

2019



CAL MARITIME

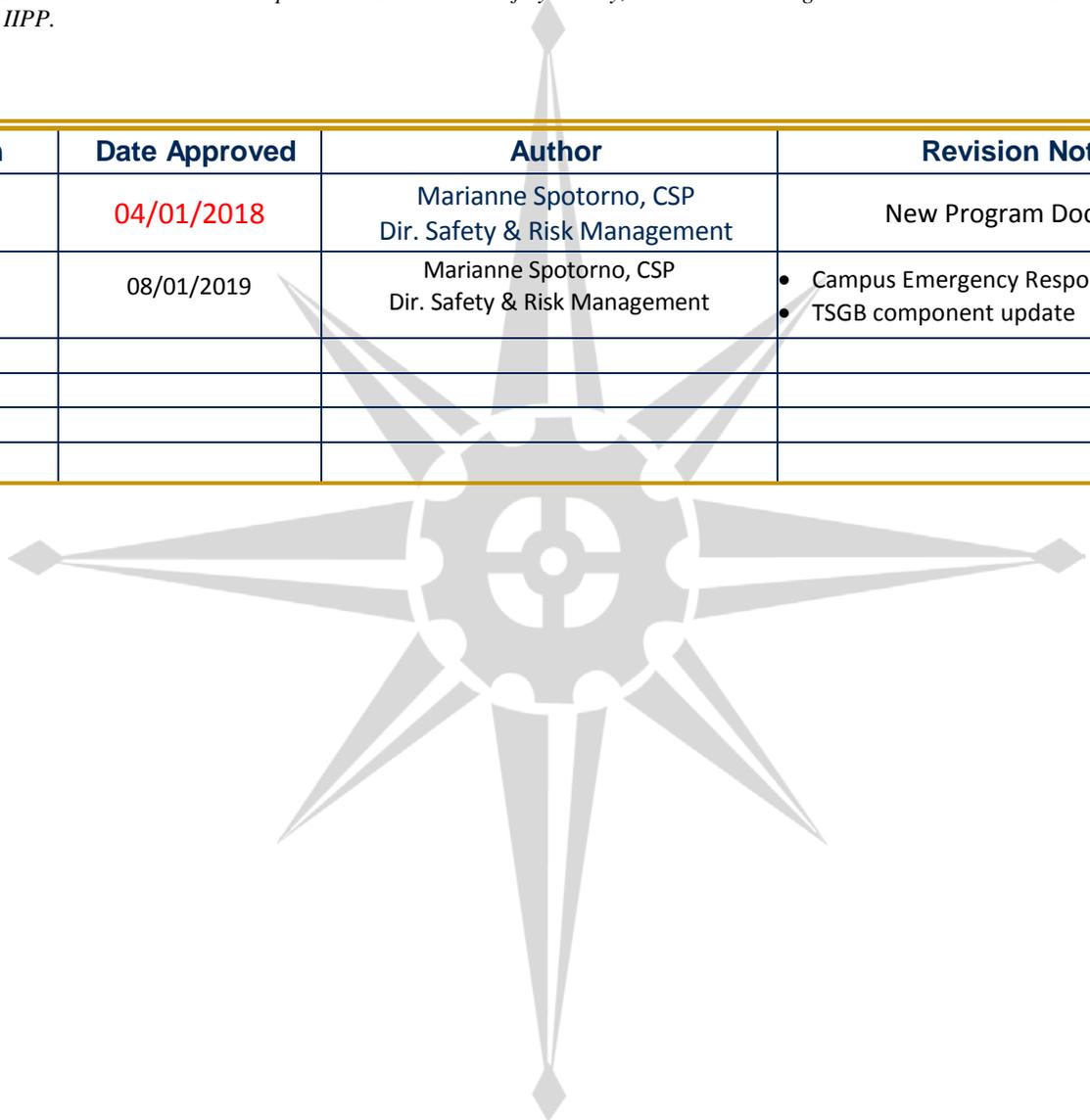


Compressed Gas Safety Plan

INJURY ILLNESS PREVENTION PROGRAM

This sheet should be completed each time the **Compressed Gas Safety Plan** is reviewed and/or modified. The Director of Safety and Risk Management is responsible for the review and update this document annually or more frequently as determined or needed per CSU Chancellor's Executive Order 1039 Occupational Health and Safety Policy, 1069 Risk Management as well as Cal Maritime A&F Policy 09-004 IIPP.

Version	Date Approved	Author	Revision Notes:
1.0	04/01/2018	Marianne Spotorno, CSP Dir. Safety & Risk Management	New Program Document
2.0	08/01/2019	Marianne Spotorno, CSP Dir. Safety & Risk Management	<ul style="list-style-type: none"> • Campus Emergency Response update. • TSGB component update



											
Risk Management	Transportation	Personal Protective Equipment	Hazardous Materials Management	Ergonomics	Material Handling	Safe Work Practices/Accident Prevention	Working at Heights/Elevated Work	Emergency Response	Controlling Hazardous Energy	Marine/Water Safety	Continuous Improvement / Change Management

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1.0 Purpose & Scope

The purpose of the Injury Illness Prevention Program (IIPP) is to outline Cal Maritime's environmental health and safety requirements, expectations, and responsibilities in order to achieve effective campus safety performance through Integrated Safety Management (ISM). The **Compressed Gas Safety Plan** is a subject specific component that supports the overall University IIPP.

This Manual applies to all Cal Maritime operations, maintenance and construction activities under the supervision of Cal Maritime personnel. For activities associated with the Training Ship Golden Bear (TSGB) refer to the Vessel Operating Manual (VOM) and/or Shoreside Administrative Manual (SAM). The TSGB is a subject specific component that supports the overall University IIPP.

1.1 Regulatory Standards Reference

Cal Maritime and its subcontractors shall comply with the following requirements.

In case of conflict or overlap of the below references, the most stringent provision shall apply.

