Safe Work Practices for Contractors Working at Retail Petroleum/Convenience Facilities

API RECOMMENDED PRACTICE 1646
FIRST EDITION, AUGUST 2006
Safe Work Practices for Contractors Working at Retail Petroleum/Convenience Facilities

Downstream Segment

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1 Introduction

1.1 PURPOSE

The purpose of this document is to provide the user with a general awareness of safety issues associated with maintenance and construction work at retail petroleum/convenience facilities including service stations. There is an Appendix at the end of this document which provides additional reference material for several sections and various model forms.

1.2 SCOPE

This document highlights many of the Federal OSHA requirements that may apply to maintenance and construction work in the retail petroleum/convenience business, but there is much more in the regulations than can be covered here. It is fully the responsibility of the contractor or employee performing the work to abide by any and all additional Federal, State, or local laws and regulations and manufacturer’s requirements that apply to the specific work being done. It is also the responsibility of contractors to ensure that subcontractors abide by all applicable safety requirements. Construction activities are covered by OSHA 29 CFR 1926 regulations while most maintenance and other operations are covered by OSHA 29 CFR 1910 (General Industry) regulations.

1.3 APPLICABILITY

The requirements and recommended practices contained in this document are minimum safety procedures with which everyone shall comply while working at a retail petroleum/convenience facility. In addition, a task specific Job Safety Analysis shall be completed before any work may begin.

1.4 DEFINITIONS

1.4.1 competent person: An individual, who, by way of training and/or experience, is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, is designated by the employer, and has authority to take appropriate actions (29 CFR 1926.32). Some standards add additional specific requirements which shall also be met by the competent person

1.4.2 confined space: A space that is large enough for a person to enter, has limited or restricted means for entry/exit, and is not designed for continuous occupancy. A confined space with certain types of life-threatening hazards is required to be classified as a permit-required confined space (PRCS). See 1.4.6.

1.4.3 DAFW—Day Away From Work injury or Illness: A work-related injury or illness that meets the OSHA requirements to be classified as DAFW.

1.4.4 forecourt: The area of a petroleum/convenience facility that is not occupied by a retail store building. The forecourt is typically considered the fueling area of such a facility. Small retail buildings under the canopy or in the midst of the fueling area may also be considered to be on the forecourt.

1.4.5 hazardous atmosphere: An atmosphere with any of the following conditions are present:

- A combustible or flammable gas
- Low oxygen concentrations
- Hazardous levels of toxic substances

1.4.6 PCRS—Permit-Required Confined Space: Any confined space where the atmosphere measures greater than 10% of the lower explosive limit or a toxic chemical exceeding the OSHA permissible exposure limit (PEL) exist, or an engulfment hazard exists. A special permit with certain safety requirements is required for worker entry.

1.4.7 JSA—Pre-Task Job Safety Analysis: An analytical method to quickly identify hazards and precautions for specific tasks. A JSA is an effective way to decide on PPE and other safety requirements and can be used for employee training.

1.4.8 LEL—Lower Explosive Limit: for a chemical or product means that the concentration of the chemical in air below this level will not support combustion
1.4.9  **Medium Or High Risk Activity**

1.4.9.1  **medium risk activities are:**

- barricading and work area isolation,
- lock-out/tag-out,
- rigging, hoisting and lifting,
- driving.

1.4.9.2  **high risk activities are:**

- confined space entry,
- hot work,
- working at heights,
- excavation work.

1.4.10  **MOC—Management of Change:** The broad concept of MOC is to anticipate and prevent incidents that may be created due to changes in all aspects of an operation; from personnel and contractor selection to equipment replacement and repair to site conditions and chemical exposures.

1.4.11  **permit loads:** Any load carried by a vehicle that requires a permit from any regulatory agency.

1.4.12  **person in charge:** The individual responsible for a specific site or operation.

1.4.13  **spotter:** A person positioned outside of a vehicle to direct a driver where the driver has no clear view of the area.

2  **General Knowledge**

**Minimum Required Knowledge**

2.1  **HOW TO PERFORM JSA AND APPLY COMMON SAFETY WORK PRACTICES TO SPECIFIC ACTIVITIES**

**Purpose:** The Pre-Task Job Safety Analysis (JSA) is a requirement to help identify work hazards and preventive measures before starting any task.

**Who should use:** Individuals, teams doing the same task, and/or groups of workers or teams doing different tasks in the same general area.

**When to use:** Before starting work and reviewed when work conditions change such as changes in weather, job scope, or equipment. A different craft beginning work in the area is another case where a review is appropriate.

**Who participates:** All stakeholders whether site employees or contractors.

**How to perform:**

*Evaluate these two questions for the work to be performed:*

- What may go wrong?
- What is the worst thing that may happen if something does go wrong?

*Analyze risks and ways to reduce them:*

- Use a standardized Job Safety Analysis form.
- Identify potential hazards specific to the project such as hazardous materials present, or communication requirements.
- Identify potential hazards specific to the site such as vehicular traffic or flammable vapors present.
- Identify potential hazards specific to the task to be performed.
- Assure that workers performing the work are properly trained to do so.
- List ways to eliminate or mitigate the hazard so the task can be done safely.
- Review and/or prepare appropriate safety materials for the tasks and hazards.
- Communicate the safety plan to the site manager, project supervisor and others as appropriate.
2.2 MANAGEMENT OF CHANGE AND AMENDMENTS TO THE JSA

The purpose of understanding Management of Change (MOC) concepts is to anticipate and prevent incidents that may be created because of changes to organizations, personnel, systems, processes, procedures, equipment, site conditions, products, materials, substances, or laws and regulations. The pre-task Job Safety Analysis procedure shall include MOC by way of answering the following question:

*What is specifically different about this task than other tasks like this that have been performed before?*

For all changes that are identified, work plans shall clearly specify the timeliest for the change, and any control measures implemented for:

- Equipment, facilities, and process
- Operations, maintenance, or inspection procedures
- Training, personnel, and communication
- Documentation

The work plan shall be authorized by the person(s) responsible for the project.

2.3 ENVIRONMENTAL CONSIDERATIONS AND CRITICAL EQUIPMENT

2.3.1 Environmental Considerations

Maintenance and construction activities can have an impact on the environment at retail petroleum/convenience sites. Proper precautions shall be taken to prevent leaks and spills in order to best protect the environment. Prevention is the key to environmental protection. Any repair that is made to a fueling system component shall be tested at a minimum of normal operating pressure to assure that there are no leaks before placing the system back into operation. There may also be regulations in your area that require specific testing of equipment and repairs. Workers are required to know and follow the legal requirements for the areas in which they work.

2.3.2 Critical Equipment

Critical equipment is any equipment that may make a facility less safe, or hurt the environment of the surrounding community if the equipment should fail. Critical equipment can also prevent emergencies. Examples of critical equipment include:

- Monitoring devices
- Leak detectors
- Sensors
- Emergency systems and controls
- Fire extinguishers
- Shear valves
- Hose breakaways

When installing or maintaining critical equipment special care shall be taken to ensure that the equipment is operating safely and properly protecting the environment.

- When a problem is found in a piece of critical equipment, it should be repaired on the spot if possible.
- If a problem would make the equipment operate outside its safe operating limits, the equipment shall be immediately shut down and not operated until it is repaired.
- If the equipment is leaking it shall be immediately shut down and not operated until it is repaired.
- All leaks shall be reported to the site operator, maintenance dispatch authority, and site operating company immediately.

Overriding critical equipment shall not be done without the express approval of the customer’s authorized representative.

2.4 REGULATORY REQUIREMENTS AND REPORTING/NOTIFICATION PROCEDURES

Regulatory requirements for reporting spills, leaks, or other emergencies vary between Federal, State, and local jurisdictions. All contractors are required to know the regulatory requirements for notification to authorities. All workers shall know the required contacts for all major types of emergencies such as;
• fire,
• spills,
• leaks,
• vehicular accidents,
• security incidents,
• all other non-specified emergencies

All workers shall also know when they are required to call 911 for emergency assistance. Workers shall report any and all emergencies to the site operator and the customer’s authorized representative.

2.5 CHAIN OF COMMAND FOR NON-REGULATORY REQUIRED REPORTING AND NOTIFICATION PROCEDURES

Reporting procedures may vary between customers. It is the contractor’s responsibility to understand and implement the proper reporting/notification processes for each of their customers.

2.6 INCIDENT/CASE MANAGEMENT AT THE JOB SITE, ESCALATION, AND OUTSIDE RESOURCES AVAILABLE TO MANAGE.

Workers may only perform activities for which they are properly trained and competent. It is important for workers to also understand when a situation has gotten to a point where they can no longer handle it. At this point, the situation shall be escalated using the notification procedures appropriate to the situation and customer.

When a serious incident occurs, work shall stop, notifications shall be made, and the incident scene preserved until an investigation is conducted. All accidents which require medical treatment shall be verbally reported as soon as possible. A follow-up written report shall be made within 24 hours. All OSHA recordable injuries shall be properly recorded in the contractor’s OSHA 300 log as soon as possible. For all injuries, the appropriate medical care should be given.

Injury cases should be managed with physicians to assure reasonable medical care is given. Proper case management can have an impact on the classification of an injury. When possible, light duty or restricted duty assignments should be made available as an alternative to days away from work. The limitations created by an injury should be evaluated, and suitable work provided to accommodate those limitations.

2.7 FACILITY OPERATIONS AND HOW TO MANAGE YOUR ACTIVITIES SAFELY WITHIN THEM

Working at an operating petroleum/convenience site presents challenges for safety of workers, site employees and the general public. Workers shall follow the proper safety procedures to minimize these risks.

2.7.1 Check-in/Work Clearance

- All workers who may be required to work on operational petroleum/convenience sites shall be in possession of identification certified by their employer.
- Contractor shall consult with the site manager regarding the regular facility work hours.
- Contractors shall confine their workers and work to the designated site or job site areas.
- Work of any kind shall not start until all workers have reported to the person in charge of the site at the time. In addition, all workers are required to identify themselves and sign-in using the site’s sign-in process (if applicable). If required by the customer workers may have to present their API Safety Qualification card (or equivalent).
- Workers shall understand the job safety analysis (JSA) of performing the activity before arriving at the worksite. Consult with the person in charge of the site to identify site specific risks not covered in the JSA and document accordingly per guidelines below.
- A representative of the site shall give clearance for work to begin. This will be according to the individual customer’s requirements, and may require that a specialized form be completed (See Job Clearance Form—Appendix B.1) or work authorized in an electronic manner.
- For jobs that will take longer than a day, or for construction work, workers shall identify themselves each day to the site manager or the attendant in charge before any work starts.
  - This will be according to the individual customer’s requirements, and may require that a specialized form be completed (See Daily Site Safety Record—Appendix B.2). Before beginning any work at a construction site, workers and visitors
shall receive a safety briefing from the person in charge of the site or his/her designated person. The minimum requirements for a briefing include:
• Description of work being performed that day (JSA).
• Hazards involved in that day’s work (for example, weather, job-site conditions or other items not covered in the JSA).
• Where to find emergency notification numbers.
• Evacuation procedures.
• Location of emergency response equipment (first aid, fire extinguishers, etc.).
• Minimum PPE requirements.
• Workers shall not obstruct site operation without prior notification to the person in charge of the site.
• Workers shall not block off or otherwise make any portion of the facility impassable or hazardous without prior notification. Contractor shall provide barricades, traffic cones, fencing, etc. (Section 8—Barricading and Work Area Isolation to make the job site safe and secure.
• Contractor shall not cut, dig or alter in any way, any existing facilities, pipes, etc., without prior authorization or a task specific work order.
• It shall be understood that damage to existing equipment may disrupt operations, cause fires, initiate environmental problems, and endanger lives.

2.7.2 Evacuation Procedures
Workers shall be familiar with both site evacuation procedures and their employer’s evacuation procedures. A primary reason for the above check-in requirements is so personnel can be accounted for in case of an emergency. Upon check-in, workers should verify the location of the site’s meeting point in the event of an evacuation.

2.7.3 Tool Box Discussions
Before the beginning of every work day and at the beginning of a potential medium or high risk activity where there will be more than one worker at a site, the workers shall conduct a daily toolbox discussion (tailgate meeting) that includes at least the following:
• work to be performed,
• hazards of the job,
• conditions that may have changed overnight or since the last time work was performed at the site.

2.8 FIRST LINE FIRE RESPONSE

2.8.1 Classification of Fire Extinguishers
• Class A fire extinguishers will put out fires in ordinary combustibles, such as wood and paper.
• Class B extinguishers should be used on fires involving flammable liquids, such as grease, gasoline, oil, etc.
• Class C extinguishers are suitable for use on electrically energized fires.
• Class D extinguishers are designed for use on flammable metals and are often specific for the type of metal in question.

The use of a class ABC multipurpose dry chemical fire extinguisher is required for hot work operations at retail petroleum/convenience locations.

2.8.2 Inspection, Maintenance and Service of Fire Extinguishers

2.8.2.1 Fire Extinguisher Inspection
Fire extinguishers shall be inspected at least monthly.
• Ensure that the seal and pin (if so equipped) are in place.
• Make sure the annual maintenance tag is intact and is current for the calendar year.
• Make sure the hose is not severely cracked, broken, damaged, or clogged.
• Check the gauge pressure. Make sure the indicator dial is in the green zone and indicates that the extinguisher is still properly charged.
• Check for exterior damage, rust, or corrosion.
• Make sure the instruction label is in place and is readable.
• Ensure the protective covering (if provided) is in place.
• The inspection tag should be marked to show that the monthly inspection has been done.

If an inspection shows any problems, the extinguisher shall be serviced for proper operation by a fire extinguisher service company.

2.8.2.2 Fire Extinguisher Service/Certification

Fire extinguishers shall be serviced annually by a licensed fire extinguisher service contractor.

2.8.3 First Line Fire Response

Any worker who may be required to use a fire extinguisher shall be provided with fire extinguisher training by his/her employer. As a reminder to those workers already trained, the method employed for using a Fire Extinguisher can be remembered by the acronym “P.A.S.S.” This stands for “Pull, Aim, Squeeze, and Sweep.” Or more detailed - “Pull pin out, Aim nozzle at the base of the fire, Squeeze discharge trigger, and Sweep nozzle quickly back and forth to extinguish fire.”

2.9 BASIC PROHIBITIONS REGARDING SMOKING, GAMBLING, FIGHTING, DRUGS, ALCOHOL, AND WEAPONS

For maintenance and construction workers at petroleum/convenience sites, the following prohibitions apply:

• No gambling or fighting.
• No smoking on site.
• No smoking off-site within 50 feet of a fuel tanker truck.
• No alcohol or drugs.
• No weapons.
• Obey all posted warnings.

2.10 GOOD HOUSEKEEPING PRACTICES

Good housekeeping practices are key to preventing slip, trip, and fall injuries. Workers shall observe good housekeeping practices. Buildings, materials and properties shall be kept clean and orderly to the extent possible. Workers shall maintain work areas in a reasonably clean, safe and orderly condition. The following requirements apply:

• Extension cords, air hoses and other cord type tripping hazards shall be stowed when not in use.
• Extension cords shall not be placed in walking paths without proper protection against trip hazards. This can include barricading the area where the extension cord is crossing a walking path, or covering the extension cord with an approved cable positioning device or ramp.
• Materials may not be stored in walking paths.
• Materials may not be stored in front of doorways.
• Materials may not be stacked within 36 inches of an electrical panel.
• Work operations should be conducted out of walking pathways whenever possible.
• Debris should not be allowed to accumulate in walkways.
• Debris from work operations (used equipment, saw cut-offs, junk equipment) should be regularly removed to a designated waste storage area.

In addition, walking/working surfaces should be well maintained and well lit. Adequate lighting shall be provided to enable safe entry into and exit from every place on a site where persons are reasonably expected to work. This is in addition to task lighting.

2.11 HAZARDS OF FUEL DELIVERIES

Delivery of petroleum products can pose specific risks to maintenance and construction personnel at a petroleum/convenience site. The following precautions shall be taken:

• The following shall stop during fuel deliveries;
  – All work on fueling systems.
  – All work within 50 feet of a vent stack.
– All work within 20 feet of a dispenser.
– All work within 15 feet of a fill pipe.
– All work within 50 feet of a tanker truck.
– All hot work.
• Workers shall evacuate all confined spaces.
• Workers may not smoke within 50 feet of a delivery transport truck, even if the worker is off of the site.

For any part of the storage tank system that is being repaired or altered that may cause fuel deliveries to be hazardous, dangerous to the underground environment, or cause a release of vapors to the atmosphere; the contractor doing the work is responsible to ensure that deliveries do not take place. Depending on the type of work to be done, the following activities may be appropriate:

• Upon check-in with the site operator, verify the schedule for fuel deliveries so as to best coordinate work.
• Disable the fill ports by locking them with padlocks.
• Any tank systems that are to be left unattended in an unfit condition shall have the fills padlocked, and the customer’s authorized representative shall be notified.

Whenever fuel shall be transferred to gas cans or storage tanks, all equipment shall be properly grounded to prevent buildup of static electricity.

