Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

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

API RECOMMENDED PRACTICE 1646
SECOND EDITION, MAY 2017

AMERICAN PETROLEUM INSTITUTE

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

Classified areas may vary depending on the location, conditions, equipment, and substances involved in any given situation. Users of this Recommended Practice should consult with the appropriate authorities having jurisdiction.

Users of this Recommended Practice should not rely exclusively on the information contained in this document. Sound business, scientific, engineering, and safety judgment should be used in employing the information contained herein.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

All rights reserved. No part of this work may be reproduced, translated, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, NW, Washington, DC 20005.

Copyright © 2017 American Petroleum Institute

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Foreword

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

Shall: As used in a standard, "shall" denotes a minimum requirement in order to conform to the specification.

Should: As used in a standard, "should" denotes a recommendation or that which is advised but not required in order to conform to the specification.

May: As used in a standard, "may" denotes a course of action permissible within the limits of a standard.

Can: As used in a standard, "can" denotes a statement of possibility or capability.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 1220 L Street, NW, Washington, DC 20005.

Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Contents

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Contents

Copyrighted material licensed to Michael Zobel on 2021-05-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Contents

Contents

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Introduction

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. There is an Annex at the end of this document that provides example forms.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

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

1 Scope

1.1 General

This Recommended Practice (RP) highlights some of the federal Occupational Safety and Health Administration (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 the sole responsibility of the contractor or employee performing the work to abide by any and all additional Federal, State, or local laws and regulations, as well as any 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.

1.2 Applicability

This RP provides recommended minimum safety procedures applicable to working at a retail petroleum/convenience facility. In addition, this RP details how to develop a task specific Job Safety Analysis that should be completed before any work may begin.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI 4950 [1], *Standard for Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations*

ANSI Z87.1, *American National Standard for Occupational and Educational Personal Eye and Face Protection Devices*

ANSI Z89.1, *American National Standard for Industrial Head Protection*

ASTM F2413 [2], *Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear*

NFPA 51B [3], *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*

OSHA 29 *CFR* [4], Parts

1910, *Occupational Safety and Health Standards by OSHA*

1926, *Safety and Health Regulations for Construction*

1926.450, *Scaffolds*

1926.453, *Aerial Lifts*

---

1 American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York 10036, www.ansi.org.
2 ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.
3 National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts, 02169-7471, www.nfpa.org.
4 The Code of Federal Regulations is available from the U.S. Government Printing Office, Washington, DC 20402, www.gpo.gov.

1926.502(a), *Fall Protection Systems Criteria and Practices, General*

1926.502(c), *Fall Protection Systems Criteria and Practices, Safety Net Systems*

1926.652, *Excavations, Requirements for Protective Systems*

3 Terms and Definitions

Definitions in this section reflect the common usage among Contractors working at retail petroleum/convenience facilities. For the purposes of this document, the following definitions apply.

3.1
ANSI hand signals
The American National Standards Institute (ANSI) standard hand signals that are used for communicating with a crane operator. The person using the hand signals must be fully competent, qualified and experienced in the signals and with crane and lifting operations.

3.2
ASTM International
Formerly ASTM (American Society for Testing and Materials). The organization that establishes testing standard methods to help comply with OSHA safety requirements. ASTM F2413 refers to Standard Specification for Performance Requirements for Protective Footwear.

3.3
biohazard
The biological substances that can pose a threat to humans. Examples include plants, insects, bacteria, and viruses.

3.4
bump test
A qualitative function check of a LEL meter in which a known challenge gas is passed over the sensors at a concentration and exposure time sufficient to activate all alarm settings. This test verifies the performance of the LEL meter and ensures the sensors are responding to their target gases.

3.5
Code of Federal Regulations
CFR
The laws/rules published in the Federal Register by the departments and agencies of the Federal Government.

3.6
competent person
One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them (29 *CFR* 1926.32(f)). By way of training and/or experience, a competent person is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, and has the authority to correct them. Some standards add additional specific requirements which shall also be met by the competent person.

3.7
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).

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

3.8
excavation
Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

3.9
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.

3.10
hazardous atmosphere
An atmosphere with any of the following conditions present:

— a combustible or flammable gas,

— low oxygen concentrations,

— hazardous levels of toxic substances exceeding permissible exposure levels.

3.11
permit-required confined space
PRCS
A confined space is one where a permit is required to work and that has one or more of the following characteristics: contains or has the potential to contain a hazardous atmosphere; contains a material that has the potential to engulf an entrant; has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant; or contains any other recognized safety or health hazard such as unguarded machinery, exposed live wires, or heat stress.

3.12
job safety analysis
JSA
A pre-task 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.

3.13
Kilovolts
kV
The measure of electrical voltage (1 kV = 1000 volts), and is the basis for determining the proximity in which overhead work or working at heights can be performed.

3.14
lower explosive limit
LEL
The lowest concentration (percentage) of a gas or vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat).

3.15
LEL meter
The LEL meter (also referred to as a "combustible gas detector", "gas monitor", or "explosimeter") is used to detect and measure the amount of combustible gases present. When a percentage of the lower explosive limit (LEL) is exceeded, an alarm signal is activated.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

3.16
management of change
MOC
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.

3.17
Occupational Safety and Health Administration
OSHA
A federal government agency charged with assuring safe and healthful working conditions by setting and enforcing standards and by providing training and education.

3.18
permit loads
Any load carried by a vehicle that requires a permit from any regulatory agency.

3.19
person in charge
The individual (person) that is responsible for a specific site or operation.

3.20
personal protective equipment
PPE
Equipment worn to minimize exposure to serious workplace injuries or illnesses. Examples include gloves, safety glasses and safety shoes.

3.21
remote fill
A separate connection and corresponding piping that is required to allow a petroleum delivery truck to make a delivery to the underground storage tank. Remote fills are needed when the petroleum delivery truck cannot connect to the direct fill piping of the underground storage tank.

3.22
spotter
The person positioned outside of a vehicle to direct a driver where the driver has no clear view of the area.

3.23
trench
A narrow excavation (in relation to length) made below the surface of the ground. Typically the depth is greater than the width, with the width (measured at the bottom) being not greater than 15 ft (4.6 m).

3.24
underground storage tank
UST
The storage vessel below the service station for the storage of petroleum products prior to being dispensed to customers.

4 General Knowledge

4.1 General

RP 1646 is intended to provide the user with a general awareness of safety issues associated with maintenance and construction work at retail petroleum/convenience facilities. The information contained in this document represents

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

the minimum required knowledge needed to perform work, and while this document does recommend a baseline of safety considerations, it should in no way be a substitute for Owner/Operator guidelines, sound engineering judgment, protocols, procedures or other contractual obligations.

4.2 Personal Safety

Performing maintenance and construction work at retail petroleum and convenience stores (service stations) can create some unique and challenging safety conditions. To be able to identify, address, and react to these specific safety challenges, contractors working at the service stations must have a good general and basic understanding of safety.

Safety is more than a priority. Priorities can change based on different factors and circumstances. Safety is a core value and fundamental requirement. Safety must always be the first consideration, no matter what the circumstances are. The core value of safety revolves around two general guidelines we all should follow.

— Nobody should get hurt.

— If the work cannot be done safely, then it should not be performed.

4.2.1 Understand that Life Threatening Activities Exist

There are situations and conditions that can exist when performing maintenance and construction work at service stations which could put one or others in a life threatening condition. Contractor workers should recognize these conditions. Workers should develop specific procedures, including the use of appropriate permits, and implement the actions when these conditions exist. Examples of conditions that could create a life threatening situation include:

— working on or around live electricity,

— working at heights,

— working in an open forecourt/driveway with moving vehicles,

— working in an explosive/flammable environment,

— working in a trench or excavation,

— working with heavy machinery (cranes, excavators, etc.).

4.2.2 Behavior-based Safety Expectations

To properly and adequately manage the safety risks that can be present at service stations, the Contractor worker must recognize that personal behavior and actions have the greatest influence. Developing a specific Job Safety Analysis (JSA) well before the beginning of the work activities, reviewing the JSA prior to beginning the activity, and applying a simple last minute "stop and think" prior to initiating the work can significantly reduce the risks of a safety incident.

4.2.3 Job Safety Analysis Basics

The following are the basics of the Job Safety Analysis (JSA):

— Purpose: The JSA is a methodical process that is designed to help identify work hazards and preventive measures before starting any task. The written JSA should be developed using the experience of the entire work

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

team and should be completed well before the work is scheduled. The JSA should be reviewed prior to starting work, adjusted as necessary to accommodate site-specific information, and referred to during the course of work.

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

— When to use the JSA: Before starting work and reviewed when work conditions change such as changes in weather, job scope, team members, or equipment. When a different group of people (contractor, trade, craft or consultant) or a different activity (task or project) is beginning work in the area, then another review of the JSA is appropriate. When multiple activities or operations are being coordinated in the same location at the same time, it is important to have all of the relevant parties come together to develop an appropriate hazard and risk mitigation plan. This group activity can be referred to as Simultaneous Operations (SIMOPS) risk identification and management plan.

— Who participates in developing or amending a JSA: All stakeholders, including site employees or contractors.

— How to perform work using a JSA.

1) Identify what work/tasks are to be performed. What is about to be performed and what are the steps?

2) 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?

3) Identify/Analyze risks and ways to reduce them. Ask yourself, "How do I prevent the risk(s)/hazard(s) from happening?"

    — Use a standardized JSA 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.

    — Ensure 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. The hazard controls should follow a hierarchy in mitigating risks, which are in decreasing order: elimination of the hazard; substitution; engineering controls; administrative controls; personal protective equipment.

    — Review and/or prepare appropriate safety materials for the tasks and hazards.

4) Communication of the above to those who need to know. Communicate the safety plan to the site manager, project supervisor and others, as appropriate.

— Amending the JSA as needed: The purpose of amending the JSA is to anticipate and prevent incidents that may be created because of changes to organizations, personnel, systems, processes, procedures, equipment, site

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

conditions, products, materials, substances, or laws and regulations. The pre-task JSA procedure shall include changes 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 timeliness for the change and any control measures implemented for:

— equipment, facilities, and process;

— operations, maintenance, or inspection procedures;

— training, personnel, and communication;

— documentation.

The amended JSA shall be authorized by the person(s) responsible for the project.

4.2.4 Stop and Think Prior to Starting Any Task

The average person will have hundreds of thoughts throughout a workday—some specific to the task at hand and some not. Multitasking is a common activity for everyone and can be valuable in certain situations. However, when a work activity is about to begin, it is critical that the thoughts and focus of the work activity be front and center in the minds of all workers involved. This can easily be done by dedicating the last minute prior to starting the task to remind yourself and all involved of the risks that exist. This last minute activity can help align the focus and priorities.

4.2.5 Actively Caring for Others

Many maintenance and construction activities involve multiple workers, including workers from other companies. There may also be site personnel, equipment suppliers, inspectors, and members of the public in and around the work area. Since the actions of anyone may have a direct safety impact on you and others, it is important to be aware of others, and actively approach others when unsafe actions or behaviors are noticed. If the approach is positively focused on preventing that person from potentially being injured, or injuring others, it is typically appreciated and well received.

Also, if someone approaches you in a manner to protect you or others from a potential injury, then hopefully you too will appreciate that someone is actively caring for you.

4.2.6 Awareness of Negative Confrontations

Performing service work at service stations can sometimes be perceived as an inconvenience to the site personnel and the public. There are cases when site personnel or members of the public engage their frustration directly towards the contractor worker. Also, by working in a public environment, workers should be aware of the potential for criminal intent.

Each worker should recognize that the work activities, or the mere location of being in the public eye, could lead to a confrontation. Contractor workers should have a plan to handle confrontations and maintaining a personal safety barrier, which should include the following.

— Remain calm and professional—do not engage in an argument.

— Stay a safe distance away from the other party—use barriers (vehicle, etc.) to maintain that space.

— Get support from others—there is safety in numbers.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— Leave the situation if necessary.

— Contact site management, contractor management, and/or authorities, as appropriate.

4.2.7 Review of Proper Manual Lifting Techniques

Manual lifting is one of the most common activities performed by all individuals multiple times per day. Lifting can involve large heavy loads, or involve repetitive lifts. Lifts can involve more than one person, or can involve going up stairs or down into excavations. Below are some key reminders on proper lifting techniques.

— Plan the lift and get help if needed.

— 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 elbows as close to the body as possible.

— Be certain of secure footing and balance.

— Keep your back straight and flex your knees.

— Keep your head up, look forward, with load close to the body and leg muscles doing 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.

4.3 Work Site Safety and Practices

4.3.1 Basic Prohibitions at the Work Site

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

— No gambling or fighting.

— No smoking on site. This includes the use of electronic smoking devices.

— No smoking anywhere within 15 m (50 ft) of a fuel tanker truck. This includes the use of electronic smoking devices.

— No alcohol or drugs.

— No weapons, except as permitted by their employer and/or state law.

NOTE Many state laws permit employees to have weapons in certain circumstances; for example, keeping firearms in locked personal vehicles. Employers can consult their local laws prior to implementing rules prohibiting weapons.

— Obey all posted warnings.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

4.3.2 Work Site Check-in/Work Clearance

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

— All workers who may be required to work on operational petroleum/convenience sites shall be in possession of identification certified by their employer.

— The 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 work certification card (i.e. API Safety Qualification card or equivalent).

— Workers shall understand the Job Safety Analysis (JSA) of performing the activity before arriving at the work site. 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 Annex A.4 for an example Job Clearance Form) 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, Annex A.5). 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 the following:

  — 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 and muster location in case of evacuation;

  — location of emergency response equipment (first aid, fire extinguishers, etc.);

  — location of emergency shut-off button (if at an active service station);

  — minimum PPE requirements.

  In addition, the following requirements apply.

  — 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 9) to make the job site safe and secure.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— The 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 should be understood that damage to existing equipment may disrupt operations, may cause fires, may initiate environmental problems, and may endanger lives.

— Simultaneous operations (SIMOPS) with potentially other contractors on site should be discussed (work scope, time to be on site, etc.).

4.3.3 Good Housekeeping Practices

Good housekeeping practices are an important component to preventing slip, trip, and fall injuries. Good housekeeping will also help prevent damage to tools and equipment, which could subsequently lead to a hazard. 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 or obstruct any emergency exits.

— Materials may not be stored in front of doorways.