- Occupational Safety and Health Act (OSHA), 1904, 1910, 1915, 1917, 1918, 1926
- California Code of Regulations (CCR), Title 8, GISO, CSO, ESO
California Regulations
 1. Title 8, California Code of Regulations, Division of Occupational Safety and Health, General Industry Safety Orders
 2. Title 26, California Code of Regulations, Department of Health Services
 3. California Building Code
 4. Title 24 California Fire Code
- Title 8, Section 5155 [Threshold Limit Values \(TLV\) and Immediately Dangerous to Life and Health \(IDLH\) Values](#)
- 2010 California Fire Code

Federal Guidelines

1.2 CSU-System & Cal Maritime Specific Reference

For additional information on Cal Maritime environmental health and safety policies, refer to:

- EO # 1039 Occupational Safety & Health/ Injury Illness Prevention Program
- A&F # 09-004 Injury Illness Prevention Program

1.3 Other Resources

- Gas vendors maintain technical data on a wide range of gases, such as the following:
 - Matheson TriGas - <http://www.mathesongas.com>
 - Scott Specialty Gases - <http://www.scottgas.com>
 - Praxair - <http://www.praxair.com>
- National Institute of Occupational Safety and Health (NIOSH)-Pocket Guide to Chemical Hazards
- American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Values and Biological Exposure Indices
- National Fire Protection Association (NFPA) 45
- [Compressed Gas Association](#)
- [Immediately Dangerous to Life or Health Concentrations](#) (IDLHs), published in 1994, National Institute for Occupational Safety and Health (NIOSH)
- LC50 data: Lowest reported value, 1 hour adjusted, [U.S. Dept. of Transportation](#)
- [Registry of Toxic Effects of Chemical Substances](#), Canadian Centre for Occupational Health & Safety
- [Table AC-1 Permissible Exposure Limits for Chemical Contaminants](#)
- UC Berkeley

2.0 Administrative Duties & Responsibilities

It is the policy of the Cal Maritime to maintain a safe and healthy work environment for each employee (including student and contract employees), and to comply with all applicable occupational health and safety regulations. This Injury and Illness Prevention Program (IIPP) is intended to establish a framework for identifying and correcting workplace hazards within the department, while addressing legal requirements for a formal, written IIPP.

To assist Cal Maritime in providing a safe, compliant, environmentally sound, and more sustainable operation, each department or operational unit is expected to review, understand, and follow the guidance provided in the Injury Illness Prevention Program components and the and the function of the integrated campus safety management system (ICSMS) as related to operations under their control.

In a proactive behavior based environmental health and safety model that entire campus community participation reflects a process that embraces the ability to;

- Eliminate adverse conditions which may result in injury or illness,
- Recommend the establishment of programs to raise safety consciousness in the community, and
- Achieve and maintain a beneficial relationship through continuing communication on issues relating to environmental health and occupational safety.

2.1 Employees (Including Student workers)

It is the responsibility of all faculty and staff to proactively participate and subsequently comply with all applicable health and safety regulations, Cal Maritime policies, and established safe work practices. This includes, but is not limited to:

- Observing health and safety-related signs, posters, warning signals and directions.
- Learning about the potential hazards of assigned tasks and work areas.
- Taking part in appropriate health and safety training.
- Following all safe operating procedures and precautions.
- Participating in workplace safety inspections
- Using proper personal protective equipment.
- Inform coworkers and supervisors of defective equipment and other workplace hazards without fear of reprisal.
- Reviewing the building emergency plan and assembly area.
- Reporting unsafe conditions immediately to a supervisor, and stopping work if an imminent hazard is presented.

2.2 Department of Safety and Risk Management (SRM)

The Director of Safety and Risk Management (SRM), as delegated by the University President, is responsible for the implementation and administrative management for Cal Maritime’s Injury Illness Prevention Program (IIPP) that meets the requirements of California Code of Regulations (CCR), Title 8, section 3203) as well as other applicable California and Federal Occupational Safety and Health (Cal-OSHA) requirements.

Further responsibilities are outlined below:

- Provide advice and guidance to all university personnel concerning IIPP compliance requirements;
- Provide centralized monitoring of campus activities related to implementation of campus IIPP;
- Ensure scheduled periodic safety inspections are performed in compliance with regulatory requirements and assist management staff in identifying unsafe or unhealthful conditions;
- Ensure safety and health training programs comply with regulatory requirements and university policy;
- Oversee the maintenance of safety and health records consistent with the requirements of this document and regulatory mandates;
- Ensure program audits, both scheduled and as required by a process, equipment or personnel change, or by a safety program mandate, are performed;

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- Interpret existing or pending safety and health legislation and recommend appropriate compliance strategies to university personnel;
- Maintain centralized environmental and employee monitoring records, allowing employee access as directed by law.
- Conduct at least an annual review of this document and make the current revision available on the SRM web site.

2.3 Deans, Directors, Department or Operating Unit Management

Campus Department or Operating Unit Head leadership have an integral campus role and shall have a thorough understanding of Injury Illness Prevention Program components and the function of the integrated campus safety management system (ICSMS) as related to operations under their control.

- The Department Head has primary authority and responsibility to ensure the health and safety of the department's faculty, staff and students through the implementation of the Injury Illness Prevention Program components. This is accomplished by communicating the Cal Maritime's campus emphasis on health and safety, analyzing work procedures for hazard identification and correction, ensuring regular workplace inspections, providing health and safety training, and encouraging prompt employee reporting of health and safety concerns without fear of reprisal.
- Specific areas include employee and student (both student employees and students in academic programs) education and training, identification and correction of unsafe conditions, and record keeping. It is recognized that a substantial amount of responsibility falls at this level.
- Colleges and Departments are encouraged to designate an individual as the College or department safety coordinator, to assist with specific operational environmental health and safety process management components.

2.4 Supervisors and Principal Investigators

Supervisors play a key role in the implementation of the Cal Maritime's Injury Illness Prevention Program components. Supervisors may be Management, Senior Research Associates, Department Chairs, Principal Investigators, or others who oversee a project and/or staff. They are responsible for but not limited to:

- Communicating to their staff and students about Cal Maritime campus's emphasis on health and safety.
- Ensuring periodic, documented inspection of workspaces under their authority.
- Promptly correcting identified hazards.
- Modeling and enforcing safe and healthful work practices.
- Providing appropriate safety training and personal protective equipment.
- Implementing measures to eliminate or control workplace hazards.
- Stopping any employee's work that poses an imminent hazard to either the employee or any other individual.
- Encouraging employees to report health and safety issues without fear of reprisal.