### 2.12 PROPER PERSONAL LIFTING TECHNIQUES

• Plan the lift and decide if you need help. Prepare your travel path by opening doors and ensuring the walkway is clear of obstructions.
  – Position your body close to the load so that you can get a secure grip. Keep in mind that the closer your elbows are to your body, the less force that is exerted on your shoulders and back. Never pick up or put down a load if doing so will cause you to have your elbows completely away from your body. This is unsafe for your back and shoulders no matter how light a load appears to be.
• Ways to bring your elbows in closer before you lift:
  – Take a step closer to the load.
  – Slide the load closer.
  – Tilt the top of the load toward you.
• Be certain of secure footing and balance.
• Keep your back straight and flex your knees.
• Pick up the load, holding it close to your body.
• Keep your head up, looking forward; and use your leg muscles to do the lifting.
• Avoid twisting or turning your body while lifting. Point your toes in the direction you want to go and then step.
• To safely put the load down, follow the lifting procedure in reverse order. The lowering procedure is as follows:
  – Avoid twisting or turning your body while lowering.
  – Point your toes in the direction where the load will be set down.
  – Keep your head up, looking forward, with your back straight;
  – Flex at the knees and use your leg muscles to do the lowering.
  – When the load reaches its resting place, release your grip.
  – Use your leg muscles to stand up.
• Get help if it is necessary to push heavy or bulky items.

### 2.13 WASTE GENERATION AND DISPOSAL

There are waste generation regulations at the Federal, State, and local levels. It is the responsibility of the contractor to train workers to know and follow all of the waste generation regulations that apply to the work being done. In general, contractors and workers shall evaluate the impact their work will have on the environment through waste disposal, and take necessary steps in agreement with customers to minimize normal and hazardous waste generation. Materials should be recycled whenever practical. Hazardous wastes shall never be placed in the normal trash or dumpsters and shall be disposed of according to the applicable regulations.
2.14 **HOW AND WHERE TO OBTAIN FIRST-AID AND MEDICAL TREATMENT, INCLUDING CPR**

All service trucks shall be equipped with a first-aid kit intended for at least the number of workers transported in the vehicle. All service trucks for workers who may be exposed to eye hazards shall be equipped with a portable eye wash kit.

Medical treatment, including CPR, shall only be performed by persons trained to do so. CPR training shall be at least equivalent to the standard Red Cross course. For non-emergency medical treatment, workers should contact their employers, and notify the site operator. If there is a contractor foreman or lead person, they shall:

- Ensure that his or her employees receive prompt medical attention.
- Transport injured contractor personnel who are not seriously injured to the nearest medical facility or to a facility of their choice.

For emergency medical treatment workers shall immediately report to their job foreman, if applicable, or the site operator. Local emergency services should be contacted (using 911 where available).

Workers are not required to provide first aid or CPR. However, should a worker decide to provide assistance, he or she shall perform the following actions, as appropriate:

<table>
<thead>
<tr>
<th>If . . .</th>
<th>Then . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>A medical emergency occurs</td>
<td>Request emergency service immediately. Dial 911.</td>
</tr>
<tr>
<td>The victim(s) is in immediate danger</td>
<td>Rescue the victim, providing it is safe to do so and proper training has been received. NOTE: Do not move a victim if he or she is not in immediate danger.</td>
</tr>
<tr>
<td>The victim is not breathing and has no heartbeat,</td>
<td>Begin CPR at once if properly trained. Use a CPR mouth-piece, pocket mask, or resuscitation bag whenever possible.</td>
</tr>
<tr>
<td>The victim is bleeding</td>
<td>Wear liquid resistant gloves to avoid contact with the blood and other body fluids while controlling a bleeding injury.</td>
</tr>
<tr>
<td>The victim is burned (chemical or thermal)</td>
<td>Remove contaminated clothing, as necessary. Use water or ice to cool the burned area or put the person under a nearby shower. Do not remove clothing that is stuck to the body.</td>
</tr>
<tr>
<td>The victim has been splashed in the face with gasoline or a chemical</td>
<td>Have victim flush his or her face and eyes for at least 15 minutes with fresh water then get medical help as needed</td>
</tr>
<tr>
<td>The victim is in shock</td>
<td>Keep him or her warm and comfortable. Make him or her lie down. Wait for the paramedics.</td>
</tr>
</tbody>
</table>

2.15 **CUSTOMERS’ PERMIT-TO-WORK REQUIREMENTS, WHERE APPLICABLE**

Permits to work are required by these Safe Work Practices for confined space, hot work, excavations, and hoisting/rigging operations. Individual customers may have their own permit-to-work system, however a standardized, multi-permit form is provided in Appendix B.3. All permits written for work shall remain at the jobsite for inspection by the customer’s representative or regulatory authorities. Contractors and workers shall be aware of the permit-to-work requirements of all customers to assure compliance.

2.16 **REFERENCES**

OSHA\(^1\)

29 CFR 1926 Subpart C

This may be obtained from OSHA’s website at http://www.osha.gov/index.html

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3 Personal Protective Equipment (PPE)

Minimum Required Knowledge

3.1 USE OF PPE

The following table shows the basic Personal Protective Equipment requirements for maintenance or construction work at retail petroleum/convenience sites.

<table>
<thead>
<tr>
<th>Personal Protective Equipment</th>
<th>Construction Projects</th>
<th>Maintenance Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Pants</td>
<td>Always</td>
<td>Always</td>
</tr>
<tr>
<td>Reflective Vest* – Blaze Orange/Green Shirt</td>
<td>Always—vest mandatory after dusk. Shirts may be substituted during daylight hours.</td>
<td>Always—vest mandatory after dusk. Shirts may be substituted during daylight hours.</td>
</tr>
<tr>
<td>Gloves</td>
<td>Must be on person—Impervious (ex nitrile) for chemicals. Leather for materials handling. Cut resistant gloves for sharp materials.</td>
<td>Must be on person—Impervious (ex nitrile) for chemicals. Leather for materials handling. Cut resistant gloves for sharp materials.</td>
</tr>
<tr>
<td>Hearing Protection</td>
<td>When in high noise areas</td>
<td>When in high noise areas</td>
</tr>
<tr>
<td>Hard Hats</td>
<td>Always</td>
<td>Where falling objects hazard exist</td>
</tr>
<tr>
<td>Bump Caps</td>
<td>Never</td>
<td>For overhead obstruction only</td>
</tr>
<tr>
<td>Safety Footwear (ANSI Z41)</td>
<td>Always</td>
<td>Always</td>
</tr>
<tr>
<td>Fall Prevention/Fall Arresting Equipment</td>
<td>When working at heights greater than six feet from the ground.</td>
<td>When working at heights greater than six feet from the ground.</td>
</tr>
<tr>
<td>Fire Resistant Clothing</td>
<td>When there is a high risk of flash fire.</td>
<td>When there is a high risk of flash fire.</td>
</tr>
<tr>
<td>Eye/Face Protection</td>
<td>Always—Safety glasses a minimum—Face shield/goggles as warranted by task.</td>
<td>Always—Safety glasses a minimum—Face shield/goggles as warranted by task.</td>
</tr>
</tbody>
</table>

Note: Some customers may allow reflective clothing to be used instead of a reflective vest.

Employers are required to provide personal protective equipment and training in its proper use. In addition to the above requirements, there may be additional PPE needs based on the specific hazards of the job. The best way to determine job specific PPE requirements is to perform a Job Safety Analysis before beginning work.

3.1.1 PPE Descriptions

3.1.1.1 Eye Protection

OSHA (29 CFR 1910.133, 1926.102) requires workers to wear eye protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. Workers shall also use side shields when there is a hazard from flying objects. Wrap around style safety glasses are satisfactory to meet this requirement. All eye protection shall meet ANSI Z87.1 standards. Per the chart above, safety glasses with side shields are the minimum eye protection required for performing maintenance or construction work at a retail petroleum/convenience site. Other eye and face protection may be required based on the hazards present and the tasks to be done.

3.1.1.1.1 Chemical Goggles

Chemical goggles protect against exposure to materials capable of causing irreversible damage to the eyes, like gasoline and corrosives. Goggles also protect eyes against splash, flying chips, and dust.

3.1.1.2 Face Shields

Face shields cover a larger part of the face than goggles, but do not provide tight seals around the edges. Some face shields provide better protection for the face than others for certain hazards. Employers shall be aware of the hazards their employees face and provide them with the appropriate eye protection suited to the hazards they face.

3.1.1.2 Head Protection

OSHA (29 CFR 1910:135, 1926.100) requires the use of safety helmets (hard hats) to protect against injury to the head from falling objects or electrical hazards. Bump caps can also protect against injury in areas with restricted clearance. All hardhats shall meet the requirements of ANSI Z89.1.
3.1.1.3 **Foot Protection**

OSHA (29 CFR 1910:136, 1926.96) requires workers to wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where an employee's feet are exposed to electrical hazards. All footwear shall meet the requirements of ANSI Z41.

3.1.1.4 **Hand Protection**

OSHA (29 CFR 1910:138) requires workers to wear gloves when their hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes. The appropriate glove for a task depends upon the hazards for that task as identified by the employer.

3.1.1.5 **Body Protection**

Wear body protection to keep corrosive, oily, dirty, or dusty materials off of the body. Shirts shall be short sleeve at a minimum. Sleeveless shirts are prohibited. Conduct a hazard assessment to determine the protection appropriate to the hazard.

3.1.1.6 **Hearing Protection**

Wear hearing protection when working in an excessively noisy environment. Also, wear hearing protection whenever using power tools, noisy yard equipment, heavy machinery, and jackhammers. Every piece of hearing PPE shall have a “Noise Reduction Rating” (NRR) expressed in decibels of reduction. So a hearing protection device with a NRR of 10 dB makes noises seem about half as loud, and a NRR of 20 dB makes noises seem about one quarter as loud. OSHA 29 CFR 1926.52 and 1910.95 apply to noise exposures.

3.1.1.7 **Required Hearing Test**

Intensity of sound is measured in decibels (dB). The scale begins at 0 dB, the faintest sound the human ear can detect. It ends at over 180 dB, the noise at a rocket pad launch. OSHA requires a yearly hearing test for workers exposed to an average of 85 dB over an 8-hour day.

3.1.1.8 **Respiratory Protection**

Wear appropriate respiratory protection when effective engineering and administrative controls cannot be used. Do not enter areas with a hazardous atmosphere. Avoid working environments that require workers to wear respiratory protection. OSHA 1910.134 addresses respiratory protection requirements.

3.1.1.8.1 **Medical Clearance**

Any worker who wears a respirator shall receive medical clearance before use. If the worker will only be wearing a single-use disposable mask to provide comfort for dust, the medical clearance is not required.

3.1.1.9 **Fall Protection**

Refer to Section 7, Working at Heights for a discussion regarding fall protection PPE.

3.1.1.10 **Fire Resistant Clothing**

Fire resistant clothing (FRC) may be needed when working with or near fuels or doing hot work. The FRC, if required, shall protect the body that may be exposed and shall be in good condition.

### 3.2 POTENTIAL ENVIRONMENTAL HAZARDS

There are a variety of possible safety hazards at a retail petroleum/convenience site. If these hazards have not been controlled through engineering or administrative controls, then PPE can be used to protect against these hazards. The best way to determine the hazards of a job is to perform a pre-task Job Safety Analysis. It is impossible to cover all possible hazards here, but some of the environmental hazards are noise, splashing and fire:
3.2.1 Noise

Noise can come from a variety of sources. OSHA requires employers to have a hearing conservation program when their employees are exposed to an average of 85 decibels over an 8-hour day. Intensity of sound is measured in decibels (dB). The scale begins at 0 dB, the faintest sound the human ear can detect. It ends at over 180 dB, the noise at a rocket pad launch. On the decibel scale, changes of 6 to 10 decibels make things sound twice as loud (6 dB up) or half as loud (6 dB down). This is also how the effectiveness of hearing protection PPE is measured. Here are some examples of noises and their volume on the decibel scale (dB).

<table>
<thead>
<tr>
<th>Activity</th>
<th>dB</th>
<th>Activity</th>
<th>dB</th>
<th>Activity</th>
<th>dB</th>
<th>Activity</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>quiet office, library</td>
<td>40</td>
<td>electric drill</td>
<td>95</td>
<td>chain saw</td>
<td>120</td>
<td>rocket launching from pad</td>
<td>180</td>
</tr>
<tr>
<td>convenience store</td>
<td>50 – 60</td>
<td>factory machinery</td>
<td>80 – 100</td>
<td>pneumatic drill</td>
<td>120</td>
<td>jet engine taking off</td>
<td>150</td>
</tr>
<tr>
<td>power lawn mower</td>
<td>65 – 95</td>
<td>gas-powered blower</td>
<td>90 – 105</td>
<td>ambulance siren</td>
<td>120</td>
<td>subway/train</td>
<td>90 – 115</td>
</tr>
<tr>
<td>truck</td>
<td>75 – 85</td>
<td>power saw</td>
<td>110</td>
<td>jackhammer</td>
<td>130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See the discussion regarding Noise Reduction Ratings for hearing conservation (3.1.1.6).

3.2.2 Splashing

Fueling systems at retail petroleum/convenience sites in the US typically operate under pressure. Therefore, gasoline splashing or spraying is always a possible hazard when working on fueling systems. Other splashing or spraying hazards from hot or cold liquids or grease may exist when servicing food and beverage equipment, plumbing, HVAC or refrigeration systems. The best way to avoid these hazards is to de-energize equipment (e.g.: electrical, fluid pressure) before working on it, and verifying that the energy has been controlled. Refer to Section 12, Lockout-Tagout for additional information. Even with an effective Lockout-Tagout program in place, proper PPE shall be worn at all times.

3.2.3 Fire

Gasoline vapors in the air are the most likely source of a hazardous atmosphere or fire hazard at a retail petroleum/convenience facility. However, there are other materials at a facility that may cause fire hazards if ignited. These may include: cooking grease, janitorial chemicals, car wash chemicals, or the building structure and insulation. Refer to Section 13, Hot Work for a discussion regarding safety in an area that may have a potentially hazardous atmosphere or flammable materials. If there is a risk of a hazardous vapor concentration a meter capable of measuring Lower Explosive Limit (LEL) shall be used to verify that the atmosphere is within the acceptable level.

3.3 Consequences of Ignoring of PPE Requirements

In many circumstances, the use of PPE is required by government regulation. Not wearing proper PPE will result in violations and fines. However, the most important reason for wearing PPE is because it prevents injuries and saves lives. Where PPE is required, all workers shall follow the requirements.

3.4 Engineering Controls

Engineering controls are features that are built into pieces of equipment so they can be used and/or serviced safely. Where a hazard is present, it is always best to eliminate it by using engineering controls. If a hazard cannot be controlled in this way, then the use of personal protective equipment is required. Examples of engineering controls include belt guards for pulley and belt drive systems, or toe boards to prevent tools and materials from falling off of a scaffold. Another example would be construction of a building such that there is a parapet wall or guardrail surrounding the roof. These are examples of engineering controls designed to eliminate the hazard of working near the edge of the roof. If there are no engineering controls to eliminate the hazards of working near the edge of a roof, then fall protection PPE is required.
3.5 REQUIREMENTS FOR RESPIRATOR PROGRAM

3.5.1 Requirements for All Workers

Anyone wearing a respirator shall receive medical clearance before use (Note: this is not applicable to workers who use a single-use disposable dust mask for comfort). Employees shall complete respirator training and pass a respirator-fit test before wearing a respirator. A qualitative fit test determines whether an employee is able to get a respirator face piece-to-face seal.

3.5.1.1 Single-Use Disposable Mask

The single-use disposable mask protects against low levels of “nuisance” dust. Use and discard masks at end of task or work day. Do not use a single-use disposable mask:

- As protection against gases or vapors or oxygen deficiency.
- If respiratory protection is required.

3.6 REFERENCES

OSHA
29 CFR 1910.133, 1926.102
29 CFR 1910.135, 1926.100
29 CFR 1910.136; 1926.96
29 CFR 1910.138
29 CFR 1910.134; 1926.103
29 CFR 1910.132; 1926.95
29 CFR 1910.95, 1926.101

These may be obtained from OSHA’s website at http://www.osha.gov/index.html

4 Tool Selection

Minimum Required Knowledge

4.1 PROPER USE, FUNCTION, AND CARE OF HAND, PNEUMATIC, AND POWER TOOLS

All tools shall be used properly to be used safely. Only use equipment for the application, and in the operating environment and manner for which it was designed and approved by the manufacturer.

- Handle all equipment so that it will not be damaged from use.
- Read and understand the instruction manual and the PPE requirements that came with the tool to be used.
- Get advice from your supervisor if you are not familiar with the proper use of a tool.
- Make sure all electrical connections and wiring follow applicable electrical codes.
- Always check before connecting plugs to make sure that the plug matches the receptacle.
- Do not handle energized cord connections when they are wet or when your hands or feet are wet.
- Do not change attachment plugs and receptacles in any way that will prevent proper continuity of the grounding conductor. You may not use adapters that interrupt the grounding connection.
- Never leave a tool overhead, where someone may pull the power cord and cause the tool to fall.
- Never jerk the power cord to suspend, raise, or lower the tool.
- When working on a small item, clamp or anchor it to prevent it from whipping or slipping.
- When using rotating equipment, do not wear rings, ties, or loose fitting clothing that may accidentally get tangled in the equipment.
- Compressed air may not be used for cleaning purposes except where reduced to less than 30 psi, and then only with effective chip guarding and personal protective equipment.