— Materials may not be stacked within 914 mm (36 in.) 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, and 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.

4.3.4 Toolbox Discussions

Before the beginning of every workday and at the beginning of a potential higher 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,

— any potential SIMOPS with other contractors or workers.

If there is only one worker at the site, then it is recommended that this worker call a designated person to conduct the toolbox meeting by phone, or have the discussion with the site personnel.

4.3.5 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.

4.3.6 Hazards of Fuel Deliveries

Delivery of petroleum products can pose specific risks to maintenance and construction personnel at a service station. The following precautions shall be taken during fuel deliveries.

— All work on fueling systems should be stopped.

— All work within 15 m (50 ft) of a vent stack should be stopped.

— All work within 6 m (20 ft) of a dispenser should be stopped.

— All work within 4.5 m (15 ft) of a fill pipe should be stopped.

— All work within 15 m (50 ft) of a tanker truck should be stopped.

— All Hot Work being performed should be stopped.

— Workers shall evacuate all confined spaces.

— Workers may not smoke within 15 m (50 ft) 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. Ideally, work would be performed at times when fuel trucks would not be making deliveries. If this is not possible, then during the delivery of petroleum products, personnel may have to rearrange various barricades in order for the fuel truck to get to the delivery location. Personnel will coordinate with both the site manager and the petroleum truck driver to clear the work zone of tools/ equipment and close any open manhole lids before removing barricades. After the truck has left the site, workers can then replace or restage all barricades before resuming work. 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 tank fill connections 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.

4.3.7 Ground Disturbance Activities

Prior to any activities that are to disturb the ground (i.e. excavating, trenching, digging, drilling, etc.), due diligence is required to be completed to help ensure there is nothing below ground that could create an unsafe situation. Most urban areas have a "call before you dig" process that must be followed. If a public service that identifies underground utilities is not available, a private utility location service should be considered.

Information regarding potential below ground structures and equipment should be obtained. Care should be taken on the initial ground disturbing activities to confirm the area below is clear of any potential risks.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Additional guidance on ground disturbance activities can be found in Section 11, Ground Disturbance/Excavation.

4.3.8 Non-regulatory Reporting and Notification Procedures

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

4.3.9 Customer's 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 or contractors may have their own permit-to-work system, however a standardized, multi-permit form is provided in Annex A.6. All permits written for work shall remain at the job site for inspection by the customer's representative or regulatory authorities until the work is completed. Contractors and workers shall be aware of the permit-to-work requirements of all customers to ensure compliance.

4.4 Safety Equipment

Contractor workers may be required to equip the service vehicle or work area with specific safety equipment. Also, active service stations and sites under construction may have different safety equipment positioned on site. It is important that all workers are aware of the safety equipment that is on site, and if necessary, know how to engage or operate.

4.4.1 Examples of Safety Equipment

Safety, or critical, equipment is equipment that may prevent a safety or environmental event from occurring, provide a response to mitigate a safety or environmental incident, or alert personnel to a potential or actual event. Examples of safety/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. Some common actions regarding safety or critical equipment include the following.

— When a problem is found in a piece of safety or 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— All leaks shall be reported to the site operator, maintenance dispatch authority, and site operating company immediately.

Overriding critical equipment shall not be done in violation of any federal, state, or local regulation and without the express approval of the customer's authorized representative.

4.4.2 Fire Extinguishers

The most common type of safety equipment is the fire extinguisher. Fire extinguishers may be required to be on board service vehicles; inside construction trailers and around construction projects; on service station islands; and inside service bays, convenience stores, car washes, and other building structures.

4.4.3 Fire Extinguisher Classifications

— 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. See Section 15, Hot Work, for more information on Hot Work and associated Fire Watches.

4.4.4 Fire Extinguisher Use

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 PASS. This stands for "Pull, Aim, Squeeze, and Sweep". A more detailed description includes "Pull pin out, aim nozzle at the base of the fire, squeeze discharge trigger, and sweep nozzle quickly back and forth to extinguish fire."

4.4.5 Fire Extinguisher Inspection

Fire extinguishers shall be inspected at least monthly by performing the following.

— Ensuring that the seal and pin (if so equipped) are in place.

— Making sure the annual maintenance tag is intact and is current for the calendar year (some fire extinguishers are not designed to have this tag and should be replaced annually).

— Making sure the hose is not severely cracked, broken, damaged, or clogged.

— Checking the gauge pressure. Make sure the indicator dial is in the green zone and indicates that the extinguisher is still properly charged.

— Checking for exterior damage, rust, or corrosion.

— Making sure the instruction label is in place and is readable.

— Ensuring the protective covering (if provided) is in place.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Following the inspection, 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 by a fire extinguisher service company to ensure proper operation.

Fire extinguishers shall be serviced annually by a licensed fire extinguisher service contractor. This includes replacing fire extinguishers that are designed to be replaced annually.

4.5 Health and Safety

The impacts of a safety incident to your health can vary based on many different factors. Timely treatment is needed to minimize the seriousness and reduce the chances of longer-term issues. Care management also includes understanding the risks to your health that may exist at a work site, and how those factors could impact people differently.

4.5.1 Basic First-aid and Medical Treatment

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 and customer. If there is a contractor foreman or lead person, they shall perform the following.

— 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 appearing in Table 1, as appropriate.

4.5.2 Care Management beyond First Aid

Workers can only be expected to perform medical activities for which they are properly trained and competent. It is important for workers to also understand when a situation has reached 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 the 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 ensure 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.

Copyrighted material licensed to Michael Zobel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Table 1—Basic First-aid and Medical Treatment Requirements

If...	Then...
A medical emergency occurs...	Request emergency service immediately. Dial 911.
The victim(s) is in immediate danger...	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.
The victim is not breathing and has no heartbeat...	Begin CPR at once if properly trained. Use a CPR mouthpiece, pocket mask, or resuscitation bag whenever possible.
The victim is bleeding...	Wear liquid-resistant gloves to avoid contact with the blood and other body fluids while controlling a bleeding injury.
The victim is burned (chemical or thermal)...	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.
The victim has been splashed in the face with gasoline or a chemical...	Have victim flush his or her face and eyes for at least 15 minutes with fresh water, then get medical help as needed.
The victim is in shock...	Keep him or her warm and comfortable. Make him or her lie down. Wait for the paramedics.

4.5.3 Blood-borne Pathogens

Blood-borne pathogens are disease-causing microorganisms that may be present in human blood and other body fluids. OSHA Standards cover blood-borne pathogens and define blood-borne pathogens to include several pathogens; Common examples include HIV, HBV, and Hepatitis C. For a complete list, refer to the OSHA Standard.

Blood-borne pathogens are transmitted when open skin and/or mucus membrane such as eyes, nose, and mouth come in contact with contaminated blood and/or other body fluids.

Care should be taken when performing work in areas where these pathogens may exist. Examples include emergency responders (safety and/or health emergencies/security events) and workers in convenience store restrooms.

Refer to OSHA Standard for blood-borne pathogens for in-depth precautions, exposure prevention, and proper handling of contaminated material.

4.5.4 Biohazards

Biological hazards, called "biohazards", refer to biological substances that may pose a threat if expose or contact is made. While most of the more common biohazard risks at service stations are typically minor in nature, there is a need to be aware of the potential exposure areas, and develop an appropriate action plan as necessary. The more common examples for the typical service station contractor worker include the following.

— Plants (poison oak, poison ivy, etc.)—If work is to be performed in areas where this exposure could exist, workers should have some knowledge on how to identify these types of plants and the appropriate precautions to use when working with these plants (i.e. proper clothing, possible herbicides, etc.). Workers should also have an understanding of basic first aid actions to implement if exposure occurs.

— Insects/Small Animals (mosquitoes, ticks, chiggers, spiders, bees, wasps, rats)—Insects and small animals can exist in many different areas, including inside electrical boxes, landscaping areas, infrequently used storage rooms, building and canopy eaves, and well vaults and covers. Precaution is needed to identify and eliminate these types of animals prior to beginning work. Issues to exposure can occur immediately (skin rash or irritation)

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

and/or over time (e.g. Lyme disease from ticks). Proper clothing, tools, and appropriate biocides should be used to minimize risk of exposure.

— Microbes/Pathogens (bacteria, viruses, etc.)—Typical work at service stations should not present a higher exposure than normal interactions in commercial environments. However, exposure could increase when performing certain activities such as canopy gutter cleaning to remove bird excrement or trash removal with the potential of containing hypodermic needles. Also, if medical first aid or CPR on another individual is required, this could create an exposure potential. Since these bacteria and viruses are not visible, appropriate precautions are the best defense for exposure. The use of nitrile gloves and appropriate eye protection are examples of ways to prevent an exposure during these activities.

Workers should make known to others in the work group any known severe reactions they may have to any biohazard (e.g. severe reaction to bee stings). Workers that experience severe reactions should attempt to avoid areas where the exposure could exist and/or should be prepared to take appropriate actions if the exposure does occur.

4.6 Environmental

While the primary focus on this document concerns safety, there are a few key environmental processes and practices that are worth referencing. Additional documents and resources are available to further define the environmental requirements and regulations.

4.6.1 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 ensure 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.

4.6.2 Reporting and Notification Procedures for Environmental Incidents

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:

— fires,

— 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

4.6.3 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.

4.7 References

OSHA (The reference below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1926 Subpart C.

5 Personal Protective Equipment (PPE)

5.1 PPE Summary

Table 2 conveys the basic Personal Protective Equipment requirements for maintenance or construction work at retail service stations.

Table 2—Basic Personal Protective Equipment Requirements

PPE	Best Practices Construction Projects or Maintenance Work
Brightly colored clothing	**Always**—High visibility ("HiVis") to maximize visibility to others
*Reflective vest	**Always**—At night or during low-visibility conditions
Head protection	**Always**—Hardhat
Eye protection	**Always**—Safety glasses w/appropriate side protection
Hearing protection	As needed—Based on noise levels
Hand protection	**Always**—appropriate gloves worn based on the task
Foot protection	**Always**
Body protection	**Always**—Long pants and shirts with sleeves
NOTE Some customers may allow reflective clothing to be used instead of a reflective vest.	

Contractors 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. See Section 4 for more information on the Job Safety Analysis.

In many circumstances the use of PPE is required by government regulation. Not wearing proper PPE can 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.

More details and descriptions of the PPE are provided below.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

5.1.1 Brightly Colored and Reflective Vests

Being visible to other workers, site personnel, and the general public is an important step towards being safe. By wearing a highly visible vest (or other highly visible clothing if allowed by the Customer), not only do you increase your chances of being seen prior to an unsafe situation, it can also be a signal to others that some work activity is occurring. This can increase awareness of all people in and around the work area.

The vest (or other endorsed clothing) must be reflective when worn at night (after dusk and before dawn). This improves visibility in working in darkened areas. Consideration should be given to wearing reflective clothing when conditions change (dark skies during thunder storms, etc.).

Vest colors and reflective material can fade over time. It is recommended that new vests or approved clothing be replaced periodically to ensure maximum visibility and reflectiveness.

5.1.2 Head Protection

OSHA (29 *CFR* 1910.135 and 1926.100) requires the use of safety helmets (hardhats) to protect against injury to the head from falling objects or electrical hazards. All hardhats shall meet the requirements of ANSI Z89.1. Hardhats should be worn at all times.

While hardhats are the preferred best practice, bump caps can also protect against injury in areas with restricted clearance. When there are no risks of falling objects or electrical hazards, bump caps may be worn. Workers should check with their company and their customer's expectations, as some do not allow bump caps and require the use of hardhats.

5.1.3 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. In addition to the basic eye protection, 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.

It is recommended that eye protection with side shields be worn at all times when on a construction site and when performing maintenance work.

In some situations eye protection that is tinted in order to also allow for sun/glare protection may also be warranted. This tinting can add additional protection when the sun is rising/setting, or when working on or around highly reflective surfaces (some asphalts, concrete, when snow is present, etc.).

Other eye and face protection may be required based on the hazards present and the tasks to be done. These include the following.

a) 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.

b) 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. Contractors shall be aware of the hazards their workers face and provide them with the appropriate eye protection suited to the hazards they face.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

5.1.4 Hearing Protection

It is recommended that hearing protection should be worn when sound levels reach 85 dB (decibels). This sound level threshold is typically reached when workers are using or are around most construction and maintenance power equipment. Table 3, below, provides typical sound level ranges.

Table 3—Typical Sound Level Ranges of Various Activities

Activity	dB	Activity	dB	Activity	dB
Quiet office	40	Factory machine	80 to 100	Jackhammer	115 to 130
Convenience store	50 to 60	Gas-powered blower	90 to 105	Ambulance siren	120
Power saw	100 to 110	Power lawnmower	65 to 95	Rocket launch	180
Truck	75 to 85	Chainsaw	110 to 120	Jet engine	150
Electric drill	85 to 95	Pneumatic drill	115 to 120	Subway/train	90 to 115

One rule of thumb for determining if the noise level is above 85 dB is if two workers cannot talk without raising their voice at an arm's length distance [0.6 m to 0.9 m (2 ft to 3 ft)], then it can be assumed the sound level is at or above 85 dB.

Every piece of hearing PPE shall have a Noise Reduction Rating (NRR) expressed in decibels of reduction. It is recommended to follow OSHA's guidance on determining if the NRR rating is sufficient to reduce noise to a satisfactory level (while the NRR is measured in decibels, the hearing protector does not reduce the surrounding noise by the exact number of the NRR rating).

When sound levels are equal to or above 95 dB, double hearing protection is recommended. Double, or dual, hearing protection will typically take the form of ear plugging devices, as well as ear muffs.

OSHA requires a yearly hearing test for workers exposed to an average of 85 dB over an 8-hour day. OSHA 29 *CFR* 1926.52 and 1910.95 apply to noise exposures.

5.1.5 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 that have been identified for that task.

Some of the more common types of gloves include the following:

— impervious (i.e. nitrile)—for use with chemicals,

— leather—for use with handling general equipment and materials,

— cut resistant—for use with sharp materials,

— impact-resistant—for use with materials that may potentially puncture the hand,

— thermal protection—for use during cold temperatures.

Multiple gloves can be worn at the same time under certain circumstances. Impervious gloves, specifically designed to protect against chemicals, should be worn as the outermost layer if used in conjunction with another glove. For

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

example, if it is cold, a worker can wear a thermal protection glove underneath a nitrile glove while performing a task, as long as finger dexterity is not compromised.