2.5 Academic Programming Faculty and Advisors

It is the responsibility of Faculty, Academic Programming Advisors other Cal Maritime related activities and student clubs to:

- Develop procedures to ensure effective compliance and support of the Injury and Illness Prevention Program components as it relates to operations under their control. Specific areas of responsibility include student education and training, identification and correction of unsafe conditions, and incident reporting.
- Develop and maintain written classroom, laboratory, and activity procedures which conform to regulatory, campus and departmental guidelines.
- Instruct students in the recognition, avoidance, and response to unsafe conditions, including hazards associated with non-routine tasks and emergency operations
- Permit only those persons qualified by education and training to operate potentially hazardous equipment or use hazardous materials, unless under close supervision.
- Supervise students in the performance of activities.

2.6 Students- Cadets

Students are expected to always adhere to safety practices presented by faculty, technical staff, student assistants, graduate assistants or other authorized individuals. They must also report potentially hazardous conditions that become known to them. These reports should be made to their supervisors, faculty advisers, Department of Safety and Risk Management, or other responsible parties.

2.7 Compressed Users

- Is trained on and applies “Safe-Work Rules” for users as outlined in this program.
- Always selects and uses a hand and power tools in a safe manner.
- Visual inspect prior to use.
- Alerts Owner Department Management when hand and/or power tools need repair/replacement.
- Assesses work to determine if fall protection should be worn and seeks alternative access methods instead of hand and/or power tools if need be.
- Proactively use Stop Work Authority when they feel there is an unsafe condition present by means of communicating with Department Management and SRM to work collaboratively to resolve and improve identified or perceived condition.

2.8 Owner Department

- The “Owner Department” is responsible to identify hazards/activities in their workplace and design into locations engineering controls such as guards, barriers, edge protection, etc., to prevent access to a hazard. Only when engineering controls cannot be used/implemented PPE may be used to aid in controlling hazards to personnel in a Department’s operations/facilities.
- The department owning or exposing personnel to hazards is responsible for the selection of the proper equipment based upon a hazard analysis of work tasks. In addition, Owner Departments must provide training to their personnel who use the equipment, keep the records of training completed, and schedule semi-annual inspections of all equipment under their ownership/control.
- Toward this end, the Department owning the equipment must:
- Assign a Safety Program Coordinator to aid in operational program management for the Department.
- Notify SRM when new equipment is purchased so that it can be inspected and added to the JHA and Equipment inventory.
- Schedule with SRM a semi-annual inspection.
- Render unusable and then dispose of any equipment that is in any way questionably safe as determined by the inspector or the person using the equipment.

3.0 Process Management

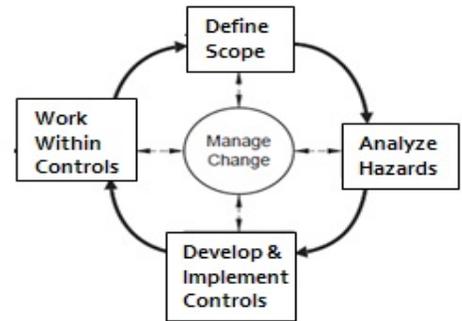
3.1 Hazard Identification, Risk Assessment & Control (HIRAC)

3.1.1 Integrated Safety Management (ISM)

Cal Maritime is committed to having all campus-related work performed safely and in a manner that strives for the highest degree of protection for the Campus Community. To achieve these goals, Cal Maritime implements, the principles of safety through an Integrated Campus Safety Management System (ICSMS).

Simply put, ICSMS applies a plan-do-check-act approach to campus safety management. Five core activities represent the plan-do-check-act approach, and comprise the underlying process for any construction work activity. The five core activities are:

- 1) Define the Scope of Work
- 2) Analyze the Hazards
- 3) Develop and Implement Hazard Controls
- 4) Perform Work Within Controls
- 5) Provide Feedback and Manage Change



The identification and analysis of workplace hazards is part of the pre-work planning process. The goal of this core activity is to ensure that the hazards associated with construction work activities are clearly understood and appropriately managed. All new campus work activities, changes to existing work or introduction of new equipment or processes (which introduce new hazards or increase the hazard level) need to be reviewed to analyze hazards, identify safety standards/requirements, and establish appropriate controls. Safety conditions and requirements need to be formally established and in place before construction work is initiated.

The campus Job Hazards Analysis (JHA) process is the principle method for achieving this.

3.1.2 Hazard Identification, Risk Assessment & Determining Control Table (HIRAC)

The EHS Hazard Identification, Risk Assessment and Determining Control Table (HIRAC) process is used to identify, assess and risk-rank Cal Maritime campus-related activities in order to ensure that Cal Maritime Campus Safety programs, activities and work controls are appropriately addressing construction risks. The initial HIRAC assessment and risk-ranking of campus-related activities was conducted during the third quarter, AY 2016-2017. The HIRAC assessment will be reviewed annually, when new campus-related activities are introduced that create or modify assessed risks, and when worksite observations or accident/incident experience identify previously unrecognized or incorrectly categorized risks.

3.1.3 Application of Hierarchy of Controls

In developing hazard controls and preparing the Job Hazard Analysis submittal, the campus shall select means and methods to mitigate worker exposure to workplace hazards using the Hierarchy of Controls as specified in the American National Standards Institute (ANSI) Z10-2005 Occupational Health and Safety Management Systems.

The campus shall make a good faith effort to analyze each hazard and identify the appropriate control(s) using the following hierarchy:

- Elimination or substitution of the hazards where feasible and appropriate;
- Use of engineering controls where feasible and appropriate;
- Application of work practices and administrative controls that limit worker exposures; and
- Provision and use of personal protective equipment

3.1.4 Job Hazards Analysis (JHA)

For the purposes of this section Job Hazard Analysis (JHA) and Job Safety Analysis (JSA) can be used synonymously. A JHA/JSA can be incorporated into a Pre Task Plan, provided there is a section for employees to review, comment and sign. Core components of the scope of work and relative hazards can be electronically completed ahead of time, provided there is room for current site conditions are able to be readily added as applicable. When the scope or conditions change, the change in work plan should be noted in a different colored pen with employee’s initially that they have been briefed on the change. The Department of Safety and Risk Management will work with individual Departments to develop a master Campus JHA library.