4.2 SAFE WORKING LIMITS OF HAND, PNEUMATIC, AND POWER TOOLS

4.2.1 Overloading

Do not overload tools. Overloading is caused by bearing down too heavily on a tool or using dull blades or cutters. Overloading can result in damaging the tool or breaking its attachments.
4.2.2 Do Not Defeat Safety Features of Tools

Workers are prohibited from removing guards, switches, grounding conductors, or other safety features, even temporarily. If protective features or switches do not work properly, remove the equipment from service immediately.

4.3 HAND, PNEUMATIC (AIR), AND POWER TOOL SAFETY FEATURES

4.3.1 Blade/Wheel Guards

- All portable circular saws shall be equipped with a working spring-loaded blade guard that extends both above and below the base plate of the saw and automatically and immediately returns into place when the saw is withdrawn from the work.
- All grinding wheels larger than 2 inches in diameter shall be used on machines with safety guards designed and maintained to meet OSHA requirements.

4.3.2 Pressure Switches

- All hand-held powered circular saws, electric, hydraulic or pneumatic chain saws, and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released.
- All hand-held powered drills, fastener drivers, horizontal, vertical, and angle grinders, disc sanders, belt sanders, reciprocating saws, saber, scroll, and jig saws, and other similarly operating powered tools shall be equipped with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

4.3.3 Air Hose Connections

Pneumatic power tools shall be secured to the air supply hose by some positive (locking) means to prevent the tool from becoming accidentally disconnected. This can be accomplished with a sliding sleeve type of connector or by using retainer clips that are locked in place with the appropriate fastener. Where air supply hoses are used as extensions hoses, they shall be fastened together in the same manner.

4.4 SAFETY REQUIREMENTS FOR SURROUNDING AREAS WHEN HAND, PNEUMATIC, AND POWER TOOLS ARE USED

Portable electrical equipment, including battery-operated equipment, may be capable of igniting flammable vapors. Workers shall use hot work safety guidelines whenever using portable electrical equipment near a potential source of flammable vapors, such as a sump or a dispenser. For more information see Hot Work (Section 13) and Confined Space Safe Work Practice (Section 11).

4.5 TRAINING REQUIREMENTS FOR HAND, PNEUMATIC, AND POWER TOOLS

Employers are required by OSHA to instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment and necessary to control or eliminate any hazards or other exposure to illness or injury. This includes the requirement to assure that workers have the knowledge or receive proper training for the tools they use.

4.6 VISIBLE WEAR OR DAMAGE TO HAND, PNEUMATIC, AND POWER TOOLS THAT MAKE MAINTENANCE OR REPLACEMENT NECESSARY

Before use, all tools shall be inspected for damage and wear that may require maintenance or replacement:

- Check all extension and attachment cords for exposed wiring, insulation cracks, or defects. Worn or damaged electrical-cord insulation may expose an energized wire and create a shock hazard.
- Ensure that the conducting pins are in good condition. Do not use the equipment if the grounding pin is not in place.
- Visibly inspect all equipment for external damage or defects such as:
  i. damage to housing
  ii. missing or loose parts
  iii. evidence of internal damage
- Verify that the guards and/or other safety features are in place and work properly.
- Make sure rotating parts are free and rotate without obstruction.
• Test the control switch or trigger mechanism to make sure it operates freely and starts and stops the equipment properly.
If any defect or damage is found, do not use the equipment until qualified persons have made the repairs or tests necessary to make the equipment safe.

4.7 USE OF GFCI OUTLETS AND EXTENSION CORDS

Take the following steps to protect yourself and others when working with electrical equipment:

• Make sure that all circuits used to power plug-and-cord equipment have an approved over-current protection device, such as a circuit breaker.
• GFCI (ground fault circuit interrupter) protection is required when using power tools while working outside, in wet environments or in confined spaces. However, it is recommended to use GFCI protection on all power tools at all times.
• Do not handle energized cords when the cords or your hands or feet are wet.

Extension cords shall not be placed in walking or vehicle paths without proper protection against trip hazards. This can include barricading the area where the extension cord is crossing the path, or covering the extension cord with an approved cable positioning device or protective ramp.

4.8 REFERENCES

OSHA
29 CFR 1910.212
29 CFR 1910 Subpart P
29 CFR 1910.243
29 CFR 1926.21
29 CFR 1926 Subpart I

These may be obtained from OSHA’s website at http://www.osha.gov/index.html

5 Driving Safety

5.0 Scope

This section highlights many of the industry consensus practices for driving light vehicles (including service trucks) that may apply to maintenance and construction work in the retail petroleum/convenience business. These practices apply while on customer property. However, contractors are encouraged to adopt similar minimum standards for use at all times. This document does not cover all DOT requirements, and it is fully the responsibility of the employer and person performing the work to abide by any and all additional Federal, State, County, or local laws and regulations and manufacturer’s requirements that apply to driving their vehicles. It is also the responsibility of contractors to ensure that subcontractors abide by all applicable safety requirements.

Minimum Required Knowledge

5.1 VEHICLE REGULATIONS AND STATE REQUIREMENTS

Personnel operating a motor vehicle shall know, and be in compliance with, all applicable federal, state and local motor vehicle laws. All citations for traffic violations (e.g. speeding, reckless driving, etc.) shall be reported to the employee’s supervisor within 24 hours of the event (unless incapacitated) and may require a fact-finding investigation. In addition, workers shall:

• Have a driver’s license which is valid for the type of vehicle being driven.
• Keep driver’s licenses in their possession at all times when driving.
• Notify their supervisor immediately, and may not drive if they have a suspended or revoked driver’s license.
• Assure that their vehicle is properly insured, and shall carry proof of insurance in the vehicle.

5.2 USE OF SEAT BELTS

Seat belts shall be worn by all occupants at all times whenever a vehicle is in motion.
5.3 **COMPANIES’ DRIVING PROCEDURES**

In addition to these requirements, it is the employer’s responsibility to assure that drivers understand and follow their policies for the safe operation of motor vehicles.

5.4 **MOBILE PHONE PROCEDURES**

5.4.1 **Mobile Phones While Driving**

Mobile telephone use by the driver of a motor vehicle is strictly prohibited while the vehicle is in motion. This includes receiving incoming calls.

- A mobile phone may be left in the on position while the vehicle is in motion to alert the driver of an incoming call, however, the call shall not be answered.
- To retrieve messages and return calls, a driver shall stop the vehicle in a safe location off the road and away from traffic.

5.4.2 **Speaker Phone or Hands-free Phones**

Mobile phones in vehicles may have an installed speaker or hands-free kit installed. Using this speaker to answer a call, or using the hands-free equipment to make or answer a call is prohibited unless the driver stops the vehicle in a safe location off the road and away from traffic.

5.4.3 **Multitasking While Driving**

Drivers are also discouraged from other forms of “multi-tasking” (e.g. eating, reading, note-taking, use of other electronic devices etc.) as these all impair the driver’s ability to operate the vehicle safely.

5.5 **PROPER PLACES TO PARK WHILE ON THE SITE**

5.5.1 **Parking**

Workers may not park vehicles on-site where they will interfere with safe entry or exit from any building. Workers may not park vehicles on-site where they will interfere with the cashier’s view of the gasoline fueling operations. Special consideration should be given to avoiding the following situations:

- Restricting exit and entrance to the facility.
- Restricting normal customer vehicle or pedestrian traffic patterns.
- Screening customer view of traffic while exiting.
- Restricting movements of delivery trucks.
- Restricting access to customer services (e.g. car wash, air, water, vacuum, phone, etc.).

Observe all posted parking regulations. Many sites do not allow parking at the main ID sign, unless the vehicle needs to be parked there for service work.

5.5.2 **Backing Hazards**

Drivers shall assure that there are no hazards behind their vehicles prior to backing the vehicle. Use a spotter if necessary.

5.5.3 **Entering and Exiting Vehicles**

Use only approved handholds and footholds when getting in and out of vehicles. When entering and exiting from vehicles, drivers shall be aware of traffic hazards.

5.6 **DEFENSIVE DRIVING PRACTICES**

All drivers shall be appropriately licensed, trained and medically fit to operate the vehicle.
5.6.1 Distractions

There are many activities that can distract a driver. It is the responsibility of each driver to ensure they devote full attention to driving when operating a motor vehicle. Any activity that detracts from the ability of a driver to operate their vehicle safely should be avoided. Listed below are a few of the distracting activities that can take place in a moving vehicle.

- Drivers should not eat while driving.
- Conversations with vehicle passengers should be limited to ensure the driver’s attention is not distracted from the task of driving safely.
- Drivers should avoid adjusting the radio or tape/CD player while the vehicle is moving.
- Reaching for miscellaneous objects (phones, CDs, paperwork, sunglasses, etc.) should be avoided while a vehicle is in motion.
- Drivers should not try to review maps or paperwork while the vehicle is moving.
- Drivers should be aware that loss of concentration or focus (daydreaming) will increase the risk of a vehicle accident. Necessary measures should be taken to ensure this does not occur while operating a moving vehicle.
- Grooming activities such as shaving or putting on makeup (by the driver) in a moving vehicle are prohibited.

5.6.2 Fatigue

All drivers shall be rested and alert to drive the vehicle. Proper sleep and alertness is required for safe driving, so only drive when physically and mentally capable of doing so safely.

5.6.3 Defensive Driving

Drive defensively. This means:

- Be alert to traffic and road conditions at all times.
- Avoid driving errors.
- Compensate for the mistakes of other drivers.

Make necessary adjustments to avoid getting into accident-producing situations.

Workers who drive vehicles for business reasons should have formal defensive driving training.

5.6.4 Alcohol and Drugs While Driving

- Do not drive under the influence of alcohol or drugs including prescription drugs that can affect judgment.
- Possession of alcoholic beverages or illegal drugs is prohibited.

5.6.5 Passengers

Workers shall not ride in a non-passenger area of heavy equipment, machinery, or motor vehicles at any time. This includes the back of pick-ups, trucks, trailers, booms, buckets, sides or any exterior area of heavy equipment.

5.7 POSTED SPEED LIMITS

Drivers shall obey posted speed limits at all times. When weather conditions are poor or traffic is congested, it may be necessary to drive slower than posted speed limits. Workers shall not drive faster than conditions allow.

5.8 TRAFFIC PATTERNS

Most sites have entrances and exits on more than one side of the property. Therefore, traffic patterns at sites may be complex with vehicles coming from several directions. Some sites are situated in the middle of a block or on a divided road with entrances only on one side. Depending on the layout of the facility, these types of sites may have a vehicle flow that is dominated by a single direction of traffic. It is the responsibility of the worker to understand traffic patterns within a site so as to safely operate his/her vehicle within the property and to properly situate the work area.
5.9 HEAVY TRAFFIC AND PEDESTRIANS PATTERNS TO AND FROM INSIDE STORE

Workers shall be aware of pathways at sites where there will be heavy foot traffic as customers make their way to and from various offerings at the facility. The most heavily walked zone will likely be between the fueling portion of the site and the building. In addition, pedestrians may be distracted as they walk back to their vehicles (counting change, carrying items, etc). Workers shall be alert and use extreme caution when operating a motor vehicle in these areas in order to safeguard the general public.

5.10 PERSONAL PROTECTIVE EQUIPMENT

Wear personal protective equipment (PPE) when required and when necessary to protect against specific hazards:

- High visibility vest are required to be worn when out of the vehicle near moving traffic, or if changing a tire on the side of the road.
- Safety glasses are required to be worn when checking fluid levels and when dust may blow into eyes/face.

5.11 ACCIDENT REPORTING AND PROCEDURES

All incidents involving personal injury or property damage, or which have the potential to cause significant injury or damage, shall be promptly reported to site management (if accident on-site), and to the workers’ customer contact and employer. All information and assistance shall be made available upon request to assist with an incident investigation.

5.12 DEPARTMENT OF TRANSPORTATION REQUIREMENTS

It is the employer’s responsibility to assure that workers driving vehicles are aware of all applicable Department of Transportation (DOT) requirements that may apply to their vehicles. This includes but is not limited to:

- Vehicle is fit for intended purpose, and is maintained in safe working order, with functional seatbelts.
- Number of passengers does not exceed the specification for the vehicle.
- Frequent inspections shall be conducted on all vehicles (see Appendix A.1 for sample inspection sheets).
- Loads are secure and do not exceed specified and legal load limits for the vehicle.
- Loads in pickup, flat-bed truck, and on trailer shall be physically secured (ropes, clamps, etc) to the vehicle.
- Loads that extend beyond the vehicle edge shall be appropriately flagged and lighted, at night, to warn other drivers and pedestrians.
- Trailer, if used, shall be securely connected to the vehicle and lights and other safety equipment shall function properly.
- Proper documentation for “permit loads.”

6 Hazard Communication

Minimum Required Knowledge

6.1 REQUIREMENTS RELATED TO “EMPLOYEE RIGHT-TO-KNOW”

The Hazard Communication ( Hazcom) OSHA standard (29 CFR 1910.1200) covers the use of hazardous materials in the workplace, including the requirement for providing MSDSs and employee training. The purpose of Hazcom is to ensure that the hazards of all workplace chemicals are evaluated, and that hazard information is communicated to employees. This might include, but is not limited to: gasoline, diesel, pipe adhesives, pipe dope, cleaning liquids, refrigerants (e.g., Freon™), and lubricants. This communication is to be accomplished by a comprehensive hazard communication program, which is to include making material safety data sheets (MSDS), container labeling and other forms of warnings, and training available to employees. This applies to any chemical that is present in the workplace that employees may be exposed to under normal conditions of use or in a foreseeable emergency.

6.2 HAZARD DETERMINATION AND MITIGATION

Hazard determination is performed by the manufacturer or importer of the hazardous material based on an evaluation as required by various regulations and includes physical hazards (for example: flammable, corrosive, reactive) and health hazards (for example: irritant, narcotic, sensitizer, carcinogen).
Every container of hazardous chemicals received shall be labeled, tagged, or marked with the required information. Your suppliers shall also send you a properly completed MSDS with the first shipment of a chemical, and with the next shipment after the MSDS is updated. Employers have no independent duty to analyze the chemical or evaluate the hazards of it.

Employers are to maintain any MSDSs that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each work shift to employees when they are in their work locations. MSDSs should be read before handling new or unfamiliar chemicals or when an exposure to a chemical has occurred.

MSDS are the primary means of communicating safety and health information (e.g., how to handle chemicals, what PPE is required, what to do when exposed to, and how to treat exposure). MSDSs are not standardized, and some information is technical. However, all MSDSs shall contain at least the following information:

- name of manufacturer
- hazardous ingredients
- health hazards
- chemical and physical properties
- special precautions
- storage
- environmental
- reactivity
- other regulatory information

**Employee Responsibilities**

- Be alert to potential hazards of all substances.
- Consult the MSDS for specific information.
- Read labels.
- Know the written program.
- Work safely, follow safe work practices.

**6.3 CHEMICAL LIST REQUIREMENTS**

Hazcom requires employers to create a list of chemicals used by their employees and to keep it updated. This list shall use the same identifying name that is on the corresponding label and MSDS for that chemical. The employer shall share the list with employees.

**6.4 HAZARD TYPES**

Chemical hazards can be in the form of solids, liquids, or gases. The chemical or physical state of a substance influences the mode of entry into the body, and the possible toxic effect. Toxic effect depends on the toxicity of the material and the degree of exposure.

**6.4.1 Physical Hazards**

Physical hazards include: flammability, corrosiveness, and reactivity.

**6.4.2 Health Hazards**

Health hazards include irritant, narcotic, sensitizer, and carcinogenic chemicals. The degree of health hazards depends upon:

- type of chemical
- concentration of exposure
- length of exposure
- acute hazard vs. chronic hazard
- route of exposure
- combination of exposures
- individual tolerances
6.4.3 Exposure Limits

The following terms are used on MSDS for the manufacturer of the chemical to report the allowable limits of exposure to workers.

- TWA-8 = Time weighted average (over 8 hours)
- STEL = Short term exposure limit (15 min.)
- PEL = Permissible exposure limit (OSHA legal limit)
- TLV = Threshold limit value (recommended limit)

Exposure limits are often shown in the following units:

- mg/m$^3$: Milligrams per cubic meter (used to measure concentrations of dusts, metals, and mists)
- PPM: Parts per million (used to measure the concentration of a gas or vapor in a million parts of air)

6.4.4 Acute Versus Chronic Health Effects

The terms “acute” and “chronic” are used to describe health effects based on severity or duration. “Acute” effects usually occur rapidly as a result of short-term exposures, and are of short duration. “Chronic” effects generally occur as a result of long-term exposure, and are of long duration. Both types of effects can range from minor to fatal.

6.4.5 Route of Chemical Entry Into the Body

There are four main ways that chemicals can enter the human body. These are called “routes of exposure” and they may include each or combinations of the following:

- Inhalation (breathing)
- Ingestion (eating/drinking)
- Injection (puncturing the skin)
- Absorption (into the bloodstream through the skin)

6.5 HAZARD LABELS

Employers shall ensure that labels on containers of hazardous chemicals are not removed or defaced. A container is any barrel, bottle, box, can, drum, or tank that can contain a chemical. This includes stationary and non-stationary containers. All containers shall be labeled, except those for “immediate use” where the person who put the chemical in the container is also the one who is going to use it. Labels need to be in English, legible, and prominently displayed.