5.1.6 Foot Protection

OSHA (29 *CFR* 1910.136 and 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 ASTM F2413.

Some work locations and customers may require non-steel, composite toe footwear to be worn, potentially in cases where electrical conductivity is an issue.

Some contractors and/or customers may require that protective footwear fully cover the ankle. An advantage of footwear that completely covers the ankle is that it minimizes scrapes/cuts to the ankle and can add additional stability when walking over uneven surfaces.

Workers should check with their contractor, customers, and other site specifications to determine what type of protective footwear is most appropriate.

5.1.7 Body Protection

Wear body protection to keep corrosive, oily, dirty, or dusty materials off of the body. Pants that cover the legs must be worn at all times. Pants should be made of appropriate material to protect the legs based on the work being performed. Shorts are never allowed.

Shirts shall be short sleeve at a minimum. Sleeveless shirts are prohibited. Some body protection, such as longer-sleeved shirts, can also provide UV protection.

A hazard assessment should be conducted to determine the protection appropriate to the hazard.

5.2 Additional PPE When Required

5.2.1 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.

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. The worker 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.

The single-use disposable mask protects against low levels of "nuisance" dust. Use and discard masks at end of each task or workday. Do not use a single-use disposable mask:

— as protection against gases or vapors or oxygen deficiency,

— if respiratory protection is required.

5.2.2 Fall Protection

Refer to Section 10 for details regarding fall protection PPE.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

5.2.3 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. Follow instructions provided on individual clothing labels when laundering FRC, as improper laundering can reduce the FRC's effectiveness.

5.2.4 Anti-static Clothing/Footwear

When working in an area that may have a flammable atmosphere, it is important that an electrostatic discharge is not created. In these cases, the appropriate clothing and footwear is needed to eliminate the risk of a static discharge from occurring. A proper risk assessment should be completed to determine if specific anti-static clothing and footwear is needed.

5.3 Potential Environmental Hazards

There are a variety of possible safety hazards at a retail petroleum/convenience facility. If these hazards have not been controlled through the hierarchy of hazard controls (elimination, substitution, engineering controls, or administrative controls), then PPE can be used as a last resort 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 potential hazards are as follows.

5.3.1 Splashing

Fueling systems at service stations 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 the Section 14 for additional information. Even with an effective lockout–tagout program in place, proper PPE should be worn at all times.

5.3.2 Fire

Gasoline vapors in the air are the most likely source of a hazardous atmosphere or fire hazard at a service station. 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 structures and insulation. Refer to Section 15 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.

5.3.3 Biohazards

The presence of biohazards, such as insects and plants, are discussed in the Section 4. The PPE defined in this section can mitigate the risk of exposures to biohazards.

5.3.4 Solar (Ultraviolet)

Significant exposure to the sun during anytime of the year can contribute to heat related illnesses such as sunburn and sunstroke/heat stroke. Prolonged sun exposure can increase a worker's risk of certain skin diseases, including skin cancer. The use of PPE, such as long-sleeved shirts, can help minimize UV exposure. The use of clothing treated with UV-protectorates can further reduce UV exposure. The use of sunscreen should also be encouraged - many commercially available products are available.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

5.4 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.

5.5 References

OSHA (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

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

6 Tool Selection

6.1 General

Tools can range from the simple hand tools (hammer, screwdriver, wrench) to the more complex (power or air/pneumatic operated). Injuries that occur from using tools typically involve one or more of the following questions not being answered correctly.

— Do I know how to use the tool?

— Is the tool in good condition and safe for use?

— Is the tool appropriate for the task?

All tools must be used properly and safely. Tools should only be used for the correct application (saws used for cutting, etc.). Only use tools in the operating environment and in a manner for which they were designed and approved by the manufacturer.

6.2 Non-power/Non-pneumatic Tools

Although we may expect all basic hand tools to last forever, we all know they do not. The handles on hammers can crack; the blade on screwdrivers can chip; even the edges on tape measures can create sharp edges. Care should be taken to protect basic hand tools to ensure the useful life is achieved, but it should be recognized that even these basic tools will wear out and need replacing. Some additional reminders on basic hand tools include the following.

- Use the right tool for the job—if a hammer is needed, do not use a wrench; if a chisel is needed, do not use a screwdriver; if a wire stripper is needed, do not use a pocket knife.
- Do not use broken, damaged, or worn-out tools—common examples are dull blades on saws, chipped screwdrivers, or worn wrenches.
- Keep body parts away from the point of contact—cutting tools should be used in a direction that is away from the body. And do not forget your fingers.
- Keep a good grip on the tool—find a replacement tool if the grip is worn out or broken.
- Keep good balance and footing when using the tool.
- Avoid applying extreme pressure when using tools—this could be an indication that the tool is worn, or another tool or additional assistance may be needed.
- Secure tools in the proper location when not in use—not only can putting tools away extended the life, but it can also remove a potential tripping hazard.
- Handle tools with the appropriate care—never toss or throw tools to another person and avoid carrying tools in pockets, especially tools with sharp or pointed ends.
- Keep track of tools when working at heights—the fall of the tool can cause serious injury to a person below.

6.3 Power/Pneumatic Tools

While much of the guidance above can also apply to power/pneumatic tools, there are additional risks that can exist from these types of tools. Therefore, additional mitigations should be in place.

6.3.1 Power/Pneumatic Tool General Safety Guidelines

The following are guidelines to observe while using power or pneumatic tools.

- 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.
- Never leave a tool overhead, where someone may pull its power cord and cause the tool to fall.
- Never jerk its 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.
- Do not overload tools. Overloading is caused by bearing down too heavily on a tool or using worn parts (blades, drill bits, etc.). Overloading can result in an injury.
- Visibly inspect all equipment for external damage or defects, including damage to housing, missing or loose parts, and any evidence of internal damage.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— Make sure rotating parts are free and rotate without obstruction.

— If any defect or damage is found, do not use the equipment until qualified persons have made the repairs necessary to make the equipment safe.

6.3.2 Safety Features/Guards on Tools

The following requirements pertain to safety features and guards on tools.

— Verify that the guards and/or other safety features are in place and work properly.

— Workers are prohibited from removing or disabling 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.

— 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 51 mm (2 in.) in diameter shall be used on machines with safety guards designed and maintained to meet OSHA requirements.

6.3.3 Pressure Switches

Pressure switch requirements for power tools are as follows.

— All hand-held powered circular saws; electric, hydraulic and 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, 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.

Before using power tools, test the control switch or trigger mechanism to make sure it operates freely and starts and stops the equipment properly.

6.3.4 Electrical Safety Guidelines for Power-operated Tools

The following electrical safety guidelines must be adhered to when using power-operated tools.

— Make sure all electrical connections and wiring follow applicable electrical codes (including requirements for wet or hazardous locations).

— Always check prior to connecting the plugs 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.

— 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.

— 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.

— 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.

6.3.5 Pneumatic (Air/Gas Driven) Tool Safety Guidelines

The following safety guidelines must be adhered to when using pneumatic tools.

— Pneumatic power tools shall be secured to the air supply hose by a 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.

— Securing/locking type devices are recommended at all connections (compressor, coupling, and tool).

— 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.

6.4 Tool Use at Retail Service Stations

Portable electrical equipment, including battery-operated equipment, may be capable of igniting flammable vapors. Even the use of some handle tools can generate sparks. Care must be taken when using tools in specific areas in and around the service station.

Workers shall use Hot Work safety guidelines whenever using tools near a potential source of flammable vapors such as a sump or a dispenser. For more information see Section 13 and/or Section 15.

6.5 Training Requirements for 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 ensure that workers have the knowledge or receive proper training for the tools they use.

6.6 References

OSHA (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1910.212

29 *CFR* 1910, Subpart P

29 *CFR* 1910.243

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

29 *CFR* 1926.21

29 *CFR* 1926, Subpart I

7 Driving Safety

7.1 General

Driving is a common activity with much risk, being performed by almost all workers. We experience this risk on a daily basis. There exists many recognized driving safety programs and it is recommended that all workers who drive participate in a program on some regular frequency.

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 service station. 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 Department of Transportation (DOT) requirements and it is fully the responsibility of the Contractor and person performing the work to abide by any and all additional Federal, State, County, or local laws and regulations, as well as any 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.

7.2 Vehicle Regulations and State Requirements

Personnel operating motor vehicles 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 their driver's licenses in their possession at all times when driving,

— notify their supervisor immediately if their driver's license has been suspended or revoked,

— ensure that their vehicle is properly insured and shall carry proof of insurance in the vehicle.

7.3 Use of Seat Belts

Seat belts shall be worn by all occupants at all times whenever a vehicle is in motion.

7.4 Company Driving Procedures

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

7.5 Mobile Phone Procedures

7.5.1 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, use of blue tooth and similar devices, and accessing all functions on a smart phone including texting and talk-to-text features.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

- 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.

7.5.2 Speaker Phone or Hands-free Phones (Blue Tooth Devices)

Mobile phones in vehicles may have an installed speaker or hands-free kit. 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.

7.5.3 Multitasking While Driving

Drivers are also discouraged from other forms of multitasking (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.

One tool to prevent multitasking while driving is the use of Global Positioning System (GPS) devices. GPS devices should be set before the vehicle is put into motion. This includes those built into vehicles, as well as those that can be moved from one vehicle to another. GPS devices that have the text-to-speech option are preferred, as it allows drivers to keep their eyes on the road while directions are verbally spoken by the unit.

Some mobile phone devices can also serve as a GPS device. The same care should be taken if the mobile phone is to be used as a GPS. The vehicle should be safely stopped when an interaction is required with the mobile phone device. The mobile phone device should provide audible directions and the driver should look at the mobile phone for directions only when safely stopped.

7.6 Proper Places to Park While on the Site

7.6.1 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.

7.6.2 Backing Hazards

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

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

The need to travel in reverse should be prevented when possible. Pull all the way through a parking space so that the vehicle is facing forward upon exit. If this is not possible, back into a parking space such that the vehicle is facing forward upon exit. Many petroleum sites have a forward-facing parking requirement, so check each site's regulations.

7.6.3 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.

7.7 Defensive Driving Practices

All drivers shall be appropriately licensed, trained and medically fit to operate the vehicle. Workers who drive vehicles for business reasons should have formal defensive driving training. In simple terms, driving defensively includes:

— being alert to traffic and road conditions at all times,

— avoiding driving errors,

— compensating for the mistakes of other drivers, and

— making the necessary adjustments to avoid getting into accident-producing situations.

7.7.1 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 his or her 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 audio devices (radio, tape/CD player, iPods, MP3 players, etc.) 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.

7.7.2 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

7.7.3 Trip Planning/Travel Management Plans

While most work related travel is routine and within the typical travel area, some trips may be longer in duration. For longer trips (greater than 2 hours), a travel management plan should be developed. Items to consider in a travel management plan include route to be taken, familiarity of the roads, weather conditions, fatigue factors, and any other potential conditions that may be encountered along the trip.

7.7.4 Alcohol and Drugs While Driving

The following must be noted.

— Possession of alcoholic beverages or illegal drugs is prohibited.

— Do not drive under the influence of alcohol or drugs, including prescription drugs that can affect judgment.

— Be aware that over-the-counter medications may sometimes make a person drowsy. Do not drive while on any medication unless you are sure of how it will affect you.

7.7.5 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-up trucks, trailers, booms, buckets, sides or any exterior area of heavy equipment.

7.8 Posted Speed Limits

Drivers shall obey posted speed limits at all times. When weather or road 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.

7.9 Traffic Patterns

Most sites have entrances and exits on more than one side of the property. Therefore, traffic patterns at sites can have 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.

7.10 Heavy Traffic and Pedestrian 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 are often distracted as they walk back to their vehicles (counting change, talking on cell phones, 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.

7.11 Personal Protective Equipment When In/Around the Vehicle

Wear personal protective equipment (PPE) to protect against specific hazards.

— Wear a high-visibility vest when out of the vehicle near moving traffic (e.g. when changing a tire).

— Wear safety glasses when checking vehicle fluid levels.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

7.12 Accident Reporting

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 is 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.

Each employer and/or client may have its own policy in regards to reporting an accident. Workers should be aware of these policies.

7.13 Department of Transportation Requirements

It is the employer's responsibility to ensure that workers driving vehicles are aware of all applicable DOT requirements that may apply to their vehicles. This includes, but is not limited to the following.

— Vehicle is fit for intended purpose and is maintained in a safe working order.

— Vehicle has functional seatbelts for the driver and all passengers.

— Number of passengers does not exceed the specification for the vehicle.

— Frequent inspections shall be conducted on all vehicles (see Annex A.1 for a sample inspection sheet).

— Loads are secure and do not exceed specified and legal load limits for the vehicle.

— Loads in pickup, flatbed truck, and on trailer shall be physically secured 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.

— Must have proper documentation for permit loads.

8 Hazard Communication (Hazcom)

8.1 Requirements Related to "Employee Right-to-understand"

The Hazard Communication (Hazcom) OSHA standard (29 *CFR* 1910.1200) covers the use of hazardous materials in the workplace, including the requirement for providing safety data sheets (SDS, formerly known as Material Safety Data Sheets, or MSDS) and employee training. The Hazcom standard has been brought into alignment with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

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 includes, 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 safety data sheets (SDS), 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.

Hazcom, through the GHS, is to give the workers not only the "right to know", but also the "right to understand" information about hazardous chemicals in the workplace.

8.2 Hazard Classification and Mitigation

Hazard classification 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 SDS with the first shipment of a chemical and with the next shipment after the SDS is updated. Employers have no independent duty to analyze the chemical or evaluate the hazards of it.

Employers are to maintain all current SDSs and they must be accessible to all employees at all times. SDSs should be read before handling new or unfamiliar chemicals or when an exposure to a chemical has occurred.

SDS is 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). SDSs are standardized in a 16 section format that contains the following information:

— identification;

— hazard(s) identification;

— composition/information on ingredients;

— first aid measures;

— firefighting measures;

— accidental release measures;

— handling and storage;

— exposure controls/personal protection;

— physical and chemical properties;

— stability and reactivity;

— toxicology information;

— ecological information;

— disposal information;

— transport information;

— regulatory information;

— other information, including date of preparation or last revision.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Employee Responsibilities

Employees must:

— be alert to potential hazards of all substances,

— consult the SDS for specific information,

— read labels,

— know the written program, and

— work safely and follow safe work practices.