- Each employee scheduled to work in the activities identified below shall receive safety training in those activities prior to working on them.
- Subcontractors shall submit a Job Hazards Analysis (JHA) for those construction activities meeting the requirements for performing JHA (see below). The JHA shall be reviewed and authorized to proceed by the Cal Maritime Department of Safety and Risk Management before work commences.
- Subcontractor shall be responsible for submitting a JHA and work procedures to Cal Maritime Department of Safety and Risk Management for review a minimum of seven days prior to the start of work for most work activities.

3.1.4.1 JHA Requirements

A JHA shall be written based on the following conditions:

- Jobs with the highest injury or illness rates
- Jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents
- Jobs in which one simple human error could lead to a severe accident or injury
- Jobs that are new to your operation or have undergone changes in processes and procedures
- Jobs complex enough to require written instructions.

If not otherwise specified in a particular project specification, the JHA shall be performed in accordance with the OSHA 3071.

JHA processes. In general the JHA will include:

- Description of work phase or activity
- Identification of potential hazards associated with the activity
- Address further hazards revealed by supplemental site information (e.g., site characterization data, as-built drawings) provided by the subcontractors construction manager.
- A list of the Subcontractor’s planned controls to mitigate the identified hazards
- Identification of specialized training required
- Identification of special permits required
- Name of the Subcontractor’s Competent Person(s) responsible for inspecting the activity and ensuring that all proposed safety measures are followed.

3.2 Hazard Assessment

⚠ Note: Each Scope of work will have its own JHA, refer to the JHA Library for more details.

GENERAL HAZARD IDENTIFICATION & CONTROL MEASURES FOR EQUIPMENT USE		
TASK	HAZARD	HAZARD CONTROLS & PROTECTION MEASURES
OPERATION OF COMPRESSED GAS	Transport the full gas cylinder: <ul style="list-style-type: none"> The cylinders may fall off the cart while transporting. 	 <ul style="list-style-type: none"> Never transport a cylinder, even across a room, without the metal cap over the valve. Secure the cylinder to the hand truck with a chain or strap. Use a hand truck or cart to transport cylinders.
	Replace the empty gas cylinder with the full one: <ul style="list-style-type: none"> Gas cylinders may fall over. Gas can leak from open valves. The misplaced washer may cause gas leakage. Dust or left over teflon tape on the cylinder outlet may cause gas leakage. The cylinder may have a pressured leakage. The cylinder may leak slightly. The regulator may misread pressure. Warm areas or direct sunlight may cause pressure increases. The cylinders contains compressed/pressurized gas and can explode. 	<ul style="list-style-type: none"> Restrain the gas cylinder with upper and lower chains to secure to a wall or cylinder stand. Close the valve before taking off the regulator. Check the washer before fitting the regulator. Wipe the outlet with a clean and dry cloth. Seal the cylinder outlet with new teflon tape. Place the regulator on the cylinder and tighten. Open the cylinder valve at <u>low</u> and check for leakage. Stand to the side of the regulator. Select a well-ventilated area to store cylinders. Squirt a soapy solution around the tightened valve-regulator junction to check for leaks. If there is no bubbling then seal is good. Check the regulator for the correct pressure and set if necessary. Select a cool, dry and well-ventilated area to store cylinders. Do not permit a flame or spark to come in contact with the gas cylinder.
	Transport the empty cylinder: <ul style="list-style-type: none"> Empty cylinder may be mistakenly used. 	<ul style="list-style-type: none"> Mark and label the cylinder as "empty" and store at the designated area.

TRAINING REQUIREMENTS

	DO NOT use this equipment unless an instructor or shop supervisor has instructed you in the safe use and operation and has authorized you to operate this equipment.	
✓ IIPP	✓ Dept. Specific	✓ Operators/Owner's Manual
		✓ Other:

PERSONAL PROTECTIVE EQUIPMENT

									
Eye Protection	Foot Protection	Hand Protection	Hearing Protection	Body Protection	Head Protection	Respiratory Protection	Fall Protection	Face Shield	OTHER
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...	When working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, or will protect the affected	When hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns	When exposed to a time weighted average noise level of 85 dBA or higher over an 8 hour work shift.	When exposure to: Intense heat, hot metals, other hot liquids Impacts from materials that can cut, burn Hazardous chemicals Or potentially infectious materials	Where there is a potential for injury to the head from falling objects and/or when there is a risk of impact to head	May be required if removal of contaminants from the air does not fall below permissible exposure level.	When there is a risk of falling from a height greater than 4ft GSO 6ft CSO 6ft MSO When working in confined space	Face shield can be used over the glasses if there is a presence of a lot of flying debris.	

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3.3 Process Management

Compressed Gas Safe Work Practices

All compressed gases present physical hazards due to their high pressure. Inert and non-flammable gases (e.g., nitrogen, helium) may displace air, causing an oxygen-deficient atmosphere that can result in unconsciousness or death. Using corrosive, reactive and toxic gases poses chemical hazards, while flammable gases pose fire and explosion hazards. A gas may have multiple hazards, such as hydrogen chloride, which is both corrosive and toxic.

3.3.1 Safe Use

Follow these guidelines to supplement any department-specific safety information and training.