OSHA requires that the following information be included on all labels:

- the product name;
- warning statement, message or symbol; and
- on commercial labels, manufacturers of hazardous materials shall include their name and address. Many manufacturers also include a statement describing safe handling procedures.

Below is an example of a warning label from a can of rubber cement thinner:

**WARNING:** MAY PRODUCE DAMAGE TO CENTRAL AND PERIPHERAL NERVOUS SYSTEMS BY SKIN CONTACT OR BY INHALING VAPORS. CONTAINS n-HEXANE (CAS110-54-3).

Avoid inhaling vapors or skin contact. Use only in a well ventilated area. When using, do not eat, drink or smoke. If swallowed, do NOT induce vomiting. CALL PHYSICIAN IMMEDIATELY.

ABC Rubber Cement Company

Altonia, Ill.
In addition to commercial labels, many organizations use labels such as those shown below. Toward the top of the label will be the chemical trade name of the hazardous material. Each colored bar or small diamond represents a different class of hazard. The hazard classes found on labels include Health, Flammability, Reactivity, and in some cases, Special Hazards. Each hazard class uses a different color and a rating scale from 0 – 4, with 0 representing the least hazard and 4 representing the most severe hazard. Remember, the higher the number, the greater the hazard.

<table>
<thead>
<tr>
<th>Health (Blue)</th>
<th>Flammability (Red)</th>
<th>Reactivity (Yellow)</th>
<th>Special Hazards (White)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = No unusual hazard</td>
<td>0 = Not combustible</td>
<td>0 = stable Not reactive when mixed with water</td>
<td>= Water Reactive</td>
</tr>
<tr>
<td>1 = May be irritating</td>
<td>1 = Combustible if heated</td>
<td>1 = May react if heated or mixed with water but not violently</td>
<td>= Oxidizer</td>
</tr>
<tr>
<td>2 = May be harmful if inhaled or absorbed</td>
<td>2 = Combustible liquid flash point of 100° to 200° F</td>
<td>2 = Unstable or may react violently if mixed with water</td>
<td>= Radioactive</td>
</tr>
<tr>
<td>3 = May be harmful. Short exposure may cause serious injury despite prompt medical treatment. Full protective equipment is required.</td>
<td>3 = Flammable liquid flash point below 100° F</td>
<td>3 = May be explosive if shocked, heated under confinement or mixed with water</td>
<td>= Corrosive</td>
</tr>
<tr>
<td>4 = May be fatal on short exposure. Specialized protective equipment required.</td>
<td>4 = Flammable gas or extremely flammable liquid</td>
<td>4 = Explosive material at room temperature</td>
<td>= Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>= Alkali</td>
</tr>
</tbody>
</table>

6.6 REFERENCES

OSHA
29 CFR 1910.1200; 1926.59 Hazard Communication

This standard may be obtained from OSHA’s website at http://www.osha.gov/index.html

7 Working at Heights

Minimum Required Knowledge

7.1 WORKING-AT-HEIGHT EQUIPMENT SELECTION

Depending on the work to be done, the following equipment may be used for operations where the bottoms of workers’ feet will be at a height greater than 6 feet.

- Scaffold or wheeled scaffold erected by a competent person.
- Scissors lift.
- Aerial lift, cherry picker or bucket truck.
- Ladders may be used to access high work areas such as roofs, canopies, etc., as long as it is within the height limits allowable by OSHA.
- Working from ladders where the bottoms of the workers’ feet will be at a height greater than 6 feet is a customer specific requirement.
7.2 USE OF ANY MOBILE APPARATUS USED FOR WORKING AT HEIGHTS

7.2.1 Wheeled Scaffolds

Scaffolds shall be erected by a competent person in accordance with OSHA requirements (29 CFR 1926.450). Scaffolds may be used for high work and also for access to other high work area. All wheels shall be locked when wheeled scaffold towers are in use. No person is permitted to remain on any scaffold tower platform while the tower is being moved. The scaffold:

- shall be constructed on level surface,
- the height cannot exceed 3.5 times the minimum base dimension (short side),
- it shall not be used when winds exceed 35 miles per hour (50 km per hour) or during other conditions that may cause it to become unstable, and
- barricades shall be constructed five feet from the base of the scaffold.

7.2.2 Aerial Lift (Cherry Picker, Bucket Truck)

Aerial lifts may be used for access to roofs and canopies. The aerial lift basket may only be lowered onto a roof when it is more than six feet from the edge. Body restraint harness shall be worn at all times while in an aerial lift basket. The use of an aerial lift shall meet the requirements of OSHA regulation (29 CFR 1926.453). The aerial lift shall be used on a surface that allows stability of the equipment in the raised position. It shall not be used when winds exceed 35 miles per hour (50 km per hour), and barricading shall be constructed around the work area. If outriggers are available on the equipment, they shall be deployed.

7.2.3 Scissor Lift

Scissor lifts may be used for high work and access to other high work areas. If a scissors lift is used for access, a ladder shall also be present for emergency exit. The scissor lift shall be used on a surface that allows stability of the equipment in the raised position. It shall not be used when winds exceed 35 miles per hour (50 km per hour), and barricading shall be constructed around the work area, if stabilizers are available on the equipment, they shall be deployed.

7.3 INSPECTIONS FOR EQUIPMENT USED WHEN WORKING AT HEIGHTS

7.3.1 Ladders

A competent person shall inspect each ladder for visible defects on a periodic basis and after any occurrence that may affect its safe use. This person shall be familiar with the hazards associated with ladder use and be authorized to take appropriate action necessary to eliminate any hazard.

7.3.1.1 Ladders with Defects: Portable or fixed ladders shall be taken out of service if they have structural defects. Examples of structural defects include:

- Broken or missing rungs, cleats, or steps
- Broken or split rails
- Missing or damaged non-slip feet
- Missing load rating sticker
- Corroded or damaged components
- Other faulty or defective components

7.3.1.2 Removing Ladders from Service: To remove a ladder from service, one of the following shall be done:

- Immediately tag the ladder with “Do Not Use” or similar language.
- Mark the ladder in a manner that readily identifies it as defective.
- Block the ladder (for example, with a plywood attachment that spans several rungs).

7.3.1.3 Ladder Repairs: Before the ladder is returned to use, it shall be repaired and restored to its original design specifications.

7.3.2 Scaffolds

Scaffolds and scaffold components shall be inspected for visual defects by a competent person before each work shift, and after any occurrence which may affect a scaffold's structural integrity. This inspection shall be documented. Scaffolding shall be tagged
with a red flag at the beginning of construction indicating that it cannot be used. It can be replaced with a green tag only when the scaffold is deemed safe to use by a competent person.

7.3.3 Aerial Lift (Cherry Picker, Bucket Truck)
Aerial lifts, bucket trucks, and cherry pickers shall be periodically inspected according to the requirements of the manufacturer of the lift. The latest editions of the following ANSI standards may also apply:

ANSI/SIA A92.2 Vehicle-Mounted Elevating and Rotating Aerial Devices
ANSI/SIA A92.3 Manually Propelled Elevating Aerial Platforms
ANSI/SIA A92.5 Boom Supported Elevating Work Platforms
ANSI/SIA A92.6 Self-Propelled Elevating Work Platforms

7.3.4 Scissor Lift
Both scissors lifts and other rolling or mobile scaffolds (OSHA classifies these in the same category) shall be inspected for visual defects by a competent person before each work shift, and after any occurrence which may affect a scaffold's structural integrity. This inspection shall be documented.

7.3.5 Fall Protection Equipment
Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

7.4 PREVENTION/PROTECTION SYSTEMS FOR WORKING AT HEIGHTS
When working at heights where the feet of the worker are greater than six feet from a lower level, they shall be protected by a guardrail, parapet wall, safety net, other fall prevention system, or personal fall arrest system. It is the responsibility of the employer to provide appropriate fall prevention/protection systems and train employees how to properly and safely use them. Fall protection requirements when working on ladders may be different for individual customers.

7.4.1 Fall Prevention Systems
These are engineering controls, systems, design elements, construction standards, or equipment intended to provide for safe work and to eliminate the risk of falling. Examples of fall prevention are: parapet walls; properly constructed safety guardrail systems; properly constructed scaffolding; edge warning and demarcation systems; and scissor lift with protective railing installed. All fall prevention systems shall meet OSHA standards.

7.4.1.1 Properly Constructed Guardrail
This consists of a top rail 42 inches high (±3 inches), mid rails, toe boards, screens or mesh as appropriate and capable of withstanding a force of 200 pounds in any outward or downward direction. There are different requirements for mid-rails and other components of guardrail systems. Any guardrail system constructed shall meet the OSHA requirements, which may be found at 29 CFR 1926.502(a) (http:\www.osha.gov).

7.4.1.2 Parapet wall meeting the same requirements as a guardrail system.

7.4.1.3 Properly Constructed Safety Net Systems
For more information, refer to 29 CFR 1926.502(c) (http:\www.osha.gov) for specifications regarding safety net system requirements.

7.4.2 Fall Protection Systems
These are personal protective gear and systems designed, installed, and worn for the purpose of preventing injury in the event of a fall from heights greater than six feet. An example of fall protection is a full body safety harness with properly sized shock absorbing lanyards attached to properly designed and installed anchor points or static lines.
7.5 ELECTRICAL HAZARDS IMPACTING WORKING AT HEIGHTS

7.5.1 Overhead Electrical Hazards

Portable ladders and all other working at heights equipment shall have nonconductive side rails if they are used where the employee or the ladder may contact exposed energized parts. Electrical hazards shall be considered in the JSA before working at heights.

7.6 LADDER POSITIONING AND USE

7.6.1 Ladder Positioning

7.6.1.1 Unstable Soil Conditions

Use ladders only on stable and level surfaces, unless the ladders are secured to prevent accidental displacement.

7.6.1.2 Ladders on Slippery Surfaces

Do not use a ladder on a slippery surface, unless you secure the ladder or it has slip-resistant feet to prevent accidental displacement. Never use slip-resistant feet as a substitute for care in placing, lashing, or holding a ladder used on a slippery surface. Examples of slippery surfaces include flat metal or concrete surfaces constructed so that there is no way to prevent them from becoming slippery.

7.6.1.3 Falling Object Hazards

Always keep the area around the top and bottom of the ladder clear. Secure all tools and equipment that are being carried up a ladder. The bottom of the ladder should be barricaded to prevent movement by unauthorized personnel, and to ensure that no one is standing in an area where they may come in contact with a falling object.

7.6.1.4 Ladders in Traffic Flow

You shall secure ladders placed in any location where they can be displaced by workplace activities, pedestrian traffic or vehicular traffic, such as in passageways, doorways, or driveways. If you cannot secure the ladder, use a barricade to keep activity or traffic away from the ladder. Service vehicles may be used as part of a barricading system for these purposes.

7.6.1.5 Protection of the Public

When ladders shall be placed in areas of pedestrian or vehicular traffic, the area under the ladder shall be barricaded to as to deter individuals or vehicles from passing underneath the ladder.

7.6.1.6 Non-self-supporting Ladders

Place the top of a non-self-supporting ladder so that the two rails are supported equally.

7.6.2 Ladder Use

7.6.2.1 Loads

Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

7.6.2.2 Purpose

Ladders shall be used only for the purpose for which they were designed.

7.6.2.3 Oil & Grease

Always keep ladders free of oil, grease, and other slipping hazards.

7.6.2.4 Top Step

The top or top step of a step ladder shall never be used as a step.
7.6.2.5  High work access

When using an extension ladder to gain access to a roof or other high work platform, the side rails of the ladder shall extend at least 36 inches above the level of the area being accessed.

7.6.2.6  Climbing

- Always face the ladder when climbing up or down.
- Always maintain three-points-of-contact (one hand and two feet, or two hands and one foot) when climbing up or down.
- Workers shall not carry any object or load on a ladder that may cause the employee to lose balance and fall.
- Do not use the cross-bracing on the rear of a ladder for standing or climbing unless the ladder is designed and provided with steps for climbing on both front and rear.

7.6.2.7  Moving/Shifting

Do not move, shift, or extend a ladder when someone is on it.

7.6.2.8  Horizontal Reach

Do not overreach beyond the rail of the ladder (a person’s midpoint shall not extend beyond the rail of the ladder).

7.6.2.9  Visual Restrictions

Do not use a ladder if you are visually restricted by a blasting hood, welding helmet, and/or burning goggles.

7.6.2.10  Prohibited Ladders

Do not use the following types of ladders:
- Single-rail ladders
- Ladders constructed on the job site

7.7  USE OF PERSONAL PROTECTIVE EQUIPMENT AND TIE-OFF POINTS

7.7.1  Use of Fall Arrest Equipment

Fall-arrest equipment is the primary personal protective equipment (PPE) required to be used for working at heights operations when the hazard cannot be eliminated by engineering controls. Working at a height where the feet or the worker are six feet or higher above the ground shall not begin unless:

- A fixed platform is used with guardrails or handrails, verified by a competent person, or
- fall arrest equipment is in use that has:
  - a proper anchor,
  - full body harness using double latch self locking snap hooks at each connection,
  - synthetic fiber lanyards,
  - shock absorber.
- Fall arrest equipment shall limit free fall to 6 feet or less.
- A visual inspection of the fall arrest equipment and system is completed and any equipment that is damaged has been taken out of service.

Fall arrest requirements when working on ladders may be different for individual customers.

7.7.1.1  Personal Fall Arrest System

A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. Anchorage points shall be able to withstand at least 5000 pounds of force. Employers using personal fall arrest systems shall properly train employees and have a rescue plan for any employee who falls. Specific OSHA requirements for personal fall arrest systems may be found at 29 CFR 1926.502(a) (http:\www.osha.gov).

7.7.1.2  Operational Requirements
When using harnesses and lanyards, specific care shall be used to determine the height of the anchor point compared to the maximum length of any potential fall. Lanyards of the correct length shall be used such that any potential free fall is limited to a length of six feet. In addition, lanyards shall be the correct length to assure that any falling worker does not contact any lower level. Self-retracting lanyards may be used, but shall limit any potential free fall to two feet. Self-retracting lanyards shall also be used in a manner which assures that any falling worker does not contact any lower level.

7.8 BARRICADING/PROTECTING/ISOLATING WORK ENVIRONMENT

Refer to Section 8 for information on barricading and work area isolation.

7.9 REFERENCES

OSHA

29 CFR 1926.1053
29 CFR 1926.453
29 CFR 1926.500
29 CFR 1926.501
29 CFR 1926.104

These may be obtained from OSHA’s website at http://www.osha.gov/index.html

8 Barricading

Minimum Required Knowledge

Before starting work that will require barricading any part of the driveway, work in the building, or work anywhere on the site when other workers or the general public may be nearby, the site manager shall be advised of the scope of work that is about to get underway, as well as the possible effect on the operation of the site. The planned work sequence and site layout (detailing work zones, delivery and storage areas) shall be confirmed daily and just before the barricading activity.

8.1 TRAFFIC PATTERNS (VEHICULAR, FOOT TRAFFIC, PEAK PERIODS, DELIVERY TRUCKS)

For proper protection while working on the driveway, the JSA shall include, but not be limited to the following:

- Vehicle traffic patterns.
- High pedestrian traffic areas.
- Peak periods (how busy is the site?).
- Merchandise and tanker deliveries underway or expected by the site during the job.
- Precautions to protect the general public and customers against accidental contact with the work being performed.
- Assurance that barricading does not create additional hazards (e.g. forcing pedestrians into heavy traffic areas).

Knowledge of traffic movement is required for successful barricading. Many sites in the retail petroleum industry are small and prone to congestion. Sites often have a predominant direction of vehicle traffic which will help determine where barricades are to be placed. The use of barricades is both for the protection of workers and protection of the general public/customers.

Try to avoid preventive maintenance or non-essential work on the fueling system or on the forecourt during peak “rush-hour” times.

8.2 ENTRANCES/EXITS TO SITES

Work to be performed at or near entrances and exits to sites shall be evaluated to determine:

- How equipment should be positioned (Is there a better choice of location where the work may be performed instead of the entrance or exit).
- The best time to do the work.
- If the entrance or exit needs to be completely closed during the work.

Try to avoid work in entrances or exits during peak rush hour times. These issues shall be part of the JSA for all work to be performed in an entrance or exit of a petroleum/convenience site.
8.3 TYPES OF BARRICADES

All barricading systems used in the driveway shall be at least 48 inches high. This is important so the barricades are more visible over the hoods of sedans and SUVs. Establish a controlled work area using the following types of barricades.

- A vehicle (car, van, or service truck) may be used to barricade the workspace, and is best used in front of the work area in the predominant direction of vehicle traffic.
- High visibility plastic fencing.
- Traffic cones and flags.
- A-frame barricades.
- Saw-horse barricades.
- Accordion type gates.
- Other similar types of barricades.

“Caution Tape” (yellow & black) may be used together with any of these types of barricades, but may not be used as the only means of barricading while working on the forecourt.

A combination of barricade types or other barriers appropriate to the job may be used to guide traffic and secure the working area where traffic impact might occur. The secured work area shall have positioned around it (at all times) an adequate number of high-visibility barricades to ensure adequate warning to pedestrians, motorists, and workers. Barricades shall be spaced so that vehicles cannot drive in between them.