8.3 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 SDS for that chemical. The employer shall share the list with employees.

8.4 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.

8.4.1 Physical Hazards

Physical hazards include: flammability, corrosiveness, and reactivity.

8.4.2 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.

8.4.3 Exposure Limits

The following terms are used on SDS 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 minutes)

— 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 (measures concentrations of dusts, metals, and mists)

— PPM: Parts per million (measures the concentration of a gas or vapor in a million parts of air)

8.4.4 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.

8.4.5 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).

8.5 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 labels for a hazard chemical must contain the following information:

— name, address and telephone number,

— product identifier,

— signal word,

— pictogram,

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— hazard statement(s),

— precautionary statement(s) for each hazard class and category.

See Figure 1, below, for an example of a hazardous substance container label.

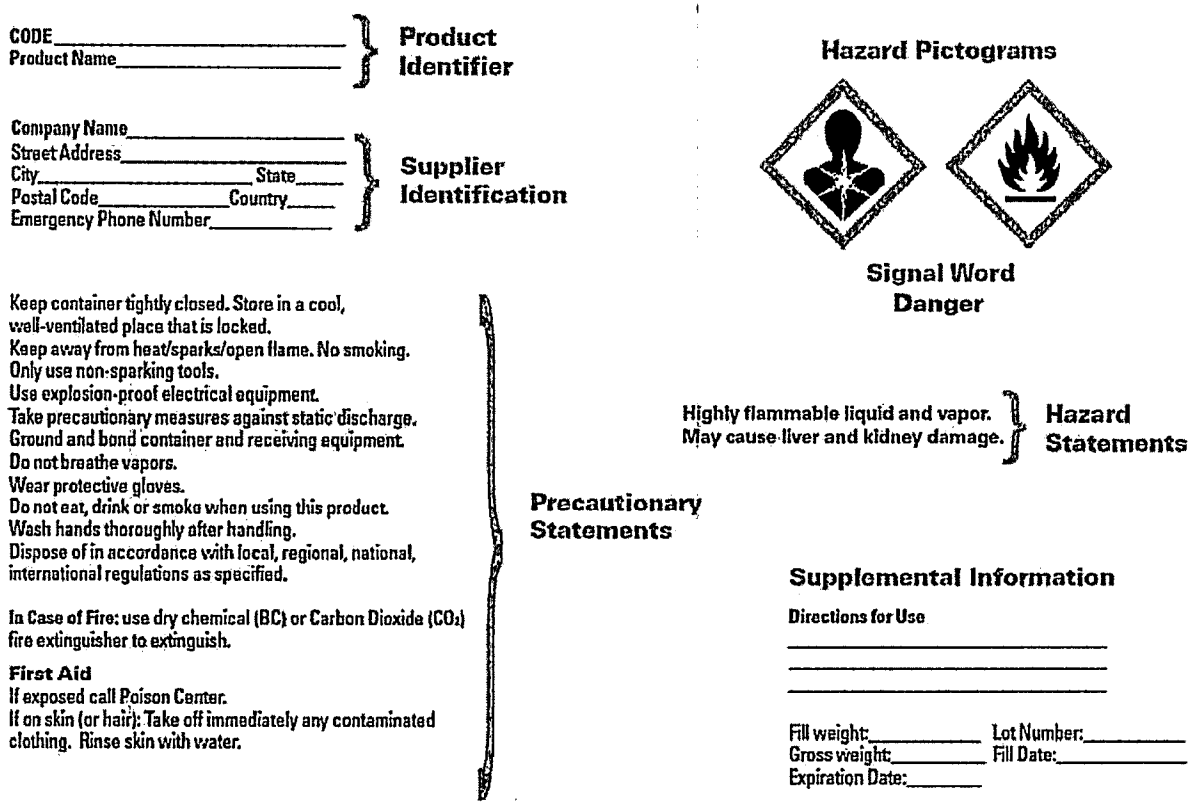


Figure 1—Example Hazardous Substance Label (image courtesy of US Department of Labor)

A pictogram is a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical.

See Figure 2, below, for the standard pictograms.

In addition to commercial labels, many organizations use labels such as those shown below in Table 4. 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 to 4, with 0 representing the least severe hazard and 4 representing the most severe hazard. Remember, the higher the number, the greater the hazard.

8.6 References

OSHA (The reference below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1910.1200; 1926.59 Hazard Communication

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

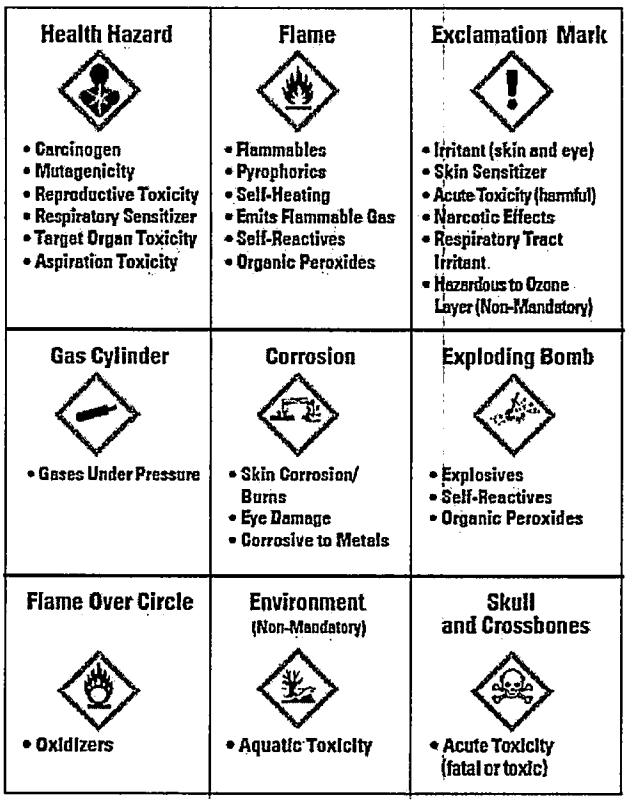
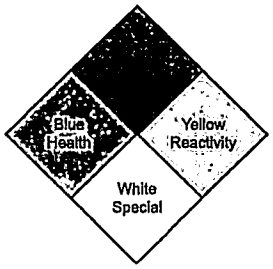


Figure 2—Hazard Pictograms (image courtesy of US Department of Labor)

Table 4—Hazard Class Label Information

Health (Blue)	Flammability (Red)	Reactivity (Yellow)	Special Hazards (White)
0 = No unusual Hazard	0 = Not Combustible	0 = stable Not reactive when mixed with water	W = Water Reactive
1 = May be irritating	1 = Combustible if heated	1 = May react if heated or mixed with water, but not violently	OX = Oxidizer
2 = May be harmful if inhaled or absorbed	2 = Combustible liquid flash point of 100° to 200° F	2 = Unstable or may react violently if mixed with water	= Radioactive
3 = May be harmful if inhaled or absorbed	3 = Flammable liquid flash point below 100° F	3 = May be explosive if shocked, heated under confinement or mixed with water	COR = Corrosive
4 = May be fatal on short exposure. Specialized protective equipment required	4 = Flammable gas or extremely flammable liquid	4 = Explosive material at room temperature	ACD = Acid
			ALK = Alkali



Copyrighted material licensed to Michael Zobel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

9 Barricading

9.1 General

One of the risks that exist at an active retail service station is the potential impact that the customers and general public can have on the maintenance and construction work. It is important that the work area (whether outside on driveway/forecourt or inside a building) has been properly established prior to beginning any work activity. The process to establish the safe work area is through barricading.

The primary functions of barricading include the following:

— providing a safe barrier and separation between the work activity and the customers/general public,

— visually alerting the customers/general public that work activities and hazards are present.

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.

9.2 Discussions with Site Management

The site management shall be advised of the scope of work to be performed, as well as the possible effect on the operation of the site. The planned work sequence and site layout (detailing work zones, identifying delivery and storage areas, etc.) shall be confirmed daily and just before the barricading activity.

9.3 Traffic Patterns (Vehicular, Foot Traffic, Peak Periods, Delivery Trucks)

For proper protection while working on the forecourt, the barricading plan shall consider, but not be limited to the following:

— vehicle traffic patterns,

— high pedestrian traffic areas,

— peak periods/"rush hour" times,

— fuel and merchandise 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 dominant 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 nonessential work during peak rush hour times.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

9.4 Entrances/Exits to Sites

Work to be performed at or near entrances and exits to sites shall be evaluated to determine the following.

— How equipment should be positioned. (Is there is 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.

9.5 Barricading Components

There are four key components to follow when developing a barricading plan.

9.5.1 Stop Element

Use a stop element in the predominate direction of traffic, such as a vehicle (car, van, or service truck). The vehicle should be used as part of the barricading, especially in forecourt and driveway work areas.

9.5.2 Visibility

All barricading systems used in the driveway shall be at least 1219 mm (48 in.) high and made from high visibility material. This is important so the barricades are more visible over the hoods of sedans and SUVs and that the barricading devices can be visible from vehicles traveling in reverse. Examples of barricading devices include:

— traffic cones and flags,

— high-visibility plastic fencing,

— A-frame/saw-horse barricades,

— accordion type gates,

— other similar types of barricades.

Caution tape (yellow and black) should not be used as the only means of barricading while working on the forecourt. It can be used to supplement any of the types of barricading above.

While visibility is critical to barricading, care should also be taken to ensure the barricading does not become a tripping hazard for the workers.

Barricades used outside should be designed to withstand wind and other weather conditions.

9.5.3 Isolate

To eliminate the potential of vehicles or customers from entering into the work area, the use of continuous horizontal barriers is recommended. Examples include the use of extension poles that connect the top of traffic cones or caution tape. Care should be taken to ensure the workers can ingress/egress the barricading area when required as safely as possible. Workers should be safe from potential tripping hazards caused by the barricading.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

A combination of barricade types or other barriers appropriate to the job may be used to guide traffic and to 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.

If working in a high foot-traffic zone, such as a building, caution tape between barricades or solid barricades (accordion, saw horse, high visibility plastic fencing, or A-frame type) shall be used.

9.5.4 Safety Perimeter

The barricading equipment should be placed a safe distance from the workplace to provide the worker plenty of room to perform the work activities. This distance can typically be 1.5 m to 3.0 m (5 ft to 10 ft), but could be more based on the work conditions. The work being performed should be properly risk assessed to ensure the proper safe distance is provided.

At no point during the work activities should the worker be outside the barricading. The barricading should account for staging of tools/equipment and other tasks needed for the worker to complete the activity.

The installation of barricading should also account for egress into the work area by the workers, especially if multiple trips in and out of the barricade area are anticipated. A safe means of egress should be part of the barricading system.

9.6 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.

9.7 General Guidelines for Barricading Use

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. See Table 5.

9.8 Personnel Requirements

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

9.9 Personal Protective Equipment

Barricading is a work activity, so all appropriate personal protective equipment must be worn. (Refer to Section 5 for basic PPE requirements.)

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Table 5—General Guidelines for Barricading

Hazardous Condition	Barricade
General Construction	Use barricades to completely isolate the work area.
Dispenser/Pump Island Work	Both sides of the island shall be barricaded.
Overhead Work	Use barricades for areas where debris may fall or drop.
Excavations (e.g. trenches, open holes)	Use barricades to prevent personnel or vehicles from falling or accidentally driving into excavations. For all excavations open for longer than a standard workday, temporary fencing and lighting may be required.
Driveway/Forecourt	Use barricades at temporary openings, like an uncovered sump pit, to prevent people or vehicles from falling into the opening.
Tripping Hazards	Use barricades to block-off potential trip hazards (e.g. conduit stubs, piping stubs, holes in floors, uneven surfaces, minor changes in elevation, etc.).
Potentially Unsafe Conditions	Use barricades when an unsafe condition exists (e.g. incident investigation scene, spill, structure is partially dismantled, etc.).
Ladders	Use barricades around the base of ladders that are located where they can be displaced by workplace activities or traffic.
Energized Lines or Equipment	Use non-conductive barricades around energized lines or equipment to prevent accidental contact.

10 Working at Heights

10.1 General

This section addresses the Working at Heights procedures that are required when the bottoms of workers' feet will be at a height 1.8 m (6 ft) or greater. These requirements are addressed and outlined in the OSHA construction standards 29 *CFR* 1926.

NOTE OSHA General Industry requirements differ from the construction requirements, which are addressed in 29 *CFR* 1910. The General Industry is standard defines work at heights as when the bottoms of workers' feet will be 1.2 m (4 ft) or greater. It is the contractor's responsibility to know which standard applies and apply the required controls accordingly.

All of the requirements referenced herein are minimum requirements. Certain customers may have more stringent requirements or additional controls may need to be put in place based on the work scope and site conditions after a careful evaluation of the hazards by a competent person.

10.2 Introduction

The risks associated with working at heights should be avoided whenever possible by following this hierarchy of control.

a) Eliminate the risk by working from the ground level whenever possible.

b) Incorporate engineering controls (parapet walls, guard rails, etc.).

c) Confirm administrative controls (training and work scheduling).

d) Wear appropriate PPE (including Personal Fall Arrest Systems).

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

There are certain universal risks associated with working at heights, no matter what type of equipment is used. These include not only the risk of the worker falling from heights, but also the risks posed by tools and other equipment falling from heights, power lines and other overhead obstructions, weather, and wind. When working on the forecourt, additional risks come into play such as traffic, customer interference, and working in a classified hazardous area. A thorough risk assessment, which takes into account all relevant risks, must be completed by a competent person whenever working at heights is required.

10.3 Examples of Working at Heights

In addition to the traditional climbing of a ladder or scaffold, or riding in an aerial lifting device, working at heights can also include the following examples.

— Work over excavations, pits or trenches—The requirements for fall prevention and/or protection are required by this standard when working at the edge of or over an excavation or pit where the base of the excavation or pit is 1.8 m (6 ft) or deeper.

— Work on skylights—The requirements of this standard apply to work on building skylights. Risks exist at unguarded skylights, or potentially falling through non-visible skylights.

— Work over water—The requirements of this standard also apply to work over water such as tank pits that are full of water. Personal flotation devices may also be necessary when working over water.

