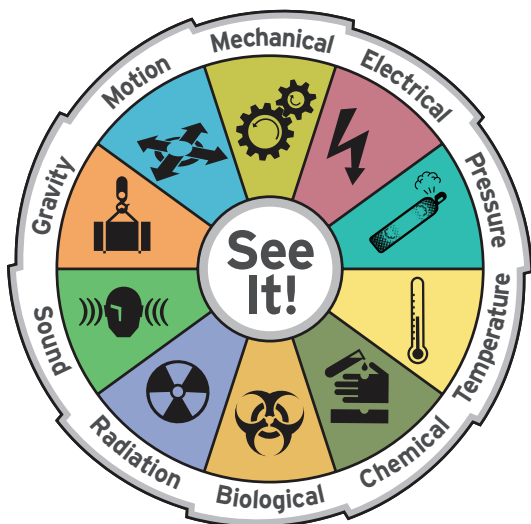


# Preventing Serious Injuries and Fatalities

## Field Guide



Applying the Hazard  
Identification Tool

# Purpose

This field guide is a quick reference to help personnel involved in *high-risk activities*<sup>1</sup> to identify and control the significant potential hazards unique to each activity and job.

This field guide supplements but **does not replace existing permitting procedures and safe work practices**.

To keep it brief, not every potential hazard or prevention is listed. Apply appropriate local hazard assessment procedures, along with this guide, to comprehensively assess each job.

## Field Guide Applications

- Before beginning your high-risk activity, review significant potential hazards and associated preventions.
- Refer to the field guide in all phases of hazard assessment: during planning, permitting, implementing and closeout.
- Integrate this tool into local efforts on fatality and serious injury prevention.
- Build awareness among workers, supervisors and work leaders at meetings, field visits, shift turnovers and any other opportunity.
- Augment Managing Safe Work (MSW) field engagement and Contractor Health, Environment and Safety Management (CHESM) activities.
- Use during near-miss and incident investigations.
- Use as an Operational Excellence (OE) audit or self-audit tool for high-risk observations.

Preventing serious injuries and fatalities requires operational discipline. This means *performing every task the right way every time*, from initial hazard assessment through each step of the job, including post-activity review.

<sup>1</sup>Activities, tasks and exposures most frequently associated with serious injuries and fatalities in Chevron and industry.

# Hazard Identification Tool Definitions



## **Gravity**

The force caused by the attraction of all other masses to the mass of the earth.

*Examples: falling object, collapsing roof and a body tripping or falling*



## **Motion**

The change in position of objects or substances.

*Examples: vehicle, vessel or equipment movement; flowing water; wind and body positioning when lifting, straining or bending*



## **Mechanical**

The energy of the components of a mechanical system, i.e., rotation, vibration or motion within an otherwise stationary piece of equipment or machinery.

*Examples: rotating equipment, compressed springs, drive belts, conveyors and motors*



## **Electrical**

The presence and flow of an electric charge.

*Examples: power lines, transformers, static charges, lightning, energized equipment, wiring and batteries*



## **Pressure**

Energy applied by a liquid or gas that has been compressed or is under a vacuum.

*Examples: pressure piping, compressed cylinders, control lines, vessels, tanks, hoses and pneumatic and hydraulic equipment*



## **Temperature**

The measurement of differences in the thermal energy of objects or the environment which the human body senses as either heat or cold.

*Examples: open flame; ignition sources; hot or cold surfaces, liquids or gases; steam; friction; and general environmental and weather conditions*



## **Chemical**

The energy present in chemicals that inherently or through reaction has the potential to create a physical or health hazard to people.

*Examples: flammable vapors, reactive hazards, carcinogens or other toxic compounds, corrosives, pyrophorics, combustibles, oxygen-deficient atmospheres, welding fumes and dusts*



## **Biological**

Living organisms that can present a hazard.

*Examples: animals, bacteria, viruses, insects, blood-borne pathogens, improperly handled food and contaminated water*



## **Radiation**

The energy emitted from radioactive elements or sources and naturally occurring radioactive materials (NORM).