8.3.1 If working in a high foot traffic zone such as a store building, caution tape between barricades or solid barricades (accordion, saw horse, high visibility plastic fencing, or A-frame type) shall be used to alert the general public/customers to the hazards present.

8.4 TRAFFIC CONTROL BY REGULATORY AUTHORITIES

If public roads/bicycle paths/footpaths etc. have to be closed or rerouted, local regulations shall be followed and all required permits shall be in place. Use the proper traffic guiding equipment such as, but not limited to:

- Stop/Slow paddle signs,
- flaggers,
- flashing lights,
- directional signs.

8.5 WORK AREA ISOLATION PLANNING

8.5.1 Establishing the Work Area

An appropriate number of barricades shall be in place to ensure a continuous separation of the work activity from anyone not involved in the work on site. It is the responsibility of the person in charge to ensure that the established barricaded area is adequate to provide the necessary margin of protection. If adequate barricading cannot be established work activities may not begin. If more than one trade or contractor is on-site, or more than one job is to be done, the persons in charge from each trade shall meet to coordinate safe work areas. Proper placement of barricades is required at all times.
8.5.2 Guidelines for Use of Barricades

<table>
<thead>
<tr>
<th>Hazardous Condition</th>
<th>Barricade</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Construction</td>
<td>Use barricades to completely isolate the work area.</td>
</tr>
<tr>
<td>Pump Island Work</td>
<td>When working on a dispenser or pump island, both sides of the island shall be barricaded.</td>
</tr>
<tr>
<td>Overhead Work</td>
<td>Use barricades for areas where debris may fall or drop</td>
</tr>
<tr>
<td>Excavations (e.g. trenches, open holes)</td>
<td>Use barricades to prevent personnel or vehicles from falling or accidentally driving into excavations. For all excavations open for longer than a standard work day temporary fencing may be required.</td>
</tr>
<tr>
<td>Temporary opening in site driveway</td>
<td>Use barricades at temporary openings, like an uncovered sump pit, in a station driveway to prevent people or vehicles from falling into the opening.</td>
</tr>
<tr>
<td>Tripping Hazards</td>
<td>Use barricades to block-off potential trip hazards (e.g. conduit stubs, piping stubs, holes in floors, uneven surfaces, minor changes in elevation, etc.)</td>
</tr>
<tr>
<td>Potentially Unsafe Conditions</td>
<td>Use barricades when an unsafe condition exists, for example:</td>
</tr>
<tr>
<td></td>
<td>• Incident investigation scene</td>
</tr>
<tr>
<td></td>
<td>• Spill</td>
</tr>
<tr>
<td></td>
<td>• Structure is partially dismantled</td>
</tr>
<tr>
<td>Ladders</td>
<td>Use barricades around the base of ladders that are located where they can be displaced by workplace activities or traffic</td>
</tr>
<tr>
<td>Energized lines or equipment</td>
<td>Use non-conductive barricades around energized lines or equipment to prevent accidental contact</td>
</tr>
</tbody>
</table>

8.6 PERSONNEL REQUIREMENTS

All workers performing traffic control tasks shall have prior knowledge and understanding of applicable public safety requirements.

8.7 PERSONAL PROTECTIVE EQUIPMENT

No additional personal protective equipment (PPE) is required for barricading operations. Refer to Section 3, “Personal Protective Equipment” for basic PPE requirements.

9 Trenching and Excavation

Minimum Required Knowledge

9.1 OVERHEAD OBSTRUCTIONS FOR EQUIPMENT AND HEAVY EQUIPMENT SAFETY

9.1.1 Overhead Obstructions

Excavations are usually made with large pieces of heavy equipment (track hoe, backhoe, and cranes). Because these pieces of equipment have large metal booms, it is especially important that the project foreman and designated competent persons know where overhead electrical and utility lines are located. Specific precautions shall be taken to ensure that the excavating equipment does not come in contact with overhead electrical lines or any other overhead utilities. Workers moving or using heavy equipment shall also be aware of clearances between the equipment and pump canopy structures. It is important to be aware of all overhead obstructions and clearances when equipment is being moved onto the site.

Refer to Section 10, Rigging, Hoisting and Lifting, and Section 12, Lockout/Tagout, for additional information regarding overhead utilities.

9.1.2 Equipment Fit-for-Purpose

All heavy equipment used for excavation work shall be capable of reaching the distances required to safely remove soil from the excavation. Equipment may not be used to overreach its capacity or load limit. All equipment shall be in good working order and be frequently and periodically inspected as required by OSHA regulations. The contractor shall certify that operators of heavy equipment are qualified to safely operate the equipment. Workers who are not certified to operate heavy equipment may not do so. In addition, the contractor shall provide any spotters who are required to assure the safe operation of heavy equipment.
9.2 FACILITY’S UNDERGROUND STRUCTURES

Before starting the excavation, the estimated location of utilities, such as sewer, telephone, communication, fiber optic lines, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work shall be determined. The contractor shall also determine the locations of tanks, product piping, or other fueling system components that may be encountered during excavation work. Utilities shall be properly marked out by local authorities prior to beginning an excavation. The contractor shall review all available site plans and engineering drawings with the facility’s Engineering Authority and Project Manager before work begins.

All digging work that shall take place in a mark-out zone or in areas where fueling system components may be encountered shall be performed using hand digging techniques so that utilities or fuel systems will not be damaged or workers exposed to uncontrolled energy. All digging work within 2 feet of a mark-out zone shall be done using hand digging techniques.

The contractor shall be aware of the ownership of the underground structures that may be encountered during an excavation. This is important so that the proper authority may be notified in case of a problem arises during the excavation process. Before the excavation begins, the contractor shall assure that the owners of all underground structures are aware than an excavation will be taking place that may affect their property.

9.3 SLOPING AND SHORING METHODS/STABILITY OF EXCAVATIONS

An adequate protective system, such as sloping or shoring, shall be in place to protect workers in an excavation from possible cave-in, collapse of an adjacent structure, and falling materials and equipment. The contractor is responsible for the design and construction of any shoring, sloping, and/or support system for entry. The system shall meet the conditions and requirements in OSHA 29 CFR 1926:652, and any other applicable State or local requirements. Support-system designs shall either:

- Meet requirements for timber or aluminum hydraulic shoring, and also use manufacturers’ tabulated data or other tabulated data for design and construction of a support system, or
- Be designed by a registered professional engineer.

During installation of a protective system, a copy of the design plan shall be kept on-site and available for inspection. Possible methods that can be used include:

9.3.1 Benching

Benching is a method of protecting employees from cave-ins by excavating the sides of a trench excavation by forming one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

9.3.2 Shield (Shield System)

A shield, or shield system is a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the confines of the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses (Also known as trench box or trench shield).

9.3.3 Shoring (Shoring System)

Shoring or a shoring system is designed to prevent cave-ins. Shoring systems can be metal-hydraulic, sheet pile, mechanical or timber based system that supports the sides of an excavation.

9.3.4 Sloping (Sloping System)

Sloping is a method of protecting employees from cave-ins by forming sides of an excavation which are sloped away from the excavation. The angle of the slope may vary with differences in soil type, environmental conditions, and depth of the excavation.

9.4 MANAGEMENT OF SITE AND PLACEMENT OF EQUIPMENT, MACHINERY, AND MATERIALS

9.4.1 Management of Site

Excavation sites shall be properly managed to reduce the risks for injuries to workers. A designated competent person shall be on-site at all times while trenching work is underway, and before employees may enter.
9.4.1.1 General Site Management

- Do not stand underneath a load that is being handled by lifting or digging equipment.
- Stand away from any vehicle being loaded or unloaded, so you will not be struck by spillage or falling materials.
- Workers may remain in the cab of a vehicle being loaded or unloaded if the vehicle has a cab shield that provides adequate protection.

9.4.1.2 Surface Crossing of Trenches

Surface crossing of trenches should not be made unless absolutely necessary. When necessary, they are only permitted under the following conditions:

- Vehicle crossings shall be designed by and installed under the supervision of a Registered Professional Engineer
- Walkways or bridges shall:
  - have a minimum clear width of 20 inches,
  - be fitted with standard rails,
  - extend a minimum of 24 inches past the surface edge of the trench.

9.4.1.3 Warning System for Mobile Equipment

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

9.4.2 Placement of Equipment, Machinery, and Materials

In no case may machinery, equipment, or materials be placed any closer than two (2) feet from the edge of the excavation. Materials may not be stockpiled so as to create the potential for material to fall into the excavation. New backfill shall be stockpiled separately from soils and debris that have been removed from the excavation.

9.5 Impact of Changes in Weather, Soil, and Groundwater Conditions

Whenever there are changes in weather, soil or groundwater conditions, a competent person shall evaluate if the new conditions require changes to protective systems, or if additional methods are required to safeguard the health and safety of the workers and protect the environment.

9.5.1 Standing Water and Water Accumulation

Workers shall have the customer’s permission before conducting operations that will require personnel to enter an excavation. Effort should be made to use techniques that allow the work to be performed without entering an excavation. The following requirements for water accumulation shall be followed if personnel shall work in the excavation:

- Personnel shall not work in excavations where standing water has accumulated.
- If water removal or de-watering equipment, such as pumps, are used, they shall be installed and monitored by a competent person.
- Personnel shall exit from excavations during rainstorms.
- Excavations/Trenches shall be carefully inspected by a competent person after each rain and before personnel are permitted to re-enter.

9.6 Isolation of the Area

Entry to the excavation work area shall be controlled. The excavation site shall be properly isolated to assure that unauthorized people are not exposed to hazards of the excavation (please see Section 8, Barracading for more information about properly isolating work areas). Specific care shall be taken to assure that the excavation area is not accessible to vehicular or pedestrian traffic if the excavation is to be left unattended.
9.7 SAFE ENTRY AND EXIT FROM EXCAVATION, INCLUDING EMERGENCY RESPONSE AND EVACUATION

Workers shall have the customer’s permission before conducting operations that will require personnel to enter an excavation. Effort should be made to use techniques that allow the work to be performed without entering an excavation. Only workers required to be in an excavation may enter an excavation.

9.7.1 Entering and Exiting Excavations

- Do not enter an excavation more than 5 feet deep until all the requirements in this Excavation Safe Work Practice and other applicable OSHA requirements have been met.
- The atmosphere in the excavation shall be tested to be sure there is no hazardous atmosphere present.
- Workers may not enter an excavation where a hazardous atmosphere is present.
- Work shall only take place in an excavation under the immediate supervision of a “competent person” experienced in excavation matters and the hazards involved.
- Isolate all lines entering an excavation to prevent liquid or gas from accidentally discharging into the excavation.
- Excavations four feet or more in depth shall be provided with a fixed means of exit.
- Spacing between ladders or other means of exit shall be such that a worker will not have to travel more than 25 feet laterally to the nearest means of exit.
- Do not enter an excavation unless the excavation has been inspected by a competent person at the start of the shift or after conditions change that may affect the stability of the excavation and an Excavation Inspection Permit-To-Work has been completed. A standardized, multi-permit form is provided in Appendix B.3.
- Do not enter an excavation unless it has been properly planned and an Excavation Checklist has been completed.
- For excavations greater than 5 feet deep, the sides of the excavation shall be protected from cave-in by sloping, benching of shoring systems (shoring systems shall be designed by a registered Professional Engineer).
- Do not enter an excavation if soil or other items are piled or stored within 2 feet from the edge of the excavation.
- No worker may be in an excavation while backfill is being added to the excavation.
- No worker may be in an excavation while underground storage tanks are being lowered into the excavation.
- Workers may not enter or remain in an excavation when an underground storage tank is unsupported or there is the possibility that the tank may roll.

9.7.2 Ladders

- Ladders shall be secured and extend a minimum of 36 inches above the edge of the excavation.
- Metal ladders should not be used when electric utilities are present.

9.7.3 Ramps

A competent person shall design any ramps used. Such ramps shall:

- Be of uniform thickness.
- Be fastened securely together if made of more than one timber.
- Have fasteners installed on the bottom of the timbers to prevent tripping.
- Have cleats or other surface treatment, when needed, to prevent workers from slipping on the ramp.

9.7.4 Rescue Plan

Workers shall not enter excavations where a hazardous atmosphere exists.

Prior to beginning the excavation the contractor shall prepare a suitable rescue plan that specifies the actions to be taken if a worker becomes disabled, overcome by atmospheric hazards or otherwise incapacitated and shall be rescued from the excavation.

9.8 EXCAVATION COMPETENT PERSON REQUIREMENTS

An excavation competent person as defined by OSHA is a person capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees. The competent person is authorized to take prompt corrective measures to eliminate existing and predictable hazards and to stop work when required. Among other things, the designated excavation competent person shall have and be able to demonstrate the following:
Training, experience, and knowledge of:

- soil analysis,
- use of protective systems,

Ability to detect:

- conditions that may result in cave-ins,
- failures in protective systems,
- hazardous atmospheres,
- other hazards including those associated with confined spaces.

9.8.1 Inspections

An excavation competent person shall conduct inspections for evidence of possible cave-in, failure of protective systems, hazardous atmospheres, and other hazardous conditions when there is a worker exposure:

- daily and before the start of each shift,
- as dictated by the work being done in the excavation,
- after every rainstorm,
- after other events that may increase hazards, such as snowstorm, thaw, earthquake, dramatic change in weather, etc.,
- when fissures, tension cracks, slouching, undercutting, water seepage, bulging at the bottom, or other similar conditions occur,
- when there is a change in the size, location, or placement of the spoil pile,
- when there is any indication of change or movement in adjacent structures.

9.9 EXCAVATION DEWATERING

Dewatering an excavation is a process used to lower groundwater level below the base of the excavation, so water does not accumulate in the excavation. This is a very specialized process and shall be conducted under the direction of the excavation competent person in conjunction with the appropriate hydro-geological expert. Excavation dewatering is typically done by pumping groundwater from either a monitoring well adjacent to the excavation or from a dewatering point installed specifically for the purpose of dewatering. When dewatering tank fields, the use of the tank field monitoring points for dewatering purposes is not typically acceptable, as they will not normally be deep enough to provide an effective dewatering point.

9.10 SITE CONDITIONS OF ADJACENT STRUCTURES AND FOUNDATIONS

When an excavation endangers the stability of an adjoining building, wall, or other structure, a support system shall be used to ensure the stability of the structure. If an excavation operation undermines sidewalks, pavement, or nearby structures, a support system shall be provided to protect workers from the possible collapse of these structures.

9.11 BARRICADEING

Barricade the excavation area to prevent vehicles from entering and endangering workers. Install barricades around an open excavation at all times. Remove them only when necessary in order to move equipment. Unless an open excavation is completely covered, install barricades around it during darkness or when the excavation is to be left unattended.

Refer to Section 8, Barricading for additional information.

9.12 MANAGEMENT OF CONTAMINATED SOILS

Soils removed from the excavation shall be stockpiled and sampled as required by regulation to determine the appropriate waste or recycling category. Stockpiled soils removed from an excavation shall be stored on suitable plastic sheeting and covered with plastic sheeting or as required by regulation. Contamination/waste classification of soils may only be performed by persons trained and capable of doing so. Contaminated soils shall be disposed of or recycled in a manner consistent with applicable federal, state, and local regulations, and within these requirements, according to the wishes and waste management requirements of the customer.
9.13 VAPOR HAZARDS
Refer to API RP 1615 for a discussion of methods for vapor-freeing tanks.

9.14 USE OF PPE
Fall prevention or fall arrest systems shall be used when workers may be exposed to a fall of greater than six feet where the hazard has not been eliminated through engineering controls. Please see API Safe Work Practice for Personal Protective Equipment (PPE) for requirements.

9.15 REGULATORY PERMIT REQUIREMENTS
Regulatory permit requirements for excavations differ widely based on state and local requirements. Agencies that govern the regulatory permitting process for excavations also differ widely within state and local governments. It is the responsibility of the contractor and competent person to know and understand the regulatory requirements for excavation permits based on the agency with jurisdiction over excavations in the area where the work will be conducted.

9.16 REFERENCES
API
RP1604 Closure of Underground Petroleum Storage Tanks
RP 1615 Installation of Underground of Petroleum Storage Systems
RP 1631 Interior Lining and Periodic Inspection of Underground Storage Tanks

OSHA
29 CFR 1926.650
29 CFR 1926.651
29 CFR 1926.652

These may be obtained from OSHA’s website at http://www.osha.gov/index.html

10 Rigging, Hoisting, and Lifting
Minimum Required Knowledge

10.1 PERSONNEL RESPONSIBILITIES
It is the responsibility of the contractor performing the hoisting or lifting operation to do so in a safe manner and in compliance with applicable OSHA regulations. If unsure about the safety of a lifting or hoisting operation, it is the contractor’s responsibility to STOP the operation until the issue has been clarified, and the operation can be performed safely.

10.1.1 Crane Operator
All operators of powered lifting devices shall be certified crane operators trained and certified for operating that equipment. Operators shall keep their certification available on the jobsite at all times.

The operator shall be a competent person and is responsible to assure that the following are done before a lift begins:

- An assessment of the lift has been completed and the lift method and equipment have been determined by a competent person.
- Make sure the crane and load are properly configured.
- Assure that outriggers and cribbing are being used at all times while performing lifts.