— Work at elevations with unprotected sides or edges—Fall protection systems shall be in place and worn by workers when working at height on building roofs and canopies that do not have OSHA compliant guardrails or parapet walls.

— Work over or near surfaces containing holes or openings (for example, skylights).

— Elevated work over dangerous equipment (moving parts and/or electrical equipment such as a car wash or air compressor).

10.4 Ladders

There are a variety of ladders available for short durations of working at heights. These include extension ladders, stepladders, A-frame ladders, platform stepladders, and specialty/multiuse ladders. Never use a ladder constructed at the job site. Employees shall be trained to select the appropriate ladder for the task to be performed. Ladders should only be used as designed (never use an A-frame ladder as a straight ladder).

Ladders may be used to access high work areas, such as roofs and canopies, as long as it is within the height limits allowable by OSHA.

10.4.1 Ladder Inspection

Inspect the ladder prior to use following the manufacturer's recommended guidance. The inspection should include a check for any visible defects, corrosion or damage. Inspect the rungs, cleats, and steps for any damaged, broken or split rails. Check the feet to ensure the nonslip protection is not missing or damaged. Ensure the load rating is clearly visible.

Ladders shall not be loaded beyond the maximum intended or designed weight, nor used beyond the manufacturer's rated capacity. Ladders shall be used only for the purpose for which they were designed.

If an issue is identified with the ladder, do not use it. Take the ladder out of service to ensure no one else can use the ladder. Examples include placing a tag on the ladder stating "Do Not Use" or marking the ladder in a manner that clearly identifies the ladder as defective.

If a ladder is to be repaired, it should only be returned to use if it is repaired and restored to its original design specification.

10.4.2 Ladder Positioning

Before climbing a ladder, the ladder must be positioned in a safe manner to prevent slipping or falling. Safety guidelines for ladder positioning include the following.

— Place the ladder base at a 4:1 ratio from the vertical. For every 1.2 m (4 ft) of working height, the base of the ladder should be 0.3 m (1 ft) out from the top support. Also, 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 1 m (3 ft) above the level of the area being accessed.

— 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.

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

— Do not use a ladder on a slippery surface, unless you secure the ladder or it has slip-resistant feet to prevent accidental displacement. Examples of slippery surfaces include flat metal or concrete surfaces constructed so that there is no way to prevent them from becoming slippery.

— 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.

— Secure ladders that are placed in a 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.

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

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

— Extension ladders must be tied off at the top to the supporting structure.

— Portable ladders shall have nonconductive side rails if they are used where the employee or the ladder may contact exposed energized parts. Electrical hazards, including overhead electrical lines, shall be considered in the hazard assessment before working at heights.

10.4.3 Ladder Climbing

Climbing a ladder should be considered part of the work activity and proper care and thought should be used. Prior to taking the first step, check that the ladder is free of oil, grease, and other slipping hazards. Other important safety reminders when climbing a ladder include the following.

— 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— 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.

— Do not allow more than one person on a ladder unless the ladder is designed for more than one person.

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

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

— Maintain your body's center of gravity over the step being used (do not allow your body's midpoint to extend back from the ladder to where you could fall backward off the ladder).

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

— The top or top step of a stepladder shall never be used as a step.

10.5 Scaffolds

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 (OSHA 29 *CFR* 1926.450).

Scaffold and scaffold components must be securely supported and not loaded in excess of their designed maximum load or rated capacity.

10.5.1 Scaffold Inspection

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.

10.5.2 Scaffold Requirements

While the design and construction of the scaffold must be performed by a qualified and competent person, the workers who use the scaffold should be aware of the key requirements.

— 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 1.8 m (6 ft) or greater.

— Freestanding scaffold towers used externally shall not be higher to the top platform level than 3 times the minimum base dimension, unless secured to a permanent structure.

— Wheeled scaffold shall not be higher to the top platform level than 3.5 times the minimum base dimension.

— 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.

— Ladder access shall be provided for all scaffolds so that cross bracing and framing are not used as a means of access.

- Screw-jacks shall be used to level scaffolds if necessary. Block should never be used.
- Scaffolds shall be tied to a structure every 9 m (30 ft) in length and 8 m (26 ft) in height.
- Working platform planks shall extend at least 0.3 m (1 ft) beyond supports.
- 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.
- Wheeled scaffold shall be constructed on a level surface.
- Wheeled scaffold shall not be used when winds exceed 50 km per hour (35 miles per hour) or during other conditions that may cause it to become unstable

NOTE The scaffold manufacturer's recommendations may be more stringent.

- Barricades shall be constructed at least 1.5 m (5 ft) from the base of the scaffold.

10.6 Aerial Lifting Devices (Scissor-type Lifting Devices and Bucket-type Lifting Devices)

Aerial lifting devices may be used for access to roofs, canopies, ID signs, and area light poles. The use of an aerial lifting device shall meet the requirements of OSHA regulation (29 *CFR* 1926.453).

Aerial lifting devices shall be inspected prior to each use and should be serviced according to the requirements of the manufacturer of the device. All inspections and service records should be documented in writing. 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*

10.6.1 Risks Associated with Using Aerial Lifting Devices

In addition to the risks involved with working at heights, the use of aerial lifting devices has additional risks that should be considered when reviewing the hazard assessment and developing the Job Safety Analysis. These additional risks include the following:

- collapse or overturning,
- workers falling or being thrown from the device,
- workers being trapped against fixed structures,
- workers contacting live electrical wires,
- the aerial lifting device being struck by another vehicle.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

10.6.2 General Guidelines for Using Aerial Lifting Devices

The following are general guidelines for using aerial lifting devices.

— The aerial lifting device shall be used on a surface that allows stability of the equipment in the raised position.

— Barricading shall be constructed around the work area. If outriggers are available on the equipment, they should be deployed.

— Follow the manufacturer's requirements for maximum wind speed.

— Do not exceed manufacturer's maximum load rating.

— Do not exceed manufacturer's maximum surface slope recommendation.

10.6.3 Scissor-lifting Devices

Scissor-lifting devices 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. This inspection shall be documented. Do not use the device if any part is damaged or missing.

Other safety guidelines for scissor-lifting devices include the following.

— Scissor-lifting devices may be used for high work and access to other high work areas. A ladder shall also be present for emergency exit when this device is used for elevated access.

— Do not drive the device near drop-offs, holes, or trenches.

— Do not drive or raise platform on uneven or soft surfaces.

— Do not use without guardrails, mid rails, chain, and bar in place.

— Do not use near moving vehicles or other construction equipment.

— Do not stand or sit on guardrails or mid rails.

— Do not override safety devices.

— Do not raise platform while device is on a truck, forklift, or other device or vehicle.

— Do not use a ladder, scaffold, or other device to increase the working size or height of the device.

— Do not use with damaged or underinflated tires, or tires that do not meet the manufacturer specifications.

— Do not attach ropes or chains to guardrails to be used as a lifting device/crane.

10.6.4 Bucket Lifting Devices

Bucket lifting devices (bucket trucks, cherry pickers, etc.) shall be inspected for visual defects by a competent person before each work shift. This inspection shall be documented. Do not use the device if any part is damaged or missing.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Other safety guidelines for bucket lifting devices include the following.

— The aerial lift basket may only be lowered onto a roof when it is more than 1.8 m (6 ft) from the edge.

— A fall arrest or fall restraint system should be used and worn at all times while inside a bucket lifting basket.

— Do not override safety devices.

— If the device is equipped with outriggers, they must be deployed during a lift.

— A rescue plan must be developed and in place if fall arrest equipment is used.

10.7 Fall Prevention/Fall Protection Systems

When working at heights where the feet of the worker are greater than 1.8 m (6 ft) from a lower level, the worker shall be protected by a guardrail, parapet wall, safety net, other fall prevention system, or a fall prevention/fall protection system. It is the responsibility of the contractor to provide appropriate fall prevention/fall protection systems and train employees how to properly and safely use them.

10.7.1 Fall Prevention Systems

Fall Prevention systems 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 scaffold, edge warning and demarcation systems, and a scissor lift with a protective railing installed. All fall prevention systems shall meet OSHA standards.

— Properly Constructed Guardrail: This consists of a top rail 1067 mm ± 76 mm (42 in. ± 3 in.) high, mid rails, toe boards, screens or mesh as appropriate and capable of withstanding a force of 889 N (200 lbf) 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).

— Parapet Wall: Parapet wall shall meet the same requirements as a guardrail system.

— Properly Constructed Safety Net Systems: Specifications regarding safety net system requirements shall meet the OSHA requirements, which may be found at 29 *CFR* 1926.502(c).

10.7.2 Fall Protection Systems

Fall protection systems shall be used for working at heights when the hazard cannot be eliminated by fall prevention systems. The primary personal protective equipment for fall protection is personal fall arrest systems (PFAS). PFAS equipment must be used that will arrest/prevent a worker from falling to the ground from a height of 1.8 m (6 ft). Specific OSHA requirements for PFAS may be found at 29 *CFR* 1926.502(a). Guidance on PFAS systems can also be found at ANSI Z359.1.

Examples of when a PFAS may be required include:

— erecting, modifying, or dismantling scaffold when worker is at a height of 1.8 m (6 ft);

— workers outside of the scaffold or scissor-type lifting device guardrails, or when guardrails are not completely enclosed;

— workers inside bucket lifting devices.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

PFAS consist of the following:

— anchorage/anchor point;

— connectors—double-latch self-locking snap hooks;

— full body harness, which may include a lanyard, deceleration/shock absorbing device, and a lifeline.

PFAS must be able to withstand a minimum of 22,241 N (5,000 lbf) per worker.

PFAS shall be visually inspected prior to each use for wear, damage, and other deterioration and defective components shall be removed from service.

Workers must be trained on the proper use of the fall arrest equipment prior to use and have a rescue plan for any worker who falls. Specific OSHA requirements for personal fall arrest systems may be found at 29 *CFR* 1926.502(a).

When using harnesses and lanyards, specific care shall be taken 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 1.8 m (6 ft). In addition, lanyards shall be the correct length to ensure that any falling worker does not contact any lower level. Self-retracting lanyards may be used, but shall limit any potential free fall to 0.6 m (2 ft). Self-retracting lanyards shall also be used in a manner which ensures that any falling worker does not contact any lower level.

Sliding beam anchors or beam clamps are the more commonly used anchorage point in the service station industry when working at heights on top of canopies.

If access to the top of the canopy or building roof is required and there is no exposed steel to enable the use of a beam clamp, an alternative anchorage to the PFAS must be designed. Consult an appropriate safety engineer if assistance is needed in designing an OSHA compliant PFAS.

10.8 Emergency Rescue

Circumstances may arise when workers need to be rescued from working at height. An emergency rescue plan shall be in place prior to work commencing.

For a worker using a PFAS, the items below must be considered.

— Suspended workers shall be rescued as quickly as possible because they are at risk of suspension trauma.

— Suspension trauma is potentially life threatening. Suspended workers with head injuries or who are unconscious are particularly at risk.

— Ability of worker to perform self-rescue with on-site equipment.

One issue to consider when determining the best rescue plan is response time—how quickly the rescue team or service can get from its location to the work site where rescue at height may be necessary. Relevant factors to consider include the location of the rescue team or service relative to the work site and potential bottlenecks or traffic congestion that might be encountered in transit.

NOTE Response time includes the time for the rescue team or service to receive notification, arrive at the scene, and set up and be ready for rescue.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

10.9 Risks of Electrocution

One of the more common and deadly hazards associated with working at heights is electrocution from contact with electrical wires and conductors. ANSI and OSHA standards specify minimum safe distances that are to be maintained while working with aerial lifting devices, as indicated in Table 6, below. If these distances cannot be achieved, DO NOT complete the work.

Table 6—Minimum Safe Electrical Conductor Clearances While Working with Aerial Lifting Devices

Conductor Voltage	Minimum Distance
< 50 kV	3.0 m (10 ft)
50 kV to 199 kV	4.6 m (15 ft)
200 kV to 349 kV	6.1 m (20 ft)
350 kV to 499 kV	7.6 m (25 ft)
500 kV to 749 kV	10.7 m (35 ft)
750 kV to 1000 kV	13.7 m (45 ft)
NOTE kV = kilovolts = 1000 volts.	

10.10 Barricading/Protecting/Isolating Work Environment

Refer to Section 9 for information on barricading and work area isolation.

10.11 References

OSHA (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1926.1053

29 *CFR* 1926.453

29 *CFR* 1926.500

29 *CFR* 1926.501

29 *CFR* 1926.104

11 Ground Disturbance/Excavation

11.1 General

When any ground disturbance (digging, trenching, drilling, boring, excavation work, etc.) is required, the risks can come from many different areas. Safety risks exist when the ground disturbance is being performed manually or with mechanical equipment, when the digging is shallow or deep, or whether or not the excavation will be entered. There are additional risks of ground disturbance at active retail service stations due to the potential location of buried underground petroleum lines and electrical wiring.

11.2 Safety Actions Prior to Ground Disturbance

Actions must be taken prior to initiating any ground disturbance activities. The 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

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

also determine the locations of tanks, product piping, or other fueling system components that may be encountered during excavation work. The contractor shall complete a permit to work form and review all available site plans and engineering drawings with the facility's Engineering Authority and Project Manager before work begins.

Utilities shall be properly marked out by local authorities prior to beginning an excavation. Many municipalities have requirements to contact them prior to initiating any digging and also other services ("Call before you dig", "One call", or "Dial 811") that will come to the site and mark utility locations. Notification must be made 48 to 72 hours prior to beginning the ground disturbance depending on the service.

At retail service stations, underground structures include the underground storage tanks and underground piping. Piping can include the product piping from the tanks to the pumps/dispensers, remote fill piping, vent piping, vapor recovery piping, and potential manifold and siphon piping. There will also be electrical wiring in and around the tanks and pumps/dispensers. A private utility locate service could be useful in locating some of these underground structures.

The layout of a typical retail service station includes underground storage tanks (USTs), dispensing equipment at the fuel pump islands, and the potential location of vent lines and remote fills. Given that the exact location of the piping may not be known, it is recommended to assume that underground equipment may be anywhere within the service station perimeter, with the edge of the perimeter located at least 3 m (10 ft) outboard of all pump islands, USTs, remote fills, and remote vents. Even with site plans and engineering drawings, it is recommended that hand digging techniques be followed when any ground disturbance activities are to occur within this station perimeter.