1. Never use a hammer or wrench to open cylinder valves.
2. Stand to the side of the valve outlet when opening the valve.
3. Never refill cylinders or change their contents.
4. Do not use gas cylinders for any purpose other than transportation and supply of gas.
5. Do not tamper with or attempt to repair or alter cylinders or regulators.
6. Most cylinders have one or more safety-relief devices to prevent rupture of the cylinder if internal pressure builds up to levels exceeding design limits. (Some gases are so toxic that their release through a safety device would be hazardous.) Never tamper with safety-relief devices.
7. Return cylinders to the gas vendor for all repairs. Refer to the manufacturers' recommendations for maintenance.
8. Do not use lubrication of any kind on valve regulators for compatibility issues.
9. Never strike an electric arc on a cylinder. Arc burns can weaken the cylinder.
10. Always secure cylinders with the valve cap, especially when moving them, as they can be projectiles if the valve is damaged.
11. Do not use valve protection cap for lifting the cylinder.
12. If an inert gas cylinder is leaking and the valve can't be closed safely, immediately evacuate, seal off the area, and contact SRM.
13. If a non-inert gas cylinder is leaking and it poses a danger to building occupants, pull the fire alarm and call 911 immediately.



3.4 Special Precautions for Certain Gases

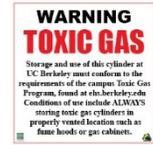
3.4.1 Flammable Gases.

Flammable gases, such as acetylene, butane, ethylene, hydrogen, methylamine and, vinyl chloride can burn or explode under certain conditions. Acetylene and liquefied gases (e.g., propane) must be stored in a valve-end up position unless specifically designed for horizontal use or storage. Before using flammable gases take note of any ignition or heat sources such as open flames, sparks, static electricity or excessive heat. Hydrogen gas can be ignited easily: the flow of gas through tygon tubing can generate static electricity and cause a fire. Refer to the SDS for additional precautions such as grounding.

Many flammable compressed gases are heavier than air. If a cylinder leaks in a poorly ventilated area, these gases can settle and collect in sewers, pits, trenches, basements, or other low areas. The gas trail can spread far from the cylinder, make contact with an ignition source and the fire produced can flash back to the cylinder.

3.4.2 Toxic Gases.

Cal Maritime has special requirements for the use of toxic gases. Examples include ammonia, carbon monoxide, chlorine, and ethylamine. **Before a toxic gas can be purchased, SRM must perform a hazard evaluation and issue a written purchase approval.** The evaluation explains the conditions that must be followed for the gas to be stored and used safely. A fact sheet on the Toxic Gas Program - which lists 48 common toxic gases - can be viewed at the end of this document.



3.4.3 Oxygen and Oxidizing Gases.

Examples of oxidizing gases include oxygen, nitrous oxide, chlorine, and bromine. They can burn and destroy body tissues on contact. Corrosive, oxidizing gases can also attack and corrode metals. Do not permit organic materials such as oil and grease to come in contact with compressed oxidizing gases. Regulators and tubing used with oxidizing gases must be specially cleaned to remove oil and other reducing agents or explosions may occur. Store oxidizing gases in areas constructed of non-combustible and corrosion resistant materials. Follow other storage requirements by checking the reactivity information contained in the SDS.

3.4.4 Corrosive Gases.

Examples of corrosive gases include hydrogen chloride, ammonia and chlorine. Periodically check cylinders to ensure that the valve has not corroded or clogged. If a cylinder or valve is noticeably corroded, the gas vendor should be contacted and the gas vendor's instructions followed.

3.4.5 Dangerously Reactive Gases.

Some pure compressed gases are chemically unstable. Common dangerously reactive gases are acetylene, 1,3-butadiene, methyl acetylene, vinyl chloride, tetrafluoroethylene, and vinyl fluoride. If exposed to slight temperature or pressure increases, or mechanical shock, they can readily undergo chemical reactions and result in fire or explosion. Some dangerously reactive gases have inhibitors to prevent these hazardous reactions.

3.4.6 Pyrophoric Gases.

Pyrophorics are materials that will spontaneously ignite upon exposure to air. These are extremely hazardous and must be handled with great care. Examples of pyrophoric gases are silane, disilane, dichlorosilane, diborane (borane) and phosphine.

3.4.7 Storage of Incompatible Gases.

Keep incompatible gas cylinders (> 1.89 liters or 2.27 Kg in capacity) at least 20 feet apart . A non-combustible partition of not less than 18" above and beyond the sides of the cylinders is required if physical separation is not practical.

3.5 Regulators & Valves

3.5.1 Safe Use of Regulators and Valves

Never attempt to attach a regulator to a cylinder without first receiving hands-on training from a knowledgeable user and reading these guidelines. Always wear approved eye protection and other safety equipment as recommended by the SDS, and make sure the regulator to be used is suitable for the application. Most gas company catalogs give this information for both gases and regulators.

Single-stage pressure regulators reduce the cylinder pressure to the delivery or outlet pressure in one step. Two-stage pressure regulators reduce the cylinder pressure to a working level in two steps. Generally a single-stage regulator is good for short duration applications; a two-stage regulator is good for long duration applications, such as gas chromatography.

3.5.2 How to Attach a Regulator

Before attempting to attach a regulator to a cylinder, check with your department and gas supplier for any additional requirements regarding the installation of regulators.

1. Use pressure regulators that are equipped with pressure relief devices, if needed.
2. Check the Compressed Gas Association (CGA) approved regulator fitting and the fitting surface of the cylinder valve for damage, especially the threads and seat. Remove any loose debris from the threads and seat and do not use if damaged.
3. Set the pressure of the regulator to zero by turning the adjusting knob or handle counterclockwise. It is important that at least two threads remain engaged into the regulator body.
4. Close the outlet valve fully in a clockwise direction.
5. Tighten the CGA approved connection in a counter clockwise direction. (Hex nuts on the CGA approved connection with notches in the middle are tightened in a counterclockwise direction.)
6. Do NOT force the connection. If you cannot easily make the connection by hand, you are using the wrong regulator or the threads are damaged. CGA approved fittings may be obtained from any gas supplier.
7. Tighten until snug using a regulator wrench, an open end wrench or an adjustable wrench. Do NOT over-tighten.
8. Cylinder connections and fittings are designed to connect without the use of Teflon® tape; Teflon® tape should only be used on tapered pipe threads where the seal is formed in the thread area.
9. If the regulator requires gaskets on the CGA connection, inspect them for wear or contamination and replace the gasket at each cylinder change out.
10. Use the proper fittings on the outlet of the regulator to the system. The correct fitting can be purchased from the regulator supplier. Do not make adapters to get to the proper fitting.
11. Use a dilute soap solution (available from gas suppliers) to check for leaks where the valve attaches to the cylinder and around all other thread connections. If leaks are discovered, depressurize, tighten, and then recheck the connections.
12. If no leaks are discovered, the operator should position him or herself with the regulator on the opposite side of the cylinder. Slowly open the cylinder valve in a counterclockwise direction, 1/8 turn. The high pressure gauge should rise to full cylinder pressure.
13. Turn the regulator's adjusting knob or handle clockwise to raise the delivery pressure to the desired working pressure while observing the delivery pressure gauge. Do not exceed the maximum delivery pressure for the regulator or the system.
14. Check the system for leaks again as outlined above.
15. Open the outlet valve on the regulator to supply gas to the system. Delivery pressure may need some adjustment.