*Examples: lighting issues, welding arcs, solar rays, microwaves, lasers, X-rays and NORM scale*



## **Sound**

Sound is produced when a force causes an object or substance to vibrate and the energy is transferred through the substance in waves.

*Examples: equipment noise, impact noise, vibration, high-pressure release and the impact of noise to communication*

# Abbreviations and Chemical Names

|                  |                                                      |
|------------------|------------------------------------------------------|
| CHESM            | Contractor Health, Environment and Safety Management |
| CO               | carbon monoxide                                      |
| CO <sub>2</sub>  | carbon dioxide                                       |
| CPR              | cardiopulmonary resuscitation                        |
| GFCI             | ground fault circuit interrupter                     |
| H <sub>2</sub> S | hydrogen sulfide                                     |
| JHA              | Job Hazard Analysis                                  |
| JLA              | Job Loss Analysis                                    |
| JSA              | Job Safety Analysis                                  |
| LPSA             | Loss Prevention Self Assessment                      |
| MOC              | Management of Change                                 |
| MSW              | Managing Safe Work                                   |
| N <sub>2</sub>   | nitrogen gas                                         |
| OE               | Operational Excellence                               |
| OEMS             | OE Management System                                 |
| PFD              | personal flotation device                            |
| PPE              | personal protective equipment                        |
| PSP              | Personal Safety Plan                                 |
| PSV              | pressure safety valve                                |
| RCD              | residual current device                              |
| SWP              | Safe Work Practices                                  |
| TIF              | Think Incident Free                                  |

# Hazard Analysis, a Requirement for All High-Risk Tasks

We 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:

1. **Planning Phase Analysis** such as Job Hazard Analysis (JHA), Safety Plan, Safety Instructions, Operating Procedures (with a review equivalent to a Planning Hazard Analysis), refinery instructions, review of safety plans, operator checklists or equivalent.
2. **Job Safety Analysis** (JSA), Job Loss Analysis (JLA) and JHA or equivalent including onsite review.
3. **Personal hazard assessment** tools, including Think Incident Free (TIF), Personal Safety Plan and Loss Prevention Self Assessment (LPSA) or equivalent.

## Identify the Hazards and Take Action

- The first safeguard is you. To reduce the odds for human error, you must 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.

## Potential Significant Hazards

A *potential significant hazard* is any condition, action or object that has the potential for an unplanned release of, or unwanted contact with, an energy source that may result in a serious or fatal injury.

## Energy Source Hierarchy of Controls

Follow a *hierarchy of controls* approach to reduce the risk of a serious or fatal injury. Where possible, it is always best to first eliminate the hazard and then apply lower-level controls as needed. Based on the energy source, the hierarchy of controls is:

1. Remove the energy source.
2. Prevent the release of energy.
3. Protect from the release.
4. Use Stop-Work Authority.

## Stop-Work Authority

All employees and contractors have the authority and responsibility to stop work that does not comply with the Tenets of Operation<sup>2</sup> or that presents an imminent hazard - without the threat of reprisal. Perform these steps in sequence if you feel your own work or the work of others is not safe:

1. Decide to intervene (take ownership).
2. Stop the unsafe act.
3. Notify immediate supervisors.
4. Resolve the issue.
5. Resume work (or stay shut down until risk is mitigated).
6. Share what you learned.

Do it safely or not at all.

There is always time to do it right.

<sup>2</sup>Tenets of Operation printed on back cover.

# Human Performance

Human error has been shown to be a factor in nearly every serious incident and fatality. Your focus on improving human performance is critical to achieving an incident-free operation.



## Distractions Can Happen to Anyone

In fact, the more familiar we are with the task, the easier it is to lose focus. Loss of focus can lead to an error. Even with established worker qualifications and the best tools and experience to guide us, we must also be personally ready to perform each job at our highest capacity.

The risk for error and injury goes up at all experience levels when individual or organizational factors, task demands or the work environment interfere with our ability to focus on our tasks.

## Assess the Situation and Take Action

If you can answer “yes” to any of the assessment questions on the facing page, it may affect incident-free job performance. Preventive actions you or your supervisor can take to reduce the risks to working safely include:

- Get help.
- Get clarification.
- Get focused.
- Defer the work.