Hand digging techniques should also be followed when within 457 mm (18 in.) of any marked-out area identified by a utility company or municipality.

Hand digging techniques include the use of hand shovels or other hand tools, as well as any soft digging non-penetrating equipment such as vacuum equipment, air knife or hydro excavation. If the surface is concrete or other paving material, machinery can be used to break this layer, but care should be taken to not penetrate below the level of the pavement.

Hand digging techniques should continue until the area is cleared of any underground structures. The depth to which to hand dig will vary based on the anticipated potential location of any underground structure.

NOTE Probing is not recommended for electric, telecommunications or non-metallic lines.

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 a problem arises during the excavation process. Before the excavation begins, the contractor shall ensure that the owners of all underground structures are aware than an excavation will be taking place that may affect their property.

11.3 Overhead Obstructions for Equipment

Excavations are usually made with large pieces of heavy equipment (track hoe, backhoe, drilling equipment and cranes). Because these pieces of equipment have large metal booms, it is especially important that the overhead electrical and utility lines are identified. 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.

ANSI and OSHA standards specify minimum safe distances that are to be maintained while working with aerial devices, as indicated in Table 6 in Section 10. If these distances cannot be achieved, DO NOT start the work.

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 12 and Section 14 for additional information regarding overhead utilities.

11.4 Heavy Equipment Operation

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 ensure the safe operation of heavy equipment.

11.5 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 all applicable State and 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 those covered by 11.5.1 through 11.5.4.

11.5.1 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.

11.5.2 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 a "trench box" or "trench shield").

11.5.3 Shoring (Shoring System)

A shoring or 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.

11.5.4 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.

11.6 Management of Site and Placement of Equipment, Machinery, and Materials

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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

11.6.1 General Site Management

When working at excavation sites, observe the following precautions.

— Do not stand underneath or within the fall radius of a load that is being handled by lifting or digging equipment.

— Stand away from any vehicle being loaded or unloaded to prevent being 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.

11.6.2 Surface Crossing of Trenches

Surface crossing of trenches should not be made unless absolutely necessary. When necessary, crossing is 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 508 mm (20 in.), be fitted with standard rails, and extend a minimum of 610 mm (24 in.) past each surface edge of the trench.

11.6.3 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.

11.6.4 Placement of Equipment, Machinery, and Materials

In no case may machinery, equipment, or materials be placed any closer than 0.6 m (2 ft) 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.

11.7 Isolation of the Area

Entry to the excavation work area shall be controlled. The excavation site shall be properly isolated to ensure that unauthorized people are not exposed to hazards of the excavation. Specific care shall be taken to ensure that the excavation area is not accessible to vehicular or pedestrian traffic if the excavation is to be left unattended.

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.

See Section 9 for more information about properly isolating work areas.

11.8 Safe Entry and Exit from Excavations, Including Emergency Response and Evacuation

An 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.

11.8.1 Entering and Exiting Excavations

The following requirements pertain to entering and exiting excavations.

— Do not enter an excavation of 1.2 m (4 ft) deep or greater until all the requirements in the 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 1.2 m (4 ft) 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 7.6 m (25 ft) 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 Annex A.6.

— Do not enter an excavation unless it has been properly planned and an Excavation Checklist has been completed.

— For excavations 1.2 m (4 ft) deep or greater, the sides of the excavation shall be protected from cave-in by sloping, benching of shoring systems. Shoring systems for excavations greater than 6 m (20 ft) deep shall be designed by a registered Professional Engineer.

— Do not enter an excavation if soil or other items are piled or stored within 0.6 m (2 ft) 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.

Excavations may be considered confined spaces. Refer to Section 13 for more information.

11.8.2 Ladders

When using ladders, please observe the following requirements:

— Ladders shall be secured and extend a minimum of 914 mm (36 in.) above the edge of the excavation.

— Metal ladders should not be used when electric utilities are present.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

11.8.3 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; and

— have cleats or other surface treatment, when needed, to prevent workers from slipping on the ramp.

11.8.4 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. The following requirements apply.

— Personnel shall not work in excavations where standing water has accumulated.

— If water removal and/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.

11.8.5 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.

11.9 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 and the use of protective systems;

— ability to detect conditions that may result in cave-ins and failures in protective systems;

— ability to identify hazardous atmospheres and other hazards, including those associated with confined spaces.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

11.9.1 Inspections

An excavation competent person shall conduct inspections daily and before the start of each shift for evidence of a possible cave-in, failure of protective systems, hazardous atmospheres, and other hazardous conditions when there is a worker exposure. These inspections should occur:

— after every rainstorm;

— after other events that may increase hazards such as snowstorm, thaw, earthquake, dramatic change in weather, etc.;

— when fissures, tension cracks, sloughing, 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.

11.10 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.

11.11 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.

11.12 Management of 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. Waste classification of soils may only be performed by persons trained and capable of doing so. 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.

11.13 Use of PPE

Fall prevention or fall arrest systems shall be used when workers are within 1.8 m (6 ft) of an unprotected ledge or opening where workers may be exposed to a fall of greater than 1.8 m (6 ft) where the hazard has not been eliminated through engineering controls. Please see Section 10 (Working at Heights) for Personal Protective Equipment (PPE) requirements.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

11.14 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.

11.15 References

API

RP 1604, *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 (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1926.650

29 *CFR* 1926.651

29 *CFR* 1926.652

12 Mechanical Hoisting and Lifting

12.1 General

Mechanical lifting and hoisting devices can come in many different shapes and sizes. From relatively simple mechanical devices; such as fork lifts and truck mounted cranes; to larger more complicated machines; such as back hoes and mobile cranes; safety risks can exist before, during, and after the lift occurs. Safe hoisting and lifting requires competent people following a proper lifting plan.

12.2 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. It is also the contractor's responsibility to complete a permit to work and to complete the lifting plan. 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.

12.2.1 Equipment Operator

All operators of powered lifting devices shall be trained and certified for operating that equipment. Operators shall keep their certification available on the job site at all times.

The operator shall be a competent person and is responsible to ensure 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.

— Crane and loads are properly configured.

— Outriggers and load stabilization are being used at all times while performing lifts.

12.2.2 Operating Crew

The equipment operator and operating crew shall work as one unit during the lifting operation. Roles and responsibilities for the operating crew should be clearly defined prior to any lifting operation. Communication methods should also be confirmed, including voice and ANSI approved hand signaling.

12.3 Lifting Plan

12.3.1 General

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:

— travel path and potential swing radius of the proposed lift;

— load does not exceed the dynamic and/or static capacities of the lifting equipment;

— barricade of 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.

— Also consider hazardous surroundings and conditions, including power lines, flammable atmospheres, excavations, and loose or shifting soil.

— The 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 a thorough review.

12.3.2 Special Rules for Small Truck Mounted Cranes

The following 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 in Section 9, Barricading, apply. When there is a choice as to truck location, the truck shall be placed so as to become a primary stop element of the barricade system.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

12.4 Equipment Selection

12.4.1 General

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 (including ability to maneuver within the available space);

— type, size, and weight of load to be lifted;

— swing capacity (capability of lifting and moving the load from one place to another);

— 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.

12.4.2 Inspections

Pre-operational and frequent inspections of the lifting equipment shall be conducted in compliance with OSHA regulations. The inspections should include the wire ropes, reeling systems, and rigging hardware. The inspection should also check that the safety controls and devices are working properly. 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.

12.5 Work Area Isolation

See Section 9 for a general discussion of work area isolation. When isolating hoisting and lifting work areas, special consideration may need to be given to 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.

— The 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

12.6 Toolbox 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.

12.7 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.

12.8 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 3 m (10 ft) 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. See Table 6. Any hazards within these guidelines shall be properly protected by the utility company.

12.9 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.

12.10 Rescuing Toppled Equipment

In the event that a piece of lifting or 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— A larger crane or lifting device may need to be brought onto the site to right the toppled piece of equipment.

— The local fire department shall be notified as deemed necessary.

12.11 References

OSHA (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1926.453

29 *CFR* 1926.550

29 *CFR* 1910.180

29 *CFR* 1910.184

13 Confined Spaces

13.1 General

Confined spaces can and do exist at retail service stations. It is important to understand what defines a space as a "confined space" and what actions must be taken if entry into a confined space is required.

13.2 Definition of a Confined Space

OSHA defines the term "confined space", which includes a space that meets these three criteria:

— a space that is large enough for a person to enter,

— limited or restricted means for entry or exit,

— not designed for continuous occupancy.

13.3 Common Examples of Confined Spaces at Service Stations

The more common examples of confined spaces at service stations include the following:

— sumps/pits on top of underground storage tanks,

— sewer manholes,

— inside of storage tanks (underground or above ground),

— storm water management systems,

— trenches and/or excavations,

— oil-water separators,

— waste lift stations or any other water or waste handling systems large enough for human entry,

— crawl spaces associated with buildings and signage.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

13.4 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 sample multi-permit form is provided in Annex A.6. Only a person who has received confined space entry training should be allowed to determine the classifications of confined spaces.

13.4.1 Permit-required Confined Space (Permit Space)

A permit-required confined space is used to describe a confined space that has one or more of the following characteristics:

— contains or has a potential (likelihood) to contain a hazardous atmosphere;

— 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.

A tank top sump or pit on an underground tank is a confined space. It may be classified as a permit-required confined space if the above conditions apply (e.g. tank contains gasoline).

The nature of the work to be performed in the confined space may also create a hazardous atmosphere meeting the requirements of a permit-required confined space (e.g. welding or the use of solvents). The work may also meet the requirements of Hot Work, so refer to Section 15 for more guidance.

13.4.2 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, Annex A.6).

A potential example of non-permit confined space is a newly constructed tank top sump in which no fuel has been introduced to the underground storage tank.

13.4.3 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 quantity of flammable gas,

— low oxygen concentrations (less than 19.5 %),

— levels of toxic substances exceeding permissible exposure limits.

13.5 Barricading/Isolating/Protecting the Work Area

Before beginning work, barricade the work area to prevent unauthorized persons and vehicles from entering. Signage shall also be posted to indicate the work area is a permit required confined space.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

13.6 Atmospheric Testing

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 and authorized to test in hazardous atmosphere conditions. Atmospheric testing shall be performed with a LEL meter and the following observed.

— Workers performing gas testing shall calibrate the testing equipment according to manufacturer's instructions. Calibration shall be documented properly and maintained as per the equipment manufacturer and/or the contractor procedures.

— Gas testing equipment shall be checked and bump tested daily.

— A log of all calibrations, bump tests, and atmospheric testing shall be kept by the authorized gas tester and available for review.

— The atmosphere shall be tested initially and continuously as long as a person is to enter the confined space area.

— Atmospheric testing shall indicate an oxygen reading between 19.5 % and 23.5 %. Any reading outside of this range shall prompt the immediate removal of all people in the confined space, unless breathing apparatus are worn.

— Any readings on a LEL meter equal to or greater than 10 % shall prompt the immediate removal of all people in the confined space.

— Any readings of other tested toxins outside the acceptable testing range shall prompt the immediate removal of all people in the confined space.

To ensure worker and customer safety, it is highly recommended that continuous gas monitoring be required when any worker is in a permit-required confined space.

13.7 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 retested to ensure that the supply of air from the ventilation unit has not introduced any additional hazards into the space.

13.8 Assignment Duties

For construction sites or existing retail service stations, 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 four general assignments for confined space entries:

— entry supervisor,

— authorized entrant,

— attendant, and

— gas tester.

A minimum of two people are required for these activities. 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.

13.9 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. This includes the following.

— 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.

13.10 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.

13.11 Personal Protective Equipment

For all confined space entries, removal of the authorized entrant in emergency situations must be planned and prepared for prior to entry. Site specific rescue procedures and contact numbers shall be documented and in place prior to the start of work.

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit-required confined space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. The retrieval system shall include a chest or full body harness with a retrieval line attached at the center of the entrant's back and near shoulder level, above the entrant's head, or in such a way to present a small enough profile for successful removal of the entrant. The retrieval line shall be attached to a fixed point outside the space or to a mechanical device. While OSHA states vertical entries more than 1.5 m (5 ft) in depth shall use a mechanical device, such as a retrieval winch or mechanical advantage rope system, it is recommended that a mechanical device be used for all confined space entries greater than 1.2 m (4 ft) in depth at retail petroleum/ convenience facilities.

An example of a common retrieval system is a tripod specifically designed and certified as a personal retrieval device, and attached to a properly sized and fitted full body harness worn by the entrant.

Refer to Section 5 for basic PPE requirements.

13.12 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;

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— atmospheric testing procedures;

— personal protective equipment, monitoring equipment, and ventilation equipment;

— rescue procedures;

— assigned duties;

— hands-on practice simulations of rescue procedures.

13.13 References

OSHA (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1926 Subpart AA

29 *CFR* 1926 Subpart P

29 *CFR* 1910.146

14 Lockout–tagout

14.1 General

Equipment and machinery must be made safe prior to performing any maintenance or service work. This includes controlling the potential hazardous energies that can exist within or around the equipment. The practices and procedures that must be followed to help ensure the potential hazardous energies have been controlled are collectively called "Lockout-tagout".

Lockout is used to prevent the release of hazardous energy or to prevent the hazardous energy from escaping. Tagout is to be used in conjunction with lockout to clearly label that a specific device is not in operation.

The third step, after lockout and tagout, is often overlooked, but is equally important. The third step is called "Test", which is to confirm the lockout has isolated and rendered the equipment inoperative.

14.2 Energy Sources

An energy source is any source of electrical, mechanical, potential, hydraulic, pneumatic, chemical, thermal, or any other type of energy. The primary source of energy that must be addressed is electrical. But additional sources of energy can exist within equipment or machinery at service stations, including pneumatic and hydraulic.

There could be situations in which multiple energy sources may need to be locked out and tagged out. For example, a dispenser filter replacement may need a lockout and tagout of both electrical and mechanical energy. A car wash repair might require lockout and tagout on electrical, mechanical and hydraulic energy. All energy sources should be identified and addressed prior to initiating any work.

14.3 Roles and Responsibilities

— 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.

— Authorized Employee: An authorized employee is a worker with specialized training 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.

14.4 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.

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

14.5 Lockout and Tagout Devices

14.5.1 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).

14.5.2 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 23 kg (50 lb) such as a nylon cable tie.