3.5.3 How to Shut down a Cylinder with a Regulator

Be certain that the gas stream is shut off at its source when not in use. Never use a regulator as a shut-off valve.

For temporary shutdown (less than 30 minutes), close the gas cylinder valve completely. For extended shutdowns (more than 30 minutes), first close the gas cylinder main shutoff valve completely. Second, set the pressure of the regulator to zero by turning the adjusting knob or handle counterclockwise, leaving at least two threads engaged into the regulator body. If your system has an outlet control valve downstream of the regulator, open this valve to purge gas from the delivery line and then close it.

3.6 Procurement

Refillable gas cylinders are supplied by gas vendors and usually must be returned to the vendor when they are empty or no longer needed. **By renting refillable cylinders rather than purchasing them outright, you will minimize storage hazards and disposal costs.**

Non-refillable, non-returnable gas cylinders, such as lecture bottles and propane tanks, are purchased from the gas vendor and are generally not returnable.

Lecture bottles are small, non-refillable compressed gas cylinders, typically 2-3 inches in diameter and 12-18 inches in height. The Department of Safety and Risk Management discourages buying non-returnable cylinders if other options are available. Ask vendors for a complete list of gases available in returnable cylinders (they are almost as portable as lecture bottles and cost less when considering potential disposal costs). Full, partially full and empty cylinders that cannot be returned to the supplier must be disposed of through SRM.

Reminder: Cylinder disposal can be very costly, so think before you buy.

Before ordering **toxic gases**, you must contact SRM for a hazard evaluation and written purchase approval.

Toxic gases are defined as gases that cause significant acute health effects at low concentrations, have a National Fire Protection Association (NFPA) health rating of 3 or 4, or have low occupational exposure limits.

3.7 Receiving Compressed Gas Cylinders from Vender

Before receiving gas from the vendor, be familiar with the physical, chemical, and toxicological properties (i.e., read the Safety Data Sheet). Inspect all incoming cylinders to ensure they are undamaged and properly labeled. Do not rely on the color of the cylinder to identify the gas. Different suppliers may use different colors for cylinders of the same gas. Be sure cylinders are not giving off odors, visible fumes, or hissing sounds. Check that the cylinder was last hydrostatic pressure tested within the required time (usually five years). Do not accept cylinders that are rusted, unlabeled, mislabeled, or if the valve or fixtures are damaged. Damaged cylinders, and those that do not comply with identification requirements, should be returned to the manufacturer or distributor.

Once accepted, it is a good practice to tag each cylinder to indicate that it is full, and write a date received on it.



3.8 Keep Your Chemical Inventory Up to Date

Gases are chemicals and must be included in the SRM chemical inventory that your laboratory must update when inventories change. Enter the concentration and volume of each compressed gas. If the volume of gas is not known, assume that the cylinder is full. Be sure to remove the cylinder from your inventory when it is removed from your lab.

3.9 Safe Storage Practices

Because of the high internal pressure in compressed gas cylinders, they can become projectiles if stored or transported in a manner that could damage the valve. Leaking cylinders may displace air, causing an oxygen-deficient atmosphere that can lead to unconsciousness or death. To help prevent serious injury to yourself and others, follow these safe storage practices.

1. Store cylinders in well-ventilated areas. Never store cylinders inside drawers, cupboards or cabinets that are not designed for gases.
2. Areas where flammable gases are stored must have suitable fire extinguishing equipment.
3. Store full cylinders away from sparks, flames, direct sunlight, or hot surfaces.
4. Store cylinders away from corridors, paths of egress, and stairways.
5. Cylinder storage areas must be accessible and uncluttered.
6. When not in use, cylinders must be stored with valve-caps in place. Lecture bottles do not have valve-caps; they need to be stored in a secure manner to prevent valve damage.

7. When storing cylinders in an upright position, prevent them from falling by using two (2) non-combustible restraints (1/3 of the way from top and bottom) such as chains. Attach them securely to a wall, rack or other solid, non-combustible structure. (Securing individually is recommended.)
8. When storing cylinders on their sides, prevent them from rolling by using a rubber stop, rack or other suitable device.
9. Secure lecture bottles in a secure rack.
10. For outdoor storage, provide drainage, ventilation, overhead cover, and security.
11. Each regulator valve should be inspected by the user annually for damage.
12. If two labels are associated with one cylinder, affix the labels 180° apart on the shoulder of each cylinder.
13. Close valves on empty cylinders, date them, and label them with an “EMPTY” tag Store them separately from full cylinders.
14. Never tamper with cylinders in any way (e.g., repair, repaint, refill, change markings, or interfere with valve threads or safety devices).
15. Do not attempt to extinguish a fire caused by a gas unless you have received training. Shut off gas at the source if safe to do so, pull the fire alarm and call 911 immediately.
16. Some gases lose integrity and the manufacturer may recommend returning the gas after a specific storage time (see SDS).
17. Cylinders are often heavy. Get help when lifting them, and prevent them from falling or rolling.



For guidance on how to engineer cylinder storage, see SRM Q-Brace guidelines

3.10 Moving and Transporting Cylinders

Only trained hazardous materials employees are allowed to transport cylinders on public roads (i.e., off campus). If you need to move cylinders off campus, contact SRM for assistance.