# Human Performance Assessment Questions



## Individual Factors

1. Are you feeling stressed, distracted or worried due to work or personal issues?
2. Are you excessively fatigued or do you have many things distracting you from the task at hand?



## Task Demands

1. Are the procedures and instructions for the task unclear?
2. Does the task require high concentration or multitasking?
3. Does the task require more time than allowed?
4. Are you capable of performing the task but feel that you require more guidance?



## Organizational Factors

1. Do you feel insecure about your ability to use Stop-Work Authority?
2. Are you unclear about your roles and responsibilities?
3. Are you uncomfortable communicating with your peers and supervisors?
4. Do you feel pressured to take shortcuts?



## Work Environment

1. Is the environment (temperature, ventilation, room for movement, egress, lighting or noise level) different from what was expected or planned for?
2. Are you in an environment prone to unanticipated distractions?
3. Are you working in unpredictable or constantly changing conditions?
4. Are labels, signs or displays inadequate?

# Confined Space



## Potential Significant Hazards



**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 staff 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.

## Prevention Means Always:

- ☐ Ask: Is there a safer way to complete the job without entering the confined space?
- ☐ *Comply with permitting requirements. Use of this field guide is not an equivalent.*
- ☐ 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.



# Electrical



## Potential Significant Hazards



**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 drilling rigs, 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.

## Prevention Means Always:

- ☐ *Minimize work on live electrical systems. The first choice is to de-energize.*
- ☐ *Comply with permitting requirements and standards for Electrical Safe Work Practices<sup>3</sup> (SWP). Use of this field guide is not an equivalent.*
- ☐ 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.

<sup>3</sup>See Chevron Corporate Required Standard for Electrical Safe Work Practice at <http://techstds.chevron.com/oe-corporate.asp>.



# Excavation



## Potential Significant Hazards



**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  $H_2S$ , 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.

## Prevention Means Always:

- ☐ Ask: Is there a safer way to complete the job without working in the excavation or near heavy equipment?
- ☐ *Comply with permitting requirements. Use of this field guide is not an equivalent.*
- ☐ 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 bracing 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).



# Hot Work



## Potential Significant Hazards



**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.

## Prevention Means Always:

- ☐ Ask: Is there a safer way to complete the job with cold work?
- ☐ *Comply with permitting requirements. Use of this field guide is not an equivalent.*
- ☐ 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.



# Lifting and Rigging



## Potential Significant Hazards



**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.



**Unchocked pipes** may become falling objects.



**Improper rigging, misidentifying the load or equipment failure** may cause dropped loads.



**Loads, outriggers or swinging counterweights 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.



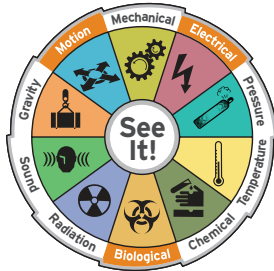
**Congested work area** can limit rigger escape.

## Prevention Means Always:

- ☐ Ask: Is there a safer way to complete the job without lifting and rigging?
- ☐ *Comply with permitting requirements. Use of this field guide is not an equivalent.*
- ☐ 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.
- ☐ Establish a clearly-marked exclusion zone and perhaps use a signalman or spotter when deploying outrigger or using counterweight.
- ☐ 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.
- ☐ Cease operations during offshore helicopter takeoff and landing.



# Marine Work



## Potential Significant Hazards

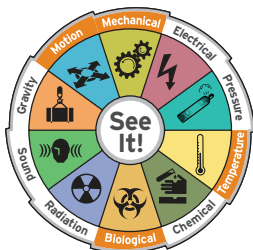
-  **Entering offshore installation safety zones** without notice or permission creates a hazard.
-  **Improper use or failure to use personal flotation devices (PFDs)** dramatically increases the risk of drowning in the event of going overboard.
-  **Unapproved or poorly maintained equipment** (such as for lifting and rigging, life safety or personnel transfer) increases the risk of accidents.
-  **Diving activities** have their own inherent hazards.
-  **Personnel transfer** using crane lifting, swing ropes, transfer bridges and other means can be hazardous.
-  **Environmental conditions** such as fog, darkness, wind and storms increase risk during routine lifts, personnel transfer and boat or helicopter operations.
-  **Static accumulation** can ignite flammables during transfer operations.
-  **Anchoring near pipelines** increases the risk to equipment and staff.
-  **Taut deck lines, ropes and chains** carry potential energy that can release with strong force if broken.
-  **Wildlife** such as jelly fish, sharks, sea snakes and crocodiles can endanger staff working in the water.