14.6 Lockout–tagout Procedures

Before starting maintenance or construction activities, equipment with hazardous energy shall be de-energized through the use of lockout devices. Every effort should be made to install a lockout device. If equipment is not capable of being locked out, then additional forms of communication should be implemented to help ensure all workers are aware. Verbal communication, along with the sufficient use of tagout devices should be performed. Tagouts shall not be used during construction as the sole means of energy isolation.

14.6.1 Applying Locks and Tags

Locks and tags should 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 should affix their own lock to the energy isolation device. If necessary, multi-lock hasps should be used to hold one lock per affected employee, such that all locks shall be removed before energy may be restored. Also refer to the OSHA guidelines for group lock procedures.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

14.6.2 Testing De-energized 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.

Exposed conductors should be treated as live until the isolation has been verified by a qualified electrician wearing appropriate PPE.

14.6.3 Removing Locks and Tags

Lockout locks and tags shall only be removed by the persons who applied them. Only under exceptional circumstances can the lock(s) and/or tag(s) 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 lockout-tagout.

— 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.

14.7 Training and Communications

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 Annex A.6 may be useful in meeting this requirement.

NOTE Additional information and training on lockout and tagout can be found in NFPA 70E, *Standard for Electrical Safety in the Workplace*. NFPA 70E covers electrical safety requirements for employees. NFPA is known for its sponsorship of the National Electrical Code (NFPA 70).

14.8 References

OSHA (The references below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1910.147, *Control of Hazardous Energy*

29 *CFR* 1926.417, *Lockout and Tagging of Circuits*

NFPA 70E, *Standard for Electrical Safety in the Workplace*

15 Hot Work

15.1 General

Hot Work is defined as any work that will generate sufficient thermal energy to ignite combustible and/or flammable materials.

There are two types of Hot Work.

— Work with a continuous/uncontrolled heat source capable of igniting flammable materials. Examples of this type of Hot Work include burning, welding, grinding, power drilling, groundwater monitoring well installation and drilling, or similar activities.

— Work with a potential to create a spark. Examples of this type of Hot Work include battery-powered equipment, such as electrical test equipment and cordless drills; air-powered equipment that may generate a friction spark; and opening live electrical equipment in a classified hazardous area.

All Hot Work at service stations should be avoided, if at all possible. Finding the most appropriate location is critical if Hot Work must be performed at a service station. All Hot Work must be thoroughly risk assessed and JSAs must be on site. Risk assessment must confirm that other options not using Hot Work have been considered and ruled out.

15.2 Definitions

Below are some key definitions that are important in understanding Hot Work risks and requirements.

15.2.1 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, and

— some sort of fuel or combustible material.

This is depicted in what is called a "Fire Triangle" (see Figure 3). Remove any of the three elements/pieces of the triangle, or otherwise disrupt the chain reaction, and a fire cannot occur.

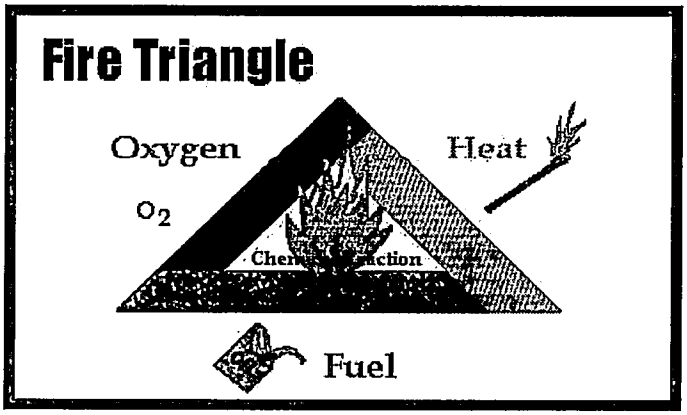


Figure 3—Fire Triangle

15.2.2 Intrinsically Safe: a device which will limit the energy available in the hazardous location to a level such that ignition of the flammable atmosphere could not occur. Intrinsically safe devices will typically be marked as such. If not marked or identified, then assume the device is not intrinsically safe.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

15.2.3 Non-intrinsically Safe Equipment: equipment that does not produce a spark or flame outside the equipment as part of its normal operation. However, the potential difference between the ends of an insulator is sufficient to cause a spark discharge through or over the insulator.

(Examples are battery-powered equipment such as electrical test equipment, cordless drills, and scissor lifts; air-powered equipment that may generate a friction spark; opening live electrical equipment in a classified hazardous area; cell phones; and cameras.)

15.2.4 Static: static electricity can produce sparking. Static electricity can be avoided by using recognized earthing and equipotential bonding techniques (i.e. equalizing electrical potential). Electrostatic discharge in flammable or explosive atmospheres is known to cause fires.

NOTE Refer to API 2003 for additional information.

15.2.5 LEL: Lower Explosive Limit. Lowest concentration (percentage) of a gas or vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat). (Hot Work should never proceed unless the LEL is 10 % or less as dictated by the Hot Work Permit).

15.2.6 LEL Meter: an instrument used to detect various flammable gases and vapors; sometimes referred to as a "combustible gas detector".

15.2.7 Bump Test: functional test which involves exposing a detector to a gas concentration that exceeds the unit's alarm set-points, testing the sensor's ability to respond.

15.3 Hot Work Requirements

Detailed Hot Work requirements can be found in NFPA 51B. The requirements of NFPA 51B are herein incorporated by reference.

No Hot Work may begin within a 10.5 m (35 ft) radius of any fueling system component where petroleum vapors may collect, or where any other combustible materials may exist, or in a classified hazardous area, without the following:

- A full evaluation of the hazards and the completion of a Job Safety Analysis by a competent person.
- Removal or isolation (covering and protecting) of combustible materials and fueling equipment.
  - Work should be moved away from any below ground pits or sewer openings. If relocation is not possible, then all pits and sewer opening should be properly covered.
- Atmospheric testing with a LEL meter to confirm the environment is safe for the work to begin.
- The presence of a Fire Watch, who must remain on site for 30 minutes after completion of the Hot Work operation.
- A 9 kg (20 lb) ABC fire extinguisher must be readily accessible to the Fire Watch
- Issuance of a Hot Work permit.

While all of the above requirements specified in NFPA 51B may not be necessary when working with certain non-intrinsically safe devices, contractors must ensure that the environment is safe prior to undertaking any task that has the potential to generate sufficient heat and sparks to start a fire.

In a classified hazardous area, atmospheric testing with a LEL meter must be performed by a competent person prior to using any non-intrinsically safe device.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

NOTE All of the above requirements are minimum requirements. Certain operators/customers may have more stringent requirements, or additional controls may need to be put in place based on the work scope and site conditions after a careful evaluation of the hazards by a competent person.

15.4 Employee Training

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

— PPE requirements including, as required, fire-rated clothing and face protection;

— 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.

15.5 Fire Watch

15.5.1 Requirements 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 of fire hazards. At a minimum, one 9 kg (20 lb) or two 4.5 kg (10 lb) 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 10.5 m (35 ft) 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.

15.5.2 Duties of a Fire Watch

The fundamental duties of the Fire Watch include the following.

— Understanding the location and nature of the Hot Work.

— Remaining in the area while the work is being performed and remaining in constant communication range with person(s) doing the Hot Work (never leave the work area for any reason without a replacement).

— Remaining at the location for a minimum of 30 minutes after the Hot Work has concluded to ensure a fire does not occur.

— When walls are involved, a Fire Watch is required for each side of the wall.

— The Fire Watch is required 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 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(s) in position prior to the start of work. The fire

Copyrighted material licensed to Michael Zubel on 2021-05-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

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.

— If there is not a separate designated gas tester, the Fire Watch (if trained as a gas tester) shall continuously or periodically (as dictated by the work permit) survey the area with a direct-reading LEL meter to ensure the work area is suitable for Hot Work. The work shall stop immediately if the LEL meter registers 10 % or greater in the atmosphere. The Fire Watch shall record LEL levels on the work permit at the frequency dictated by the permit.

— The Fire Watch shall be equipped with and shall wear the personal protective equipment needed to perform the work safely, such as appropriately rated fire resistant clothing and properly shaded goggles for working with welders.

15.6 Atmospheric Testing

15.6.1 Atmospheric Testing Requirements

Atmospheric testing shall be performed with a LEL meter as part of any Hot Work task.

— The worker responsible for gas testing and recording results shall be stipulated on the Hot Work Permit.

— Workers performing gas testing shall calibrate the LEL meter according to manufacturer's instructions. Calibration shall be documented properly and maintained as per the equipment manufacturer and/or the contractor procedures.

— Gas testing equipment shall be checked and bump tested daily.

— For all Hot Work, the atmosphere shall be tested initially and periodically as conditions require and as stipulated on the Hot Work Permit.

— LEL shall never exceed 10 %.

  — If LEL is greater than 10 %, Hot Work may not proceed, or if ongoing, shall be shut down immediately.

— LEL readings and other combustible gas readings, as required, shall be recorded at the required intervals on the Hot Work Permit.

To ensure worker and customer safety, it is highly recommended that continuous gas monitoring be required when Hot Work or work with non-intrinsically safe devices is performed in classified hazardous areas.

15.6.2 NFPA 30A Classified Hazardous Areas

NFPA 30A, incorporated by reference, includes the following locations within service stations as Class I, division 2 (including division 1, where vapors COULD be present) hazardous areas:

— within a 6 m (20 ft) radius of the fuel dispenser,

— within a 4.5 m (15 ft) radius of the tank fill pipe,

— within a 1.5 m (5 ft) radius of the tank vent.

NOTE The areas mentioned above are only a partial listing of classified hazardous areas that are most typically present at service stations. Please refer to NFPA 30A for details on additional hazardous areas.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

15.7 Hot Work Permit

15.7.1 General

A Hot Work Permit shall be completed for any Hot Work.

15.7.2 Hot Work Permit Writer

Duties of the Hot Work Permit writes are as follows.

— The Permit Writer shall be competent and know the hazards of the specific Hot Work task.

— The Permit Writer will complete the Hot Work Permit and review all permit conditions with any personnel performing the Hot Work. Any special conditions shall be noted on the permit and discussed with affected personnel.

— Before beginning the Hot Work permit process, the Permit Writer shall discuss the work with the site manager to ensure that the operators of the site are aware of the work to be done.

— The 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 Permit Writer shall perform a visual inspection of the work area and know the locations and properties of all flammable and combustible materials. SDSs are good resources for determining the properties of these materials. Items to check include the following.

  — 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.

  — Fueling system components within 10.5 m (35 ft) of the Hot Work operation shall be shielded with listed (ANSI 4950) fire resistant blankets or fire curtains during the operation.

  — Combustible materials within 10.5 m (35 ft) of the Hot Work operation that cannot be removed shall be shielded with listed fire resistant blankets or fire curtains during the operation. (Do not overlook landscaping materials and convenience store items when assessing work location and required precautions.)

  — Floor openings, gratings, wall openings or open ductwork that could allow sparks from the Hot Work to be carried into another area must be covered or isolated.

  — Drain covers within 15 m (50 ft) of the Hot Work site should be covered with a fire resistant blanket, or other suitable fire resistant material, to form a seal across the whole opening to prevent the escape of flammable vapors from the drainage systems and the entry of sparks into the drain. Sand should be used to seal the blanket edges.

— The Permit Writer shall verify by checking that the permit is complete, including testing of specified equipment and that PPE is in place, before endorsing the permit. The permit shall be posted in a prominent location before beginning Hot Work.

— The Permit Writer shall terminate the permit when the work is complete or when conditions not allowed under the permit arise.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

— The Permit Writer shall determine at periodic intervals that acceptable Hot Work conditions are maintained.

15.8 References

NFPA

51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2014 Edition.

30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*

OSHA (The reference below may be obtained at OSHA's website: http://www.osha.gov/index.html.)

29 *CFR* 1926.352

API

RP 2003, *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*

16 Underground Storage Tanks

16.1 General Requirements

16.1.1 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.

16.1.2 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 5 for more information.

16.1.3 Safety Around Storage Tanks in Excavations

16.1.3.1 Entering Excavations

See Section 11 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.

16.1.3.2 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 1.8 m (6 ft) or greater without taking proper fall protection measures. Workers shall never be on top of a UST while it is being hoisted, set, or otherwise moved.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

16.1.3.3 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.

16.1.4 Atmospheric Hazards of Gasoline Vapors

Gasoline can present common atmospheric hazards. Each of these types of hazards is readily detected by air testing meters.

16.1.4.1 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.

16.1.4.2 Oxygen Depleted/Rich Atmospheres

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

16.1.4.3 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 and local requirements.

16.1.4.4 Buildup of Vapor

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

— sumps and manways,

— 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.

16.1.5 Corrosion Prevention

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

16.1.5.1 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

16.1.5.2 Cathodic Protection

Cathodic protection consists of sacrificial pieces of 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).

16.1.5.3 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.

16.2 Storage Tank Installation Activities

16.2.1 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 and 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 ensure 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 may also be installed by other approved methods (e.g. ballasting), as authorized by the tank manufacturer. 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.

16.2.1.1 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.

16.3 Storage Tank Removal Activities

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

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

16.3.1.1 Inerting

Inerting removes the oxygen in a hazardous atmosphere by replacing it with a gas that does not support combustion (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 sustain combustion or to support life. Therefore, inerted spaces shall never be entered by workers.

16.3.1.2 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.

16.3.1.3 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. 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.

16.3.2 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. Activities that physically affect a UST should not begin until the atmosphere inside the tank has proven to be safe. This work should be performed 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.

16.3.3 Excavating a Tank

Many activities must be performed prior to excavating an underground tank, and these activities can create safety risks. Some of the key sections that should be reviewed prior to tank excavation include Section 11, Section 12, Section 13, and Section 15. Also, API RP 1604 can be used as another reference.

The underground storage tank and other components may have an installed impressed current corrosion protection system. Care should be taken not to damage or remove any wiring until it is clear that all components are to be removed and/or replaced. The impressed current system should remain on and active prior to the excavation.

16.3.4 Working on Tanks After They Have Been Removed from an Excavation

16.3.4.1 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

16.3.4.2 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.

16.4 Storage Tank Maintenance/Upgrade Activities

16.4.1 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.

16.4.1.1 Moving Sensors Prohibited

In many jurisdictions specific positioning and operational condition of the sensors is a legal requirement for operating a fueling system. Generally speaking, liquid sensing devices should be securely positioned within 25 mm (1 in.) of the bottom of the containment sump designed to collect these liquids.