10.1.2 Operating Crew
The crane operator or operating crew shall conduct a pre-operational inspection to verify that the crane and rigging equipment are configured properly and that controls and safety devices are working properly. They shall also ensure that the following are in good condition and are adequately rated for the intended load:

- crane,
- wire ropes,
• reeling systems,
• all rigging hardware,

10.1.3 **Riggers**
All rigging shall be performed by competent persons.

10.2 **LIFTING PLAN**
Every lift with mechanical equipment shall be planned before the lift begins. At a minimum, the following factors shall be considered in the lift plan.

- Swing radius/travel path of the proposed lift.
- Load does not exceed the dynamic and/or static capacities of the lifting equipment.
- Barricade the work area.
- Weather conditions.
- Control lines—if the load shall be guided or stabilized; control lines may be used. Control lines shall be connected before the load is raised. Do not attempt to connect them if the load is suspended.
- Use proper ANSI approved hand signals.
- Consider hazardous surroundings and conditions, including:
  - power lines,
  - flammable atmospheres,
  - excavations,
  - loose/shifting soil.
- Pick area and set area shall be identified and barricaded as part of the lifting plan. The pick area and set area shall not be changed without the modification of the JSA.

10.2.1 **Special Rules for Small Truck Mounted Cranes**
These safety rules apply to all maintenance service trucks with small boom cranes on the rear of the vehicle.

- The truck shall be placed so as to perform the hoisting operation as safely as possible.
- The truck engine shall be turned off during the entire maintenance work operation.
- The work area shall be barricaded to eliminate entry by the public and to provide a high visibility work area for safety of the person performing the work. The requirements of Section 8, Barricading, apply. When there is a choice as to truck location, the truck shall be placed so as to become a primary element of the barricade system.

10.3 **SOIL STABILITY**
When placing lifting equipment, proper clearance shall be given to open excavations or recently filled excavations. Outriggers shall be placed on stable pavement or soil capable of withstanding the pressures of the load. Lifting equipment shall be placed on paved surfaces unless there is prior approval from the site owner. When soil conditions change (e.g. as the result of weather change), placement of equipment and outriggers shall be reevaluated.

10.4 **OVERHEAD POTENTIAL RISKS**
Assume that all overhead utility lines are energized, unless the owner of the line has verified that the line is not energized and the line has been visibly isolated. Maintain a minimum distance of 10 feet between all parts of the crane and load and all overhead utility lines. Additional requirements and greater clearance distances apply for power lines rated higher than 50 kV. Any hazards within these guidelines shall be properly protected by the utility company.

10.5 **EQUIPMENT SELECTION**
Equipment used for any job shall be appropriate for the site and for the work to be done. Selection criteria should include

- Physical size of the equipment (will it fit into, and maneuver within the available space?).
- Type, size and weight of load to be lifted.
- Swing capacity (is the equipment capable of lifting and moving the load from one place to another as required by the job?).
• Rated load capacities.
• Height of lift required.
• Recommended operating speeds.
• Aerial lifts shall be electrically isolated and meet the requirements for insulated aerial devices in OSHA 29 CFR 1926.453.
• A full body harness shall be worn and a lanyard attached to the boom or aerial lift basket when working from an aerial lift.

10.5.1 Inspections

Frequent and periodic inspections of the lifting equipment shall be conducted in compliance with OSHA regulations. Inspection documentation shall be readily available for inspection by the customer. This requirement applies to rental equipment as well. The rental agency shall provide documentation of completed inspections; otherwise, the equipment shall not be used.

10.6 WORK AREA ISOLATION

See Section 8, Barricading, for a general discussion of work area isolation. When isolating hoisting/lifting work areas special consideration may need to be given for the following:

• Hoisting shall not take place while any person is standing on any part of an object to be lifted, or in a tank excavation.
• Personnel shall never stand under an object suspended by a lifting device or in the travel path of the object.
• Operator shall be aware of the location of adjacent obstacles to avoid trapping personnel between equipment and the obstacles.
• Streets or portions of the public right-of-way may need to be temporarily blocked to ensure public safety. This shall be done in accordance with all local ordinances and in cooperation with all appropriate governmental agencies.

10.7 MACHINERY MOVEMENT

Machinery requiring outriggers shall not be traveled while under load. Personnel lift equipment shall not be moved with personnel inside of them unless the equipment is specifically designed for that purpose. The traveled area shall be part of the work area isolation plan and lift plan.

10.8 TOOL BOX DISCUSSION DIRECTLY PRIOR TO LIFTING ACTIVITY

Before executing the lift plan where there will be more than one worker at a site, the workers shall conduct a toolbox discussion (tailgate meeting) that includes at least the following:

• work to be performed,
• hazards of that activity,
• conditions that may have changed overnight or since the last time work was performed at the site.

10.9 RESCUING TOPPLED EQUIPMENT

In the event that a piece of lifting/hoisting equipment topples and needs to be righted, the following shall be considered:

• The event shall be treated as an emergency response and shall be managed by an OSHA trained incident commander.
• A hazard assessment shall be completed.
• There may be a fuel spill associated with the toppling event.
• All applicable emergency response procedures shall be initiated.
• Health and safety of workers and the general public is of primary concern.
• The site owner shall be notified.
• The load shall be secured.
• The entire area surrounding the toppled equipment shall be barricaded.
• A larger crane or lifting device may need to be brought onto the site to right the toppled piece of equipment.
• Local Fire Department shall be notified as deemed necessary.

10.10 REFERENCES

OSHA
29 CFR 1926.453
Confined Space Entry

Minimum Required Knowledge

11.1 Definition of a Confined Space and Permit Required Confined Space

Confined Space: means a space that is large enough for a person to enter, has limited or restricted means for entry/exit, and is not designed for continuous occupancy.

11.2 Types of Confined Spaces, Including Typical Service Station Examples

For typical work at retail petroleum/convenience sites, the most common confined spaces are sumps, manholes, and pits atop underground storage tanks. Additional confined spaces that may exist include: storage tanks, storm water management systems, sewer manholes, trenches, excavations, oil-water separators, waste lift-stations, any other water or waste handling systems large enough for human entry, and crawl spaces associated with buildings.

11.3 Permit Requirements for Confined Spaces

A permit is required for confined space entries if the space meets the definition of a permit-required confined space. A standardized, multi-permit form is provided in Appendix B.3. Only a person who has received detailed confined space training in addition to this overview should be allowed to determine the following classifications of confined spaces.

11.3.1 Permit-Required Confined Space (Permit Space)

A permit required confined space:

- contains or has a potential (likelihood) to contain a hazardous atmosphere or, contains a material that has the potential for engulfing someone who enters.
- Is configured such that a worker may be trapped or buried by inwardly converging walls, as in a trench excavation.
- Contains any other recognized serious safety hazard.

For example, a tank top sump or pit is always a confined space. It may be classified as a non-permit required confined space if the above conditions do not apply.

11.3.2 Non-permit Confined Space

A non-permit confined space means a confined space that does not meet the criteria of a permit-required confined space. A space may only be deemed “non-permit required” following completion of a Pre-Entry Checklist (see multi-permit form, Appendix B.3).

11.3.3 Hazardous Atmosphere

A hazardous atmosphere is an atmosphere that may expose workers to air not acceptable for human breathing or may create a hazardous situation:

- a combustible or flammable gas,
- low oxygen concentrations,
- levels of toxic substances.

11.4 Barricading/Protecting/Isolating Work Area

Before beginning work, barricade the work area to prevent unauthorized persons and vehicles from entering.
11.5 ATMOSPHERIC TESTING INCLUDING SAFE ATMOSPHERIC LEVELS
Before any person enters either a permit-required or non-permit-required confined space, the atmosphere inside the space shall be tested by a person trained in for hazardous atmosphere conditions.

11.6 VENTILATION METHODS
After initial testing of the atmosphere, the space shall be ventilated with a mechanical ventilation system designed for ventilating confined spaces. The atmosphere shall be re-tested to ensure that the supply of air from the ventilation unit has not introduced any additional hazards into the space.

11.7 ASSIGNMENT DUTIES
For construction sites or existing retail petroleum/convenience sites, the individual in charge of performing the work is responsible for identifying all confined space areas as well as implementing and enforcing the confined space entry program. There are three general roles and responsibilities for confined space entries—the entry supervisor, authorized entrant and attendant. These individuals shall receive special training before working in or near confined spaces. No other personnel on the site shall be in the confined space work area.

11.8 ENTRY PROCEDURES FOR CONFINED SPACES
Contractors who enter confined spaces shall develop and implement the means, procedures, and practices necessary for safe confined space entry operations, including, but not limited to the provisions of this Safe Work Practice. Such means procedures, and practices shall:

• Be in full compliance with all applicable federal, state, and local regulations.
• Be written as the contractor’s confined-space compliance policy.
• Include as a minimum pre-entry procedures, pre-entry checklist and confined space permit execution.

11.9 RESCUE PROCEDURES FOR SINGLE OR MULTI-EMPLOYER ENTRIES
Rescue procedures shall be established for each confined space entry. All necessary rescue procedures shall be developed before confined space entries may begin.

Workers who have not received special training for confined space and who encounter an emergency should not attempt a rescue by themselves. This may endanger the would-be rescuer as well as reduce the likelihood of rescuing the original person. Immediately seek help which should include the job superintendent or person in charge. Call 911 immediately and inform them of “man down in a confined space” and the type of space.

11.10 PERSONAL PROTECTIVE EQUIPMENT
For all confined space entries greater than 5 feet in depth, full retrieval gear shall be used. Additionally, site-specific rescue procedures and contact numbers shall be documented and in place prior to the start of work. Full retrieval gear consists of (at a minimum):

• tripod specifically designed and certified as a personnel retrieval device,
• properly sized and fitted full body harness connected to the tripod and worn by the entrant.

Refer to Section 3, Personal Protective Equipment Safe Work Practice for basic PPE requirements.

11.11 TRAINING REQUIREMENTS FOR ALL PERSONNEL INVOLVED IN CONFINED SPACE WORK
Contractors working in confined spaces shall ensure workers have been trained to work in confined spaces. Training shall include but not be limited to:

• Types and locations of confined spaces at the facility.
• Chemical or physical hazards involved, including symptoms and consequences of exposure.
• Work practices and techniques.
• Atmospheric testing procedures.
• Personal protective equipment, monitoring equipment, and ventilation equipment.
• Rescue procedures.
• Assigned duties.
• Hands-on practice simulations of rescue procedures.

11.12 REFERENCES

OSHA
29 CFR 1926.21
29 CFR 1910.146

These may be obtained from OSHA’s web site at http://www.osha.gov/index.html)

12 Lockout-Tagout

Minimum Required Knowledge

12.1 AFFECTED EMPLOYEE

An affected employee is a worker whose job requires him/her to operate, use, or work near a machine or equipment being constructed, serviced or maintained under lockout or tagout.

12.2 AUTHORIZED EMPLOYEE

An authorized employee is a worker who locks out (or tags out) machines or equipment in order to perform servicing or maintenance on that machine or equipment. Examples include operations, maintenance/service, construction or contractor workers who apply locks or tags to machinery or equipment and are authorized to do so because they are performing work on the equipment.

12.3 ENERGY ISOLATING DEVICE

An energy isolating device is a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following:

• manually operated electrical circuit breaker,
• disconnect switch,
• line valve,
• manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and in addition, no pole can be operated independently (Only 110 volt switches meet these criteria).

Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

12.4 ENERGY SOURCES

An energy source is any source of electrical, mechanical, potential, hydraulic, pneumatic, chemical, thermal, or any other type of energy.

12.5 LOCKOUT AND TAGOUT DEVICES

12.5.1 Lockout Device

A lockout device uses a positive means such as a separately keyed lock, locked chain, or cable to hold an energy isolating device in a safe position and prevent the energizing of a machine, equipment, or circuit. Lockout devices shall be strong enough to prevent removal without the use of excessive force (for example, using bolt cutters or other metal cutting tools).

12.5.2 Tagout Device

A tagout device is a prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed. Tagout devices and their means of attachment shall be strong enough to prevent accidental removal. Tagout device attachment shall be non-reusable, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength 50 pounds such as a nylon cable tie.
12.6 LOCKOUT/TAGOUT PROCEDURES

Before starting maintenance or construction activities, equipment with hazardous energy shall be de-energized through the use of lockout devices. Only if equipment is not capable of being locked out, may workers use a tagout process. Tagouts shall not be used during construction as the sole means of energy isolation.

12.6.1 Applying Locks and Tags

Locks and tags shall be identified with the name of the person who applied it. When there is more than one affected employee on the same site, each employee shall affix their own lock to the energy isolation device. If necessary, multi-lock hasps shall be used to hold one lock per affected employee, such that all locks shall be removed before energy may be restored.

12.6.2 Testing De-energized Equipment, or “Trying” the Equipment

After energy isolation devices have been applied, and before work begins; the machinery or equipment that has been de-energized shall be tested to confirm that equipment cannot be started and/or that the hazardous energy has been controlled. This is often referred to as Lock, Tag, and Try.

12.6.3 Removing Locks and Tags

Lock-out locks and tags shall only be removed by the person who applied them. Under exceptional circumstances: Lock and/or tags may be removed by the person in charge (authority not to be delegated) after complying with the following procedure:

- Verify that the person who placed the lock and tag is not on-site.
- Make all reasonable efforts to contact the person.
- Ensure that the site and applicable equipment is in a safe and operable condition.
- Remove lock-out/ tag-out.
- Re-commission (start-up) equipment in a careful and systematical way to catch any unsafe situations.
- Ensure that the person who applied the tag and lock knows the equipment has been returned to service.

12.7 TRAINING AND COMMUNICATION

Before lockout or tagout operations start, the manager of the site and employees who may be working in the lockout area (for example in the same room as the electrical panel) shall be made aware that lockout/tagout procedures will be taking place, what parts of the site may be de-energized, and that only the person performing the work may remove the lockout or tagout device. The multi-permit form in Appendix B.3 may be useful in meeting this requirement.

12.8 REFERENCES

OSHA

29 CFR 1910.147 Control of Hazardous Energy
29 CFR 1926.417 Lockout and Tagging of Circuits

These may be obtained from OSHA’s website at http://www.osha.gov/index.html

13 Hot Work

Minimum Required Knowledge

13.1 ACTIVITIES THAT CONSTITUTE HOT WORK

Hot Work is defined as any work that will generate sufficient thermal energy to ignite combustible and/or flammable materials. The following activities are examples of Hot Work, however, there may be more that are applicable at specific locations: welding, burning, drilling, flame cutting, grinding, use of portable heaters, electrical tools/equipment that are not explosion-proof or intrinsically safe), sandblasting operations (static charges), certain operation of internal combustion engines, or any other work capable of producing an ignition source at a retail petroleum/convenience site.

NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work requires precautions to be taken in the presence of combustible materials within a 35 foot radius of hot work operations. Therefore, no Hot Work may begin within a 35 foot radius of any fueling system component where petroleum vapors may collect even in an upset condition, without:
• A full evaluation of the hazards.
• Removal of combustible materials that are not part of the fueling system.
• Issuing a Hot Work permit (see multi-permit form, Appendix B.3).
• The presence of a fire watch.

The requirements of NFPA 51B are herein incorporated by reference. Please see section 4 above for more information about evaluating Hot Work hazards.

13.2 THE FIRE TRIANGLE (FUEL, OXYGEN, IGNITION SOURCE)

Three components shall be present at the same time to produce the chain reaction that is fire:

• Enough oxygen to sustain combustion,
• Enough heat to provide an ignition source,
• Some sort of fuel or combustible material, and

This is called the Fire Triangle. Remove any of the three pieces of the triangle, or otherwise disrupt the chain reaction and a fire cannot occur.

13.3 REQUIREMENTS FOR AND DUTIES OF THE FIRE WATCH

13.3.1 Requirement for a Fire Watch

A Fire Watch is required for all Hot Work. The Fire Watch shall assist Hot Work activities by providing fire protection, air monitoring, and being constantly aware for fire hazards. As a minimum, one 20-pound or two 10-pound ABC dry chemical fire extinguishers shall be available for immediate use.

The work supervisor is responsible for assigning a Fire Watch when Hot Work is within 35 feet of a potential combustible or flammable vapor source. The Fire Watch shall be trained in the proper use of a fire extinguisher. The supervisor shall review the duties with the Fire Watch before the fire watch begins or when any conditions change or new hazards are recognized during the fire watch.

13.3.2 Duties of a Fire Watch

• Understanding the location and nature of the Hot Work.
• Remain in the area while the work is being performed and remain in constant communication range with person(s) doing the Hot Work.
• Have a fire extinguisher available and ready for use if necessary.
• The Fire Watch is authorized to stop the Hot Work whenever work conditions become unsafe or if the work description on the permit is exceeded. The supervisor shall be notified for any “stop work” situation.

See Hot Work Appendix A.4 for detailed duties of the Fire Watch.

13.4 HOT WORK PERMIT WRITING

13.4.1 Duties of the Hot Work Permit Writer

The person who writes the Hot Work Permit is responsible for determining if acceptable working conditions exist. The permit writer is responsible for the following duties:

• Shall know the hazards of the specific Hot Work task.
• Shall know the locations and properties of all flammable and combustible materials. MSDS are good resources for determining the properties of these materials.
• Shall communicate effectively with operators of the site and other contractors or personnel who may be affected by the Hot Work.
• Shall verify by checking that the permit is complete, including testing and specified equipment in place, before endorsing the permit.
• Terminate the permit when the work is complete, or when conditions not allowed under the permit arise.
• Determine at periodic intervals that acceptable hot work conditions are maintained.