## Prevention Means Always:

- ☐ *Comply with permitting requirements. Use of this field guide is not an equivalent.*
- ☐ Provide supervisory job-site walk-through prior to permit approval and periodically during work.
- ☐ Prepare detailed dive plans that include rescue, Permit to Work and Simultaneous Operations plans as appropriate.
- ☐ Complete and verify the isolation checklist and follow approved procedures before starting work, for example, ensure water pumps are locked out/tagged out before divers enter the water.
- ☐ Use only certified and inspected lifting, rigging, diving and personnel transfer equipment.
- ☐ Establish clear communications and gain permission before entering any 500 meter Safety Zone.
- ☐ Anchor in areas away from pipelines or obstructions.
- ☐ Stay aware of taut lines, and stay out of the line of fire for deck lines, ropes and chains.
- ☐ Avoid contact with marine wildlife by minimizing work in the water, conducting work when wildlife is less active, using barriers (cages, dive bell, shark guards), and using spotters, alarms and procedures, or PPE (protective suits, mesh gloves).
- ☐ Adhere to grounding, bonding and transfer rates and related procedures to prevent static accumulation and discharge during flammable materials transfer.
- ☐ Wear PFDs at all times when they are required.
- ☐ Adhere to seating assignments on crew boats.
- ☐ Adhere to a transfer plan for on- and off-boarding.
- ☐ Use Stop-Work Authority if you feel environmental conditions make the risk of continuing work too high.



# Motor Vehicle and Motorized Equipment



## Potential Significant Hazards



**Distracted driving** due to reaching for something, eating, or phone/radio/computer use is hazardous.



**Recklessness** (speeding, unplanned routes, seatbelts off, ignoring conditions) increases risk of crashes.



**Impaired driving** (fatigue, medications, substance abuse) slows reaction time and hinders judgment.



**Poor visibility** from weather or poor lighting, mirrors or obstructed view (dirty windows, load or vehicle structure) increase driver risk.



**Road conditions** (slick, potholes, loose gravel, soft shoulders) may cause loss of control or rollovers.



**Oncoming traffic and speeds over 25 mph (40 kph)** raise impact severity in collisions.



**Unsecured cargo** can strike occupants and cause loss of driver control.



**Large loads in congested work sites** may strike equipment and personnel.



**Uncontrolled vehicle entry** may cause ignition in classified areas and higher risk of struck-by injuries.



**Pedestrian traffic and large-animal crossings** can be unpredictable and present extra hazards.



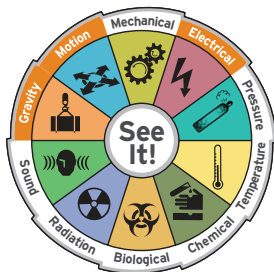
**Equipment failure** (brakes, tires, lights) can lead to crashes.

## Prevention Means Always:

- ☐ Question the need for all trips and for moving equipment in congested construction or work sites.
- ☐ Comply with permitting requirements. Use of this field guide is not an equivalent.
- ☐ Prepare and follow a journey management plan. Address congested work zones, heavy traffic, night driving and weather and road conditions.
- ☐ Perform a walk-around inspection of your vehicle before use. Perform recommended maintenance.
- ☐ Secure all inside cargo and any cargo to be hauled.
- ☐ Wear your seatbelt, and make sure passenger seatbelts are fastened before the car is started.
- ☐ Make driving your sole task while operating a vehicle: *Don't use a cell phone*, and avoid other distractions.
- ☐ Drive drug- and alcohol-free.
- ☐ Pull off the road in a safe place at signs of fatigue. Rest before proceeding, or have someone else drive.
- ☐ Use Smith System (or similar) defensive driving principles.
- ☐ Maintain the recommended speed and following distance. Adjust for traffic, road and weather.
- ☐ Pay attention to road conditions, pedestrians, animals and other vehicles.
- ☐ Use caution lights, traffic cones, barricades or flaggers to control vehicular traffic in work areas.
- ☐ Use flaggers or trained spotters, and maintain two-way communication with equipment operators, especially when backing heavy motorized equipment.
- ☐ Make eye contact with equipment operators when you are on foot to be sure the operator sees you.