- To move a cylinder on campus, remove the regulator if one is attached and secure the protective valve cap. Do not roll or drag a cylinder or allow cylinders to strike each other or other objects. Always use a suitable cylinder cart for transporting cylinders, with the cylinder securely chained or strapped to the cart. Inspect the cylinder cart and wheels for wear and tear before each use. If you purchase a two-cylinder cart, each cylinder must be restrained by its own chain. Carts are for transporting cylinders, not for storage.
- Do not lift or move the cylinder by the cap. Ropes or slings should not be used to suspend cylinders unless the gas vendor has made provisions for such lifting.
- Cylinders should be transported in freight/cargo elevators only, and **never** in the passenger compartment of a vehicle. Please refer to the SRM Fact Sheet titled “Transporting Chemicals Safely on Campus.”



3.11 Compressed Gas Cylinder Return or Disposal

In general, a cylinder is considered empty when the cylinder pressure is approximately 30 pounds per square inch (30 psi or about 2x atmospheric pressure). The ability to return a gas cylinder to the vendor when empty or no longer in use depends on whether or not it is **refillable** or **non-refillable**:

1. **Refillable** gas cylinders, (typically ≥ 4 ” in diameter) are owned by the gas vendor and must be returned when they are empty or no longer needed. If you have a refillable cylinder, follow the campus return procedures.
2. **Non-refillable** gas cylinders (e.g., lecture bottles) must be managed as potential hazardous waste through SRM.



If you cannot return your unwanted cylinder (empty or partially full) to the vendor, SRM will pick it up and manage it appropriately. SRM also takes “unknown” cylinders (cylinders containing unknown gases are expensive to test and dispose). SRM will arrange for the most cost effective and environmentally sound disposal, including possible reuse on campus.

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Do not cut cylinders or remove cylinder valves without SRM approval and training.

Removal of valves from lecture bottles can present a significant hazard if the cylinder is not fully discharged. Lecture bottles that held flammable gases may still present a fire or explosion hazard, while those that held corrosive, poisonous, or reactive gases may still have sufficient residues to present a health hazard. Pyrophorics should never have their valves removed.

3.12 Hazardous Materials Management

The Solano County Department of Resource Management, Environmental Health Services Division is the Certified Unified Program Agency (CUPA) for all cities and unincorporated areas within Solano County. The legislation that developed the CUPA was created by the State Legislature to minimize the number of inspections and different fees for businesses that use hazardous materials and dispose of hazardous wastes see [Hazardous Materials Section Overview](#). The laws and regulations pertaining to the use and disposal of hazardous materials and hazardous wastes are in the California Health and Safety Code, Chapters 6.5, 6.67, 6.7, 6.75, 6.95, & 6.11 and the California Code of Regulations, Title 19, Title 22, Title 23, & Title 27 found at [Health and Safety Code](#) and [California Code of Regulations](#). The CUPA provides regulatory oversight for the program activities listed on this web page: https://www.solanocounty.com/depts/rm/environmental_health/hazmat/default.asp

3.12.1 Hazardous Materials Business Plan (HMBP)

Conducts regulatory oversight (review of plans and inspections) **of all businesses** including farms, federal agencies, state agencies, and local agencies that **handle quantities of hazardous materials/ hazardous waste greater than or equal to 55 gallons of liquid, 500 pounds of solids or 200 cubic feet of a compressed gas at any time**; The Solano County Agriculture Department conducts inspections on farms under the oversight of the Environmental Health Services Division as the CUPA. There are an estimated 1,800 businesses in Solano County regulated by this program. For hazardous materials documents see [Solano County Hazardous Materials Documents](#)

HMBP program addresses the preparedness for emergency response to incidents involving hazardous materials. The HMBP includes a chemical inventory of hazardous materials which must be reviewed annually and if necessary updated. Hazardous materials are chemicals used for a process that by their nature are hazards to people, property, or the environment or are hazardous wastes that are listed in regulations or have the following characteristics: toxicity, reactivity, ignitability, or corrosiveness. Reportable releases in California are any threatened or actual release that poses a potential or actual risk to people, property, or the environment. A facility that needs fire, and/or ambulance response should call **911**. Separately, a facility is required to report actual or threatened releases of hazardous materials to Environmental Health Services Division, Hazardous Materials Section as the CUPA at **707-784-6765** 8am to 5pm weekdays, and to Solano County Dispatch at **707-421-7090** evenings, holidays, and weekends. See the [Release Reporting Regulatory Matrix](#) for additional guidance.

4.0 Training Requirements

Effective dissemination of safety information lies at the very heart of a successful Injury and Illness Prevention Program. It is essential to provide training for employees concerning general safe work practices as well as specific instruction with respect to hazards unique to each employee’s job assignment.

Training content is determined by the Department of Safety and Risk Management, as well as Department Management which is based upon observed hazards, type of equipment, Department need, and work requirements.

- Providing training from within the department as a part of academic programming, or
- Training provided by CSU-System, or
- Training provided by Cal Maritime SRM, or
- A training provider outside the University.

Note: All outside trainer vendors are to be reviewed and content approved by SRM. The Department of Safety and Risk Management, in conjunction with various departments have developed training programs designed to meet general safe work practice requirements. These programs are elements of larger programs which service broad campus needs.

Employees expected to utilize hand and portable power tools as part of their job duties must be adequately trained prior to using such tools.

- Employees should be trained in the following areas:
- Be able to recognize hazards associated with different types of tools and equipment; and the safety precautions necessary for use.
- The PPE required to be worn during the use of tools.
- The proper use of hand and power tools and other hand-held equipment
- Be able to recognize defects in tools, which may render them out of service.
- When applicable, provide access to the manufacturer specifications and manual’s for specific equipment to be used.
- Department-developed standard operating procedures (SOPs) outlining specific safety precautions for certain tools or activities.

Retraining may be necessary to maintain employee knowledge of working with tools or if a near-miss or injury has occurred.

Training is to be documented and kept in a readily accessible location by the Department designee for access reference as needed by Department Management, Department of Safety & Risk Management, or regulatory agency (e.g. CalOSHA). Submit the completed training roster of attendees to the Department of Safety & Risk Management.