13.4.2 Perform Visual Inspection and Atmospheric Test

Atmospheric testing shall be performed as part of any Hot Work task (for additional information see Appendix A.4). The Hot Work permit writer shall conduct a pre-task job safety analysis (JSA) to determine all hazards of the Hot Work location before issuing a permit. The work area shall not contain any combustible or exposed flammable materials. Follow these steps to perform visual inspection:

• Check the area for the presence of exposed flammable material and for conditions such as equipment damage that may potentially cause a release of flammable material.
• If any flammable materials or unsafe conditions are found, the hazard shall be cleaned up, isolated, or repaired before the Hot Work may begin or continue.

13.5 SPARK CONTAINMENT SYSTEMS AND FIRE EXTINGUISHERS

13.5.1 Fire Extinguishers (See Section 2—General Knowledge)

13.5.2 Spark Containment Systems (Fire Blankets and Fire Curtains)

When welding, flame cutting, using an open flame, or performing any operation that may generate sparks within 35 feet of a gasoline dispenser, or within a tank top sump, the fueling system components shall be shielded with fire resistant blankets or fire curtains during the operation.

13.6 REFERENCES

NFPA²
51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, 2003 Edition

OSHA
29 CFR 1926. 352

This may be obtained from the OSHA web site at http://www.osha.gov/index.html

14 Underground Storage Tanks

Minimum Required Knowledge

14.1 STORAGE TANK CERTIFICATIONS

All installation and removal of underground storage tank (UST) and piping systems is to be performed under the direction of a person who is certified by the State or other appropriate jurisdiction where the work will be performed. UST installer certifications are very specialized and typically require a combination of verifiable experience and testing before a certification is issued.

14.2 SAFETY AROUND STORAGE TANKS IN EXCAVATIONS

14.2.1 Entering Excavations

See Section 9, Trenching and Excavation, and applicable OSHA regulations for general requirements for entering excavations. Workers shall never position themselves under a suspended load and shall not enter or remain in an excavation while a tank is being lowered into the excavation. Workers may not enter or remain in an excavation when a UST is unsupported or there is the possibility that the tank may roll.

14.2.2 Working on Top of a UST

Workers shall not be on top of a UST when it is unsupported or there is the possibility that the tank may become unstable and move. Workers may not be on top of a UST where there is the possibility of a fall of more than six feet without taking proper fall protection measures. Workers shall never be on top of a UST while it is being hoisted, set, or otherwise moved.

14.3 TANK INERTING AND PURGING

Inerting and purging are two techniques used to change the atmosphere in a storage tank so that various work may be performed.

14.3.1 Inerting

Inerting removes the oxygen in a hazardous atmosphere by replacing it with a noncombustible gas (such as carbon dioxide or nitrogen) so that the resulting atmosphere is noncombustible. In an inerted atmosphere, flammable chemicals, such as hydrocarbons, are still present. However, there is not enough oxygen to promote combustion or to support life. Therefore, inerted spaces shall never be entered by workers.

14.3.2 Purging

Purging removes a hazardous atmosphere from an enclosed space by means of specialized types of ventilation. This dilutes the hazardous components in the atmosphere so that ultimately it will become non-hazardous.

See API RP 1604 for more information about inerting and purging.

14.4 WHEN TANKS ARE EMPTY AND/OR SAFE FOR REMOVAL

After a UST is removed from service, a hazardous atmosphere still exists inside the storage tank, even if the petroleum products have been pumped out. Operations that physically affect a UST shall not begin until the hazardous (explosive/flammable) atmosphere inside the tank has been purged or inerted under the direction of a certified UST Installer. Many jurisdictions have special rules for performing this activity. It is the responsibility of the contractor and certified UST Installer to understand all applicable rules and regulations, and to be sure that the atmospheric hazard inside a storage tank has been properly abated before work may begin.

14.5 UST “HOLD-DOWN” PROCEDURES AND TANK BUOYANCY

When there is groundwater in the soil or backfill outside of a UST, the UST will become buoyant if the system used to anchor the tank has been removed. In these cases, storage tanks may “float” and become dislodged from their backfill, making the storage tank unfit for further use. To avoid this situation, USTs are prevented from moving by many types of “hold-down” systems. These may include:

- Anchor straps attached to a concrete slab beneath the UST.
- Anchor straps attached to concrete weights (usually called “dead men”) sitting at the bottom of the excavation.
- Covering the USTs with backfill and concrete.

State or local requirements will determine which “hold-down” systems may be used in any specific area. When performing operations that require the concrete and backfill above a UST to be removed, the operations shall be performed by a certified UST Installer. If the UST will continue to be used, extreme care shall be taken to assure that a UST will not “float” or otherwise move when the concrete or backfill overburden is removed. In many cases it is necessary to artificially pump the groundwater lower around the USTs to prevent “floating.” This is called “dewatering.” USTs that are to continue in use may not be uncovered without first taking measures that are required to address potential buoyancy of the tanks.

14.6 CORROSION PREVENTION SYSTEMS

Metal USTs shall have special integrated systems to prevent corrosion (rust). Corrosion can take place when metal comes into contact with moist soil or groundwater. There are three ways steel USTs are typically protected against corrosion

14.6.1 Non-conductive Coatings

Tanks may be covered with epoxy or another material that prevents the steel tank from coming into contact with soil or groundwater.

14.6.2 Cathodic Protection

Consists of sacrificial pieces metal called anodes which are bonded to the tank and are designed to rust instead of the tank. This can be achieved by bonding metal pieces to the UST that are more prone to rust than the steel of the tank (passive or “sacrificial”
cathodic protection). Cathodic protection can also be achieved by passing low levels of electrical charge through specially designed and installed anodes (active or “impressed current” cathodic protection).

14.6.3 Dielectric Fittings

Bungs or holes in the tops of many steel tanks where various components are attached have special fittings to prevent the components from coming into electrical contact with the UST. This allows the tank’s corrosion protection system to work properly.

14.6.4 Other Corrosion Considerations

14.6.4.1 Electrical Shorts

Care shall be taken when working around steel USTs to assure that no electrical conduits or other metal components touch the outside of the tank. This may cause the cathodic protection system to become inoperable.

14.6.4.2 Dissimilar Metal Corrosion

Some metals may corrode merely by being in contact with other metals having different chemical compositions. An example of this is steel and copper. Care should be taken to avoid this type of corrosion of parts used in the construction and repair of UST systems.

14.7 LIFTING AND SETTING STORAGE TANKS

Please see API Safe Work Practice for Lifting and Hoisting. USTs shall only be lifted or hoisted by using their lifting lugs as attachment points for a properly designed hoisting sling. If control lines are needed, they shall be in place before the lift begins.

14.8 ATMOSPHERIC HAZARDS OF GASOLINE VAPORS

Gasoline presents three common atmospheric hazards;

14.8.1 Explosive/Flammable

Workers shall not enter or remain in an area where an explosive/flammable atmosphere over 10% of the Lower Explosive Limit (LEL) is present

14.8.2 Oxygen Depleted Atmosphere

Workers may not enter or remain in an area where there is less than 19.5% or more than 23.5% oxygen in the atmosphere

14.8.3 Toxic Substances

Workers may not enter or remain in an area where levels of toxic substances such as benzene or hydrogen sulfide are greater than allowed by federal, state or local requirements.

Each of these types of hazards are readily detected by air testing meters

14.8.5 Buildup of Vapor

Care shall be taken when working around the following components, as gasoline vapors may buildup in these areas:

- Sumps and man ways.
- Inside electrical conduits. All conduits at a petroleum/convenience site should be sealed at each end to prevent vapors from being transmitted.
- In and around fill pipes and vapor connections.
- Around vent stacks.

Anywhere residual gasoline liquid may accumulate.

14.9 RETURNING FUEL TO STORAGE TANKS

To minimize a static charge concern, petroleum products from maintenance operations (e.g. pump calibration) shall not be dispensed into, nor carried in a plastic container. All fuel shall be dispensed into and carried back to the UST in a metal container. While dispensing fuel the metal container shall be in contact with the pavement or ground at all times. When returning petroleum
products to the UST, a suitable metal funnel shall be used. The container should be in constant contact with the funnel while pouring to avoid buildup of static electricity. Petroleum products shall not be poured into UST fills without the use of a funnel. Any fuel that drips into the spill bucket around the fill shall be drained back to the storage tank or cleaned up immediately.

14.10 WORKING ON TANKS AFTER THEY HAVE BEEN REMOVED FROM AN EXCAVATION

14.10.1 Atmospheric Hazard

After a UST is removed from the ground, a hazardous atmosphere may return to the inside of the storage tank, even if it had been properly purged or inerted for removal. Conditions such as weather, outside temperature, and the method previously used for purging/inerting the UST may affect the safety of the atmosphere inside the tank.

In many areas it is common to cut holes in a UST after it has been removed from the ground to prevent the tank from being used again, or to satisfy transportation requirements. Operations such as these that physically affect a UST after it has been removed from the ground shall not begin until the hazardous atmosphere inside the tank has been tested and purged or inerted to a safe condition under the direction of a certified UST installer. Many jurisdictions have special rules for performing this activity. It is the responsibility of the contractor and certified UST installer to understand all applicable rules and regulations, and to be sure that the atmospheric hazard inside a storage tank has been properly abated before and during any work.

14.10.2 Roll hazard

Work may not begin on a UST after it has been removed from the ground without providing protection against the possibility that the tank may roll. Storage tanks shall be stabilized before work begins.

14.11 EQUIPMENT USED FOR REMOVING VAPORS FROM A TANK (CERTIFICATION REQUIRED)

Purging or inerting vapor from a UST shall be conducted under the direction of a UST installer certified in the jurisdiction where the work is taking place. Equipment, including vacuum devices that are not labeled/certified as explosion-proof (such as a shop type vacuum) shall not be used to remove vapors from a UST.

14.12 ENTERING UNDERGROUND STORAGE TANKS

Underground storage tanks shall not be entered by workers without prior written permission from the UST owner. Entry into USTs is a very hazardous and specialized task and shall only be performed by appropriately trained individuals. All USTs are confined spaces. Additional state and local regulations may apply for this activity.

14.13 UST MONITORING SYSTEMS

UST monitoring systems take many forms and are manufactured by a variety of companies. The most common types of monitoring performed by these devices are:

- fluid level,
- tank leak detection,
- interstitial space level (liquid or vapor space between layers of a double-wall tank),
- sump/catch basin level (liquid or vapor) beneath dispensers, turbine pumps, or other areas with a containment sump,
- electronic line leak detection.

Some monitoring systems may also be used for other types of monitoring.

14.13.1 Moving Sensors Prohibited

In many jurisdictions specific positioning and operational condition of the sensors is a legal requirement for operating a fueling system. In these jurisdictions sensors shall not be disabled or moved from their regulatory required positions. It is the responsibility of the contractor performing the work to know and understand the regulations that govern sensor placement in the areas where they will be performing work.

14.14 PERSONAL PROTECTIVE EQUIPMENT

When working on pressurized fueling systems, goggles or a face shield may be needed if a spray or splash hazard exists. In addition, flame resistant clothing (FRC) may be needed if a fire hazard exists. Nitrile gloves may be required to protect hands against
contact with gasoline. Performing a pre-task job safety analysis is the best way to help determine the potential hazards and proper precautions to take. See Section 3, Personal Protective Equipment for more information.
APPENDIX A.1

A.1 Driving Safety—Section 5

<table>
<thead>
<tr>
<th>Inspect the following items monthly or at 5000 mile intervals, whichever comes first</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check that the following external lights and reflectors are clean and functional:</td>
<td></td>
</tr>
<tr>
<td>Headlights (high and low beams)</td>
<td></td>
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<tr>
<td>Tail lights and brake lights</td>
<td></td>
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<tr>
<td>Turn signals</td>
<td></td>
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<tr>
<td>Four-way emergency flashers</td>
<td></td>
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<tr>
<td>Test that dash indicators work when corresponding lights are turned on:</td>
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<tr>
<td>Left and right turn signals</td>
<td></td>
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<tr>
<td>Four-way emergency flashers</td>
<td></td>
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<tr>
<td>High beam headlights</td>
<td></td>
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<tr>
<td>Tire inflation: Check for proper inflation using a tire gauge</td>
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</tr>
<tr>
<td>Tire tread depth: Check for minimum tread depth per tire following manufacturer’s recommendations; if manufacturer's recommendations are unknown, minimum is $\frac{1}{8}$ inch on all tires</td>
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</tr>
<tr>
<td>Tire condition: Check that tread is evenly worn and look for cuts or other damage to tread or sidewalls; make sure valve caps and stems are not damaged</td>
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<tr>
<td>Oil, brake fluid, power steering fluid, and transmission fluid levels shall measure above “add” mark on dip stick</td>
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<tr>
<td>Windshield wipers: Check that wiper arms and blades are secure, not damaged, and operate smoothly</td>
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</tr>
<tr>
<td>Windshield washer fluid filled and operating correctly</td>
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<tr>
<td>Inspect parking brake for proper operation</td>
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<tr>
<td>Battery connections do not show signs of excessive corrosion; where provided, check battery maintenance indicator</td>
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</tr>
<tr>
<td>Check ALL belts for snugness (up to $\frac{3}{4}$ inch play at center of belt), cracks, or frays</td>
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</tbody>
</table>

**Table 1—Periodic Vehicle Inspection**

**Before Entering Vehicle:**
- Look for dripping fluids on underside of engine and transmission
- Visually inspect each tire for proper inflation (Note: radial tires will “balloon” slightly on the sidewall so learn the appearance of your tires when properly inflated)

**Before Starting Engine:**
- Mirrors should be clean and adjusted properly
- Windshield should be clean with no stickers, damage, ice or other items that obstruct vision
- Check that safety belt is securely mounted, adjusts and latches properly

**After Starting Engine:**
- Check all gauges and warning lights for normal operation position
- With the engine running, check for excessive play by turning the steering wheel back and forth
- Check horn for proper operation
- Pump the brake pedal three times, then hold it down for five seconds; brake pedal should not move (depress) during the five seconds

**Table 2—Vehicle Daily Pre-trip Checklist**
A.2—WORKING AT HEIGHTS—SECTION 7

A.2 Procedures To Erect/Move/Dismantle Scaffolding

A.2.1 Erection: All scaffolds shall be designed, erected, moved, dismantled and altered under the supervision of a qualified person as defined by OSHA or applicable state regulations. Scaffolds shall be constructed according to the design and used as intended.

A.2.2 Secure Footing: Scaffolds shall have a secure footing, top rails, mid rails and toe boards with full work platform planking when there is a possibility of falling of more than six (6) feet.

A.2.3 Height vs. Base Dimension: Free-standing scaffold towers used externally shall not be higher to the top platform level than three times the minimum base dimension, unless secured to a permanent structure. For internal use only, the height to platform may rise to 3.5 times the minimum base dimension.

A.2.4 Wheel Locks: All wheels shall be locked when wheeled scaffold towers are in use. No person is permitted to remain on any scaffold tower platform while the tower is being moved.

A.2.5 Tagging Scaffolding: Scaffolding shall be tagged with a red flag indicating that it is not to be used and replaced with a green tag when the scaffold is okay for use.

A.2.6 Ladder Access: Ladder access shall be provided for all scaffolds so that cross-bracing and framing are not used as a means of access.

A.2.7 Leveling: Screw-jacks shall be used to level scaffolds if necessary. Never use blocks.

A.2.8 Attachment to Structures: Scaffolds shall be tied to a structure every thirty (30) feet in length and twenty-six (26) feet in height.

A.2.9 Working Platform Planks: Working platform planks shall extend at least six (6) inches beyond supports.

A.2.10 Falling Object Hazards: Where hazards of falling materials from the scaffold exist, netting shall be provided or the area around the bottom of the scaffold shall be barricaded.

A.2.11 Qualified Person Requirement: Scaffolds shall be erected, moved, dismantled and altered under the supervision of a qualified person.

A.2.12 Inspection: Scaffolding shall be inspected daily by a qualified individual. These inspections shall be documented.
APPENDIX A.3—Lockout-Tagout—Section 12

A.3 Training and Program Audit

A.3.1 LOCKOUT TAGOUT PROGRAM AUDIT

Employers shall review their Lockout Tagout program annually and certify that the procedures are adequate to address the hazard, or note any deficiencies and take actions to correct them.

A.3.2 TRAINING

Employers shall provide training to ensure that workers understand the use of energy controls and have the skills to properly use them. The training shall include at least the following: Recognition of hazardous energy sources, Type and magnitude of the energy available in the workplace,

- Methods and means necessary for energy isolation and control.
- Purpose and use of the energy control procedure.
- The prohibition of attempting to restart or reenergize machines or equipment which are locked out or tagged out.
- The limitations of tags:
  i. Tags are essentially warning devices and do not provide physical restraint that is provided by a lock.
  ii. Tags are not to be removed without authorization of the person responsible for it.
  iii. Tags may never to be bypassed, ignored, or otherwise defeated.
  iv. Tags shall be legible and understandable by all authorized and, affected employees, and all other employees whose work operations are or may be in the area.
  v. Tags and their means of attachment shall be made of materials which will withstand the environmental conditions encountered in the workplace.
  i. Tags may evoke a false sense of security, and their meaning and limitations need to be understood as part of the overall energy control program.
  iii. Tags shall be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

A.3.3 RETRAINING

Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.
APPENDIX A.4—Hot Work—Section 13

A.4 Additional Requirements

A.4.1 EMPLOYEE TRAINING

Employees shall be trained so they know the relevant aspects of safety regarding Hot Work. Training should include:

- Types and locations of potential fire hazards at the facility and specifically near the work area.
- Work practices and techniques to control hot work exposures.
- Atmospheric testing procedures.
- Use of fire extinguishers, atmosphere monitoring equipment, and ventilation equipment.
- Relevant Hot Work policies.