# Work at Heights



## Potential Significant Hazards



**Inadequate equipment, improper use or non-use** 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.

## Prevention Means Always:

- ☐ Ask: Is there a safer way to complete the job without working at heights?
- ☐ *Comply with permitting requirements. Use of this field guide is not an equivalent.*
- ☐ 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. Caution tape is not a substitute for barricades. 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.



# Process Safety



## We **always** assure safeguards are in place and functioning

We process, handle and transport hazardous materials every day. To do this safely, we must always maintain containment and control of these materials. Maintaining effective barriers, systems and safeguards is critical to preventing loss of process containment.

## Significant Loss of Containment Events

- **Fires and vapor cloud explosions** can be fatal to workers in the immediate vicinity or surrounding area.
- **Toxic and hazardous releases** in sufficient quantities can be fatal to anyone who is exposed.
- **Release of hazardous energy or material** can cause significant equipment damage and endanger nearby workers.

## Key Preventive Activities

- Maintain operation within safe limits.
- Follow operating procedures.
- Follow Management of Change procedures.
- Follow isolation procedures.
- Perform inspections and preventive maintenance.
- Follow maintenance procedures.
- Maintain process safety information.

## Safeguards<sup>4</sup>

- ☐ Operate in accordance with procedures, and maintain the primary layers of protection.
- ☐ Identify critical process parameters, and stay within defined safe operating limits.
- ☐ Maintain the integrity of protective systems such as detectors, alarms, shut-ins, interlocks, over-speed trips, relief devices and fire protection systems.
- ☐ Assure proper isolation when opening process equipment or piping.
- ☐ Follow documented maintenance procedures.
- ☐ Provide onsite supervisory control, including pre-job walk-through and during work activities.
- ☐ Communicate effectively when issuing or receiving permits so that everybody understands the process hazards and how to safely transfer equipment custody between work crews and operations.
- ☐ Address condition changes that may affect process operations and equipment.
- ☐ Recognize process changes and follow Management of Change (MOC) procedures when appropriate.
- ☐ Conduct pre-startup safety reviews before introducing hazardous material or energy to verify equipment is safe to start up.
- ☐ Identify abnormal conditions and report them to supervision.
- ☐ Make certain that emergency procedures are well-understood and rescue drills conducted regularly.
- ☐ Report all loss of containment events; investigate to determine root causes and prevent recurrence.

<sup>4</sup>The “Swiss Cheese Model” describes how accidents may be caused. It proposes that incidents are the result of a series of failures or flaws in existing safeguards (procedures, training, inspection, alarms, etc.). The slices of Swiss cheese represent the safeguards, and the holes are the failures or flaws in each safeguard. Having multiple safeguards in place is analogous to a stack of different slices of Swiss cheese. It’s when the holes line up and allow successive failures to go unchecked that a serious incident occurs.

James Reason (1990-10-26). Human Error. Cambridge University Press. ISBN 0521314194



# Notes

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# Preventing Serious Injuries and Fatalities

## Field Guide

### Tenets of Operation

Do it safely or not at all.

There is always time to do it right.

1. Always operate within design and environmental limits.
2. Always operate in a safe and controlled condition.
3. Always ensure safety devices are in place and functioning.
4. Always follow safe work practices and procedures.
5. Always meet or exceed customers' requirements.
6. Always maintain integrity of dedicated systems.
7. Always comply with all applicable rules and regulations.
8. Always address abnormal conditions.
9. Always follow written procedures for high-risk or unusual situations.
10. Always involve the right people in decisions that affect procedures and equipment.

<http://go.chevron.com/fatalityprevention>

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