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.

16.4.2 Corrosion Considerations

16.4.2.1 Working Around Corrosion Protection Systems

Impressed current cathodic protection systems should be identified prior to retrofit work to help ensure that any saw cutting or excavation does not disable or disturb any buried cabling.

Impressed current cathodic protection systems should be left operational during retrofit work or testing procedures.

Avoid removing any grounding wires connected to risers while impressed current is applied. A sparking hazard is present and may ignite a hazardous atmosphere.

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

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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

16.4.2.2 Microbial Induced Corrosion

Small amounts of water in the bottom of steel tanks, along with the changes in fuel blends, can lead to internal corrosion, referred to as "microbial induced corrosion" Care should be given when performing maintenance and testing of steel tanks to help ensure internal damage is minimized.

16.4.3 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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Annex A
(informative)

Forms

A.1 General

The following forms are provided as examples and samples only. Prior to using any generic form or checklist, it should be reviewed and modified as necessary. The use of forms and checklists is recommended, but each contractor and/or worker should properly assess the risks of the work to be performed and develop the appropriate forms and checklists for the task at hand.

A.2 Driving Safety (Refer to Section 7)

Table A.1—Periodic Vehicle Inspection

Inspect the following items monthly or at 8064 km (5000 mi) intervals, whichever comes first	
Check that the following external lights and reflectors are clean and functional:	Yes/No
Headlights (high and low beams)	
Tail lights and brake lights	
Turn signals	
Four-way emergency flashers	
Test that dash indicators work when corresponding lights are turned on:	
Left and right turn signals	
Four-way emergency flashers	
High beam headlights	
Tire inflation: Check for proper inflation using a tire gauge	
Tire tread depth: Check for minimum tread depth per tire following manufacturer's recommendations; if manufacturer's recommendations are unknown, minimum is 1/8" on all tires	
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	
Oil, brake fluid, power steering fluid, and transmission fluid levels shall measure above "add" mark on dip stick	
Windshield wipers: Check that wiper arms and blades are secure, not damaged, and operate smoothly	
Windshield washer: Fluid filled and operating correctly	
Inspect parking brake for proper operation	
Battery connections do not show signs of excessive corrosion; where provided, check battery maintenance indicator	
Check ALL belts for snugness (up to 3/4" inch play at center of belt), cracks, or frays	

Table A.2—Vehicle Daily Pre-trip Checklist

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 visual obstructions.
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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

A.3 Hot Work (Refer to Section 15)

HOT WORK CHECKLIST

Date _____ Time _____

Name of Person(s) Performing Work

_____

Specific Location of Work _____ Duration of Permit _____

Yes	No	
___	___	Cutting or welding permitted in an area that has been made fire safe.
___	___	All movable fire hazards in the vicinity have been taken to a safe place.
___	___	Guards used to contain the heat, sparks and slag if fire hazards cannot be removed.
___	___	Floor or wall openings or cracks, open doorways and windows protected or closed.
___	___	Fire extinguisher available for instant use.
___	___	Fire watch in areas where other than a minor fire might develop such as around combustible material.
___	___	Floors swept clean of combustible material for a radius of 10.5 m (35 ft).
___	___	Combustible floors have been kept wet, covered with damp sand or protected by fire resistant shields.
___	___	Welding/cutting done only in areas authorized by management. No welding/cutting in sprinkled building when sprinkler system is impaired or in presence of explosive atmosphere, or in area of storage of readily ignitable material.
___	___	Dusts and conveyor systems that might carry sparks to distant combustibles protected or shutdown.
___	___	Cutter/welder is trained in safe operation of equipment and the safe use of the process.
___	___	Any on-site contractors advised about flammable material or hazardous conditions of which they may not be aware.
___ ___	___ ___	Welding or cutting containers: Container thoroughly cleaned and ventilated; Any pipe lines or connections to containers disconnected or blanked.
___	___	PPE used as needed, e.g. eye protection, helmet, protective clothing, respirator, gloves.
___	___	Warning sign posted to warn other workers of hot metal.
___	___	Appropriate ventilation provided.
___	___	When working in confined spaces a permit must be issued for this as well.

_____

Authorized Signature

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

A.4 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 #	Station Address:	Work Order Number:	Date:

Contractor Company Name:	Contractor person in charge (print name):	Number of Workers:	JSA Reference Number: (if required)	Start Time:	End Time:	Labor:	Travel Time:	Travel Distance:

Problem/Work Description:

Return Call: yes / no

Damage Claim: yes / no

PPE REQUIRED (CHECK AND/OR FILL BLANK SPACE)

☐ SAFETY VEST ☐ HARD HAT ☐ SHOES & BOOTS ☐ HEARING PROTECTION ☐ RESPIRATOR

☐ PROTECTIVE CLOTHING ☐ GLOVES ☐ SAFETY GLASSES/GOGGLES ☐ WELDING PPE ☐ 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)

TASK STEP	Hazards not covered by JSA	How to reduce or eliminate risk - Include PPE to be Worn

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
- ☐ Work in confined spaces (e.g. tank, interceptor or deep manhole entry)
- ☐ Hot work with risk of product or vapour ignition
- ☐ LPG system degassing, installation or maintenance

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

Contractor representative name	Signature

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?
- ...

Site representative name	Signature
I have discussed job clearance form with contractor	

SIGN OUT AND OPERATOR VERIFICATION OF WORK

GENERAL SAFETY CHECKS

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

Contractor signature

Site representative name	Signature

Site representative comments

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.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

A.5 Daily Site Safety Record

SITE: (*site name*)	**DAILY SITE SAFETY RECORD** SITE REGISTER OF EVERYBODY ENTERING SITE	*contractor logo*

DATE:

1

COMPANY NAME	LAST NAME, FIRST NAME	Type of work performed/ Reason for visit	Time in	Time out	Visitor Signature (*)	JSA Reviewed/checklists completed (Site Supervisor Initials for Acknowledgement)	Attended today's Toolbox Meeting (Site Supervisor Initials for Acknowledgement)

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

Copyrighted material Licensed to Michael Zubel on 2021-09-15 for Licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

SITE: (*site name*)	**DAILY SITE SAFETY RECORD**	*(main contractor logo)*

DATE:

2

Start Work Discussion held by:

(Work to be performed during the day. Are there 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" and what may have happened.)

Safety Toolbox discussion topics (See log attendance on page 1.)

Notes and action points

Reviewed by: Signed Date

Site Foreman

Other

Other

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

A.6 Permit to Work Multi-use Form

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.		1.	2.
		3.	4.
		5.	6.
7.	8.	9.	10.
Person In Charge:	Date:	Location	
Work Order #:	Equipment ID:	Time Issued:	am/pm
Nearest Medical Facility and Phone #:		Time expires:	am/pm
Emergency/Rescue Phone #:			

REQUIRED PERMITS AND/OR PROCEDURES

☐ Hot Work	☐ Excavation Checklist	☐ Lockout Tagout	☐ Pre Entry Checklist	☐ Confined Space
☐ One Call	☐ Hoisting/Rigging	☐ Management of Change	☐ Work Notification	☐ Other

HOT WORK PERMIT—API 1646 Section 15

Category of Work: ☐ Welding ☐ Cutting ☐ Drilling ☐ Grinding ☐ Sandblasting ☐ Other	Describe:_____
Which of the following special precautions are required? Check all that apply: ☐ Inspect Excavation ☐ Adequate Bonding ☐ Local Rectifiers Off ☐ Lockout Tagout ☐ Fuel Delivery ☐ Hydrocarbon Soils Nearby ☐ Vent Stacks ☐ Other Vapor Hazards (list):	

Atmospheric Tests:	O_2:	% LEL:	Toxicity (H_2S):
Job Control Contact Name:		Fire Watch Name (if applicable)	

HAZARDOUS ENERGY LOCKOUT TAGOUT (LOTO)—API 1646 Section 14

	YES	NO	N/A
Has the piece of equipment or system been properly isolated?	☐	☐	☐
Has the energy isolation been reviewed by all affected employees?	☐	☐	☐

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

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

PERMIT TO WORK for Petroleum/Convenience Sites (Continued)

GROUND DISTURBANCE AND EXCAVATION—API 1646 Section 11

Has "One Call" performed utility mark outs?	YES ☐	NO ☐	**One Call Dig Number:**
Has a line locating service marked out utilities on site?	☐	☐	**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:_____ **(if > 4 ft also complete pre-entry/reclassification Permit)**		Length:_____	Width:_____	Depth:_____
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	

	YES	NO		YES	NO
Are employees kept out of and/or away from the excavation during digging or material handling?	☐	☐	Evidence of significant fracture planes in soil or rock?	☐	☐
Have proper notifications been made?	☐	☐	Any area of unusually weak soils or materials?	☐	☐
Is there an exit or entry point within 25 feet of each worker?	☐	☐	Any noted dramatic dip in bedrock?	☐	☐
Soils, tools, equipment >2 feet from excavation edge?	☐	☐	Short-term excavation (<24 hours)?	☐	☐
Are barricades/flagging in place?	☐	☐	Trench box(es) certified?	☐	☐
Is high visibility clothing being properly worn?	☐	☐	Tension cracks observed along slope top?	☐	☐
Utilities or structures protected?	☐	☐	Hydraulic shore pumped to design pressure?	☐	☐
Underground lines exposed?	☐	☐	Any water seepage in excavation walls or bottom?	☐	☐
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:

MECHANICAL HOISTING AND LIFTING—API 1646 Section 12

	YES	NO		N/A	YES	NO
Has the Lift Plan been completed by a competent person?	☐	☐	Does the equipment have the size, load, and swing capacity to do the job safely?		☐	☐
Air or hydraulic systems inspected for deterioration or leakage in lines, tanks, valves, drain pumps, etc.?	☐	☐	Toolbox discussion conducted & lift plan communicated to all affected personnel?		☐	☐
Hooks, hoist chains, and end connections checked for signs of wear, twist, cracks, distorted links, or excessive stretch?	☐	☐	Are outriggers set before hoisting operations begin?	☐	☐	☐
Has rigging been performed by a competent person?	☐	☐	Is proper cribbing being used?	☐	☐	☐
Is the hoisting equipment sitting on a stable surface?	☐	☐	Overhead risks evaluated as part of the lift plan?	☐	☐	☐
Is work area properly barricaded/isolated?	☐	☐	Is the operator certified for the equipment?		☐	☐
Has the hoisting equipment been inspected before use?	☐	☐	Are periodic inspections complete and documented?		☐	☐

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

PERMIT TO WORK for Petroleum/Convenience Sites (Continued)

CONFINED SPACE PRE-ENTRY CHECKLIST/RECLASSIFICATION—API 1646 Section 13

Atmospheric Tests (Pre-isolation & Ventilation)	Time:_____	O_2 (19.5 % to 23.5 %):	% LEL (<10 %):	Toxicity (H_2S, Benzene):	
Source Isolation *(No Entry)*	Electrical LOTO	☐ YES	☐ NO	☐ NA	
	Pumps off and LOTO	☐ YES	☐ NO	☐ NA	
	Lines disconnected	☐ YES	☐ NO	☐ NA	
	Valves shut and LOTO	☐ YES	☐ NO	☐ NA	

NOTE: If any "NO" box is checked above, fill out "Confined Space Entry Permit" section. If all "YES" or "NA," continue on.

Atmosphere Ventilation	Mechanical Forced Air	☐ YES	☐ NO	☐ NA
	Natural Ventilation Only	☐ YES	☐ NO	☐ NA
Atmospheric Tests (Post-Isolation and Ventilation)	Time:_____	O_2 (19.5 % to 23.5%):_____	% LEL (<10%):_____	Toxicity (H_2S, benzene):_____

Pre-entry Check-list	Surrounding area free of hazards?	☐ YES	☐ NO	☐ NA
	Proper notifications made?	☐ YES	☐ NO	☐ NA
	Does your knowledge indicate the area will remain free of all atmospheric hazards?	☐ YES	☐ NO	☐ NA
	Are you trained in confined space entry?	☐ YES	☐ NO	☐ NA
	Are you trained in the operation of the air monitor used?	☐ YES	☐ NO	☐ NA
	Has the monitor been calibrated before use?	☐ YES	☐ NO	☐ NA
	Did you test the atmosphere in the space before entry?	☐ YES	☐ NO	☐ NA
	Did the atmosphere check as acceptable?	☐ YES	☐ NO	☐ NA
	Will the atmosphere be continuously monitored?	☐ YES	☐ NO	☐ NA
	NOTE: IF ANY OF THE ABOVE ANSWERS ARE *"NO"*, DO NOT ENTER			

CONFINED SPACE ENTRY PERMIT—API 1646 Section 13

Purpose of Entry:			Entry Supervisor:	
Attendants:	1.	2.	Entrants: 1.	2.
	3.	4.	3.	4.

Pre-entry Checks:	☐ LOTO	☐ Emergency Rescue Plan	☐ Secure Area	☐ Ventilation
	☐ PPE	☐ Lines Isolated/blocked	☐ Respirators	☐ Fire Extinguisher
	☐ Purge	☐ Hot Work Permit	☐ Communication System	☐ Lighting
	☐ PPE	☐ Lines Isolated/blocked	☐ Respirators	☐ Fire Extinguisher

Minimum Requirements To Be Completed & Reviewed Before Entry

	Test	PEL	Initials	Time:	Time:	Time:	Time:	Time:
Continuous atmosphere Monitoring: (Record at least every 30 minutes)	Oxygen	19.5% to 23.5%		Value:	Value:	Value:	Value:	Value:
	LEL	10 %		Value:	Value:	Value:	Value:	Value:
	H_2S	<10 PPM		Value:	Value:	Value:	Value:	Value:
	Other			Value:	Value:	Value:	Value:	Value:

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:

Copyrighted material licensed to Michael Zubel on 2021-09-15 for licensee's use only.
No further reproduction or networking is permitted. Distributed by Techstreet LLC, www.techstreet.com.

1220 L Street, NW
Washington, DC 20005-4070
USA

202.682.8000

Additional copies are available through Techstreet
Email Address: techstreet.service@clarivate.com
Online Orders: www.techstreet.com

Information about API Publications, Programs and Services
is available on the web at **www.api.org**

Product No. A164602