Employees shall be trained prior to conducting their first Hot Work task, when assigned duties change, or when the employee’s supervisor believes it to be appropriate.

A.4.2 DUTIES OF THE FIRE WATCH

- Understanding the location and nature of the hot work.
- Remain in the area while the work is being performed and remain in constant communication range with person(s) doing the Hot Work.
- Never leave the work area for any reason without a replacement.
- When walls are involved in Hot Work, each side requires a fire watch.
- The fire watch shall be in the ready position at all times when Hot Work is being performed. The ready position consists of being attentive and having the fire extinguisher in position prior to the start of work. The fire extinguisher shall be nearby while the Hot Work is being performed. The fire extinguisher shall be returned to its designated location when the Hot Work is complete. The fire extinguisher shall not be discharged unless a fire actually occurs.
- The fire watch shall periodically survey the area with a direct-reading combustible gas meter to ensure the work area is suitable for Hot Work. The work shall stop immediately if the combustible gas meter registers 10% or greater of the lower explosive level (L.E.L.) in the atmosphere.
- The fire watch is authorized to stop the Hot Work whenever work conditions become unsafe or if the work description on the permit is exceeded. The supervisor shall be notified for any “stop work” situation.
- The fire watch shall be equipped with the personal protective equipment needed to perform the work safely, such as properly shaded goggles for working with welders.

A.4.3 GAS TEST HOT WORK AREAS—COMPLETE HOT WORK PERMIT

Before beginning the Hot Work permit process, the permit writer shall discuss the work with the site manager to assure that the operators of the site are aware of the work to be done.

Atmospheric testing shall be performed as part of any Hot Work task. Workers performing gas testing shall check and calibrate their LEL monitoring equipment as necessary according to manufacturer’s instructions. Calibration shall be documented properly and maintained as per the equipment manufacturer’s and/or the contractor’s procedures.

For all Hot Work, the atmosphere shall be tested initially and periodically as conditions require. A Hot Work permit shall be completed for any Hot Work to be conducted within 35 feet of flammable material. For any Hot Work conducted:

- LEL shall never exceed 10%.
- If LEL is greater than 10% Hot Work may not proceed, or if ongoing, shall be shut down immediately.

The Permit Writer will complete the Hot Work Permit and review all permit conditions with any additional personnel performing the Hot Work. Any special conditions shall be noted on the permit and discussed with affected personnel. Personnel shall be informed that it is their responsibility to discontinue Hot Work immediately if an unsafe condition develops or may develop, and report to the permit writer. The permit shall be posted in a prominent location before beginning Hot Work.
APPENDIX B.1—JOB CLEARANCE FORM
# Job Clearance Form

**CONTRACTOR INSTRUCTIONS PRIOR TO START OF WORK:** 1. Review form, check appropriate boxes, read and sign at the bottom of this form. 2. Inform dealer, manager or site representative of the job to be performed and potential safety concerns and obtain signature.

### Station 

<table>
<thead>
<tr>
<th>Station #</th>
<th>Station Address</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Work Order Number</th>
<th>Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Contractor Company Name</th>
<th>Contractor person in charge (print name)</th>
<th>Number of Workers</th>
<th>JSA Reference Number (if required)</th>
<th>Start Time</th>
<th>End Time</th>
<th>Labor</th>
<th>Travel Time</th>
<th>Travel Distance</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Problem/Work Description</th>
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</table>

<table>
<thead>
<tr>
<th>Return Call</th>
<th>Damage Claim</th>
</tr>
</thead>
</table>

**PRE REQUIRED (CHECK AND/OR FILL BLANK SPACE)**

- **SAFETY VEST**
- **HARD HAT**
- **SHOES & BOOTS**
- **HEARING PROTECTION**
- **RESPIRATOR**
- **PROTECTIVE CLOTHING**
- **GLOVES**
- **SAFETY GLASSES/GOGGLES**
- **WELDING PIPE**
- **OTHER**

**Contractor to complete this section below if circumstances on site or specific to this job may generate additional hazards that are not described in the JSA (also see back of page for additional guidance and if more space required to document)**

<table>
<thead>
<tr>
<th>Task Step</th>
<th>Hazards not covered by JSA</th>
<th>How to reduce or eliminate risk - Include PPE to be Worn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Work documentation requirements**

- **Lower Risk - no JSA required**
- **Medium Risk / Higher Risk tasks - JSA required**
- **Higher Risk - JSA required & appropriate check list completed (see below)**

**Examples of Higher / Medium tasks:**

- **Works at heights:**
  - in all cases on open sites
  - on closed sites if no JSA present

- **Trenching or excavation related to underground tank, product lines:**

- **Heavy lifting:**

**This form must be completed for each job and updated and re-signed if circumstances change or additional hazards identified.**

**SIGN IN**

**Operating sites:** to be signed by the Site Representative

**Non-operating sites:** to be signed by Contractor Representative only

**GENERAL SAFETY CHECKS**

- Have all site personnel been informed?
- Has fuel delivery service been informed?
- Is a fuel delivery due?
- Have isolation procedures been agreed - lock out/tag out?
- Are work areas cordoned off to protect workers, site staff & public?
- Other

<table>
<thead>
<tr>
<th>Site representative name</th>
<th>Signature</th>
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</table>

<table>
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<tr>
<th>Have discussed job clearance form with contractor</th>
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</table>

<table>
<thead>
<tr>
<th>Site representative name</th>
<th>Signature</th>
</tr>
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</table>

**SIGN OUT AND OPERATOR VERIFICATION OF WORK**

<table>
<thead>
<tr>
<th>Contractor signature</th>
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</table>

**GENERAL SAFETY CHECKS**

- Has the work area been left tidy and safe?
- Are site personnel aware of status of work including remaining isolation?
- Are chances to equipment documented and communicated?
- All incidents, near incidents, unsafe situations reported?
- Other

<table>
<thead>
<tr>
<th>Site representative name</th>
<th>Signature</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Site representative comments</th>
</tr>
</thead>
</table>

**PARTS - Ordered, Replaced and/or Disposed Of (include model and serial #s as appropriate)**

The contractor through its authorized representative shall sign, issue and be solely responsible for all job clearance forms and the obligations arising there under applicable to the work. This form covers important reminders and is not intended to relieve the contractor from safely performing the work in compliance with all applicable laws and regulations. The store operator may require the contractor to stop work if it appears that the contractor or any of its workers are failing to comply with the requirements in the applicable items of this form or other applicable safety requirements.
APPENDIX B.2—DAILY SITE SAFETY RECORD
## DAILY SITE SAFETY RECORD

SITE REGISTER OF EVERYBODY ENTERING SITE

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>NAME – FIRST NAME</th>
<th>Type of work performed / Reason for visit</th>
<th>Time in</th>
<th>Time out</th>
<th>Visitor Signature (*)</th>
<th>JSA Reviewed / checklists completed</th>
<th>Attended today’s toolbox Meeting</th>
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<tbody>
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</table>

(*) Signatory acknowledges having either attended start work discussion (operatives) or read and understood the site safety rules (delivery – visit)
DAILY SITE SAFETY RECORD

SITE: (site name)  (main contractor logo)

DATE: ___________________________  2

Start Work Discussion held by: ____________________________________________

(Works to be performed during the day – Any safety precautions to take? – Review of hazardous situations spotted during the previous day - see also start work discussion guide)

Hazardous situations spotted during the day
(Describe briefly what? where? what may have happened?)

Safety Toolbox discussion topics (log attendance on page 1)

Notes and action points

Reviewed by: ___________________________  Signed ___________________________  Date ___________________________

Site Foreman

Other

Other
PERMIT TO WORK For Petroleum/Convenience Sites

Worker Signatures: I have reviewed and understand the conditions of this permit and its attachments. I will report hazardous conditions or acts identified on this jobsite to my supervisor or customer representative.

<table>
<thead>
<tr>
<th>1.</th>
<th>2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>4.</td>
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<tr>
<td>5.</td>
<td>6.</td>
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<td>7.</td>
<td>8.</td>
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<tr>
<td>9.</td>
<td>10.</td>
</tr>
</tbody>
</table>

Person In Charge: Date: Equipment ID: Location

Time Issued: am/pm Time expires: am/pm

Nearest Medical Facility & phone #: Emergency/Rescue Phone#

REQUIRED PERMITS AND/OR PROCEDURES

- [ ] Hot Work
- [ ] Excavation Checklist
- [ ] Lock-Out Tag-Out
- [ ] Pre Entry Checklist
- [ ] Confined Space

- [ ] One Call
- [ ] Hoisting/Rigging
- [ ] Management Of Change
- [ ] Work Notification
- [ ] Other

HOT WORK PERMIT—API 1646 Section 13

Category of Work
- [ ] Welding
- [ ] Cutting
- [ ] Drilling
- [ ] Grinding
- [ ] Sandblast
- [ ] Other

Describe:

Which of the following special precautions are required? Check all that apply:
- [ ] Inspect Excavation
- [ ] Adequate Bonding
- [ ] Local Rectifiers Off nearby
- [ ] Vent Stacks
- [ ] Other vapor hazards (list):

- [ ] Lock-Out Tag-Out
- [ ] Fuel Delivery
- [ ] Hydrocarbon soils

Atmospheric Tests:
- [ ] O2:
- [ ] %LEL:
- [ ] Toxicity (H2S):

Job Control Contact Name: Fire Watch Name (if applicable)

HAZARDOUS ENERGY LOCK-OUT TAG-OUT (LOTO)—API 1646 Section 12

Has the piece of equipment or system been properly isolated?
- [ ] YES
- [ ] NO
- [ ] N/A

Has the energy isolation been reviewed by all affected employees?

List All Affected Workers: 1. 2. 3. 4. 5. 6. 7. 8. 9.

TRENCHING AND EXCAVATION—API 1646 Section 9

Has "One Call" performed utility mark outs?
- [ ] YES
- [ ] NO

Has a line locating service marked out utilities on-site?
- [ ] YES
- [ ] NO

Comments:

Weather Conditions: Rainfall Last 24 hours? Water Conditions: ☐ Wet ☐ Dry

Who is the designated excavation Competent Person? How deep is the excavation?

Manual methods to determine soil classification:
- [ ] Thumb Compression Test
- [ ] Pocket Penetrometer
- [ ] Plasticity
- [ ] Dry Strength

Visual methods to determine soil classification:
- [ ] Observe samples of excavated material
- [ ] Observe excavation walls
- [ ] Observe adjacent surface area
- [ ] Observe soil as it is excavated

Trench / Excavation Measurements:
- [ ] Length:
- [ ] Width:
- [ ] Depth:

(if > 4ft. also complete pre-entry/reclassification Permit)

What is the Soil Classification?
- [ ] Stable Rock (vertical)
- [ ] Class A (3/4:1)
- [ ] Class B (1:1)
- [ ] Class C (1.5:1)

Which protective system(s) is used?
- [ ] Sloping
- [ ] Shoring
- [ ] Trench Shield/Trench Box

Are Employees Kept Out of and/or away from the excavation during digging or material handling?
- [ ] YES
- [ ] NO

Evidence of significant fracture planes in soil or rock?
- [ ] YES
- [ ] NO

Have proper notifications been made?
- [ ] ☐ Any area of unusually weak soils or materials?
- [ ] ☐ Any noted dramatic dip in bedrock?
- [ ] ☐ Short term excavation (<24 hours)?
- [ ] ☐ Trench box(es) certified?

Are barricades / flagging in place?
- [ ] ☐ Tension cracks observed along slope top?
- [ ] ☐ Hydraulic shore pumped to design pressure?
- [ ] ☐ Bracing system installed according to design?
- [ ] ☐ Is shoring secure?
- [ ] Evidence of shrinkage cracks in excavation walls?
- [ ] Trees, boulders, or other hazards in area?
- [ ] Evidence of caving or sloughing of soils?
- [ ] Vibration from Traffic / equipment being too close?
- [ ] Are slopes cut at design angle of repose?

NOTE: Excavations deeper than 20 feet shall have protective systems designed by a Registered Professional Engineer

Observations:

I hereby attest that the above conditions existed and that the items were checked or reviewed during this inspection:

Competent Person Signature:
PERMIT TO WORK For Petroleum/Convenience Sites (Continued)

<table>
<thead>
<tr>
<th>RIGGING, HOISTING AND LIFTING—API 1646 Section 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has the Lift Plan been completed by a competent person?</td>
</tr>
<tr>
<td>Air or hydraulic systems inspected for deterioration or leakage in lines, tanks, valves, drain pumps, etc?</td>
</tr>
<tr>
<td>Tool Box discussion conducted &amp; lift plan communicated to all affected personnel?</td>
</tr>
<tr>
<td>Are outriggers set before hoisting operations begin?</td>
</tr>
<tr>
<td>Has rigging been performed by a competent person?</td>
</tr>
<tr>
<td>Is proper cribbing being used</td>
</tr>
<tr>
<td>Is the hoisting equipment sitting on a stable surface?</td>
</tr>
<tr>
<td>Overhead risks evaluated as part of the lift plan?</td>
</tr>
<tr>
<td>Is work area properly barricaded/isolated?</td>
</tr>
<tr>
<td>Is the operator certified for the equipment?</td>
</tr>
<tr>
<td>Has the hoisting equipment been inspected before use?</td>
</tr>
<tr>
<td>Are periodic inspections complete and documented?</td>
</tr>
</tbody>
</table>

CONFINED SPACE PRE-ENTRY CHECKLIST / RECLASSIFICATION—API 1646 Section 11

<table>
<thead>
<tr>
<th>Atmospheric Tests (Pre-Isolation &amp; Ventilation)</th>
<th>Time:</th>
<th>O₂ (19.5%-23.5%):</th>
<th>% LEL (&lt;10%):</th>
<th>Toxicity (H₂S, Benzene):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Isolation (No Entry)</td>
<td>Electrical LOTO</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Pumps off &amp; LOTO</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Lines Disconnected</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Valves shut and LOTO</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: If any "NO" is checked above, fill out "Permit Required Confined Space Entry Permit" section. If all "YES" or "NA" Continue on.

Atmosphere ventilation:
- Mechanical Forced Air: YES
- Natural Ventilation Only: YES

Atmospheric Tests (Post-Isolation & Ventilation) | Time: | O₂ (19.5%-23.5%): | % LEL (<10%): | Toxicity (H₂S, Benzene): |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Pre-Entry Check List</td>
<td>Surrounding Area Free of Hazards?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
</tr>
<tr>
<td>Proper notificiations made?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Does your knowledge indicate the area will remain free of all atmospheric hazards?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Are you trained in confined space entry?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Are you trained in the operation of the air monitor used?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Has the monitor been calibrated before use?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Did you test the atmosphere in the space before entry?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Did the atmosphere check as acceptable?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Will the atmosphere be continuously monitored?</td>
<td>YES</td>
<td>NO</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: IF ANY OF THE ABOVE ANSWERS ARE “NO”, DO NOT ENTER

CONFINED SPACE ENTRY PERMIT—API 1646 Section 11

<table>
<thead>
<tr>
<th>Purpose of Entry:</th>
<th>Entry Supervisor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendants:</td>
<td>Entrants:</td>
</tr>
<tr>
<td>1.</td>
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<td>2.</td>
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</tr>
</tbody>
</table>

Pre-Entry Checks:
- LOTO | Emergency Rescue Plan | Secure Area | Ventilation |
- PPE | Lines Isolated/block | Respirators | Fire Extinguisher |
- Purge | Hot Work Permit | Communication system | Lighting |
- PPE | Lines Isolated/block | Respirators | Fire Extinguisher |

Minimum Requirements To Be Completed & Reviewed Before Entry

Continuous atmosphere Monitoring: (Record at least every 30 minutes)

<table>
<thead>
<tr>
<th>Test</th>
<th>PEL</th>
<th>Initials</th>
<th>Time:</th>
<th>Time:</th>
<th>Time:</th>
<th>Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>19.5%-23.5%</td>
<td>Value:</td>
<td>Value:</td>
<td>Value:</td>
<td>Value:</td>
<td>Value:</td>
</tr>
<tr>
<td>LEL</td>
<td>10%</td>
<td>Value:</td>
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<tr>
<td>H₂S</td>
<td>&lt;10 PPM</td>
<td>Value:</td>
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<td>Other</td>
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Remarks:
- Gas Tester Make/Model: | Instrument Serial Number: |
- Have all of the conditions above been satisfied? YES | NO |
- Attendant signature: | Entry Supervisor Signature: |

I ensure this permit has been filled out completely and in conjunction with all applicable OSHA requirements to provide a safe workplace for all workers and myself. I will take action to eliminate hazardous conditions or acts identified on this job site.

Person In Charge Signature:
Additional copies are available through IHS
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