Program Administrators are trained on their roles and responsibilities in the management/maintenance of the requirements and inspections outlined in this program.

Refer to Cal/OSHA Safety & Health Training and Instruction Requirements as outlined in Appendix C of the Injury Illness Prevention Program.

5.0 Document Control & Recordkeeping

Essential records, including those legally required for Workers' Compensation, insurance audits and government inspections will be maintained for as long as required. Individual Departments and/or Colleges will also keep records of steps taken to establish and maintain the Injury and Illness Prevention Program.

They must include:

- Records of scheduled and periodic inspections to identify unsafe conditions and work practices. The documentation includes the name of the person(s) conducting the inspection, the unsafe conditions and work practices identified, and the corrective action(s) taken. These records will be maintained for at least three years.
- Documentation of health and safety training for each employee. Specifically, employee name or other identifier, training dates, type(s) of training and the name of the training provider will be included. Records will be retained for at least three years. Standard forms for maintaining this information can be obtained from the Department of Safety and Risk Management.

Training records will be kept in each department and copies will be forwarded to the Department of Safety and Risk Management.

Departments must maintain the following records as part of the hand and portable power tool safety program.

- Employee training records
- Specialized SOPs
- Manufacturer specifications/manuals
- Maintenance/service records

Record	Timeframe/Frequency	Location of Record	Retention Period*
Compressed Gas Safety Training-General	Initial, Annual Refresher for affected employees.	Document on Employee's Safety Training Checklist	3-Years
Compressed Gas Safety Training-General	Post incident and/or process management change for affected employees.	Document on Employee's Safety Training Checklist	3-Years
Compressed Gas Safety Training-Equipment Specific	Initial, Annual Refresher for affected employees.	Document on Employee's Safety Training Checklist	3-Years
Compressed Gas Safety Training-Equipment Specific	Post incident and/or process management change for affected employees.	Document on Employee's Safety Training Checklist	3-Years

*Refer to the Injury Illness Prevention Program Document Retention Table and/or California State University Systemwide for more information.

Appendix A: Definitions

General

ANSI:	American National Standards Institute
Authorized person:	Means a person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the jobsite.
Competent person:	<p>A competent person is a person who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees.</p> <p>The competent person has the authority to impose prompt corrective measures to eliminate these hazards.</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Excavation - Inspectors 1541 • Fall Protection Plan implementers & supervisors 1671.1 • Lift Slab Construction 1522.1
Confined Space:	Is a space that (1) is large enough and so configured that an employee can enter bodily, (2) has limited or restricted means for entry or exit (e.g., tanks, vessels, vaults, shafts, pits), and (3) is not designed for continuous occupancy.
Construction Manager:	Is the Cal Maritime employee responsible for the supervision and field management of day-to-day needs of a construction project. It may be a project superintendent, a craft supervisor, or a lead person.
Construction work:	For purposes of this section, "Construction work" means work for construction, alteration, and/or repair, including painting and decorating. Construction: is any combination of engineering, procurement, erection, installation, assembly, demolition, or fabrication used to create a new facility, or to alter, add to, rehabilitate, dismantle, or remove an existing facility. It also includes the alteration and repair (including dredging, excavating, and painting) of buildings, structures, or other real property, as well as any construction and excavation activities conducted as part of environmental remediation efforts.
Controlled Access Zone (CAZ)	Means an area in which certain work (e.g., overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled
Imminent Danger:	Is any condition or practice that could reasonably be expected to cause death or serious physical harm (permanent or prolonged impairment of the body or temporary disablement requiring hospitalization) to employees or the public unless immediate actions are taken.
Project Manager:	Is the Cal Maritime employee representative with overall responsibility for a project. This person ensures subcontractor compliance with subcontract documents, including performance, schedule, budget, and safety.
Shall:	Means mandatory
Should:	Means recommended
Subcontractor:	Is a firm that has sole contractual responsibility for execution of the construction work related to a project, and for compliance with all safety, health, and environmental codes, standards, and regulations.
Qualified Person:	<p>A qualified person is a person designated by the employer; and by reason of training, experience, or instruction has demonstrated the ability to perform safely all assigned duties; &, when required is properly licensed in accordance with federal, state, or local laws and regulations.</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • Mobile Crane & Tower Crane Operators 5006.1(a) • Scaffold Erection & Dismantling Supervisors 1637(k)(1) • Demolition 1736 • Personal Fall Arrest System supervisors 1670(b)

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Appendix B: Job Hazard Analysis Template-Sample

SAFETY GUIDELINES

IMAGE	SCOPE OF WORK/EQUIPMENT USE	DEPARTMENT:			
		HAZARD POTENTIAL EVALUATION			
		<input type="checkbox"/> Struck By <input type="checkbox"/> Struck Against <input type="checkbox"/> Slip/Trip/Fall <input type="checkbox"/> Caught In/Between <input type="checkbox"/> Material Handling <input type="checkbox"/> Equipment Operating	<input type="checkbox"/> Weather Conditions <input type="checkbox"/> Hazardous Substance <input type="checkbox"/> Electrical Hazards <input type="checkbox"/> Obstruction		
		SRM-HIRAC	1	2	3
				4	

TRAINING REQUIREMENTS

	DO NOT use this equipment unless an instructor or shop supervisor has instructed you in the safe use and operation and has authorized you to operate this equipment.	
<input type="checkbox"/> IIPP	<input type="checkbox"/> Dept. Specific	<input type="checkbox"/> Operators/Owner's Manual
<input type="checkbox"/> Other:		

PERSONAL PROTECTIVE EQUIPMENT

									
Eye Protection	Foot Protection	Hand Protection	Hearing Protection	Body Protection	Head Protection	Respiratory Protection	Fall Protection	Face Shield	OTHER
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...	When working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, or will protect the affected	When hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns	When exposed to a time weighted average noise level of 85 dBA or higher over an 8 hour work shift.	When exposure to: Intense heat, hot metals, other hot liquids Impacts from materials that can cut, burn Hazardous chemicals Or potentially infectious materials	Where there is a potential for injury to the head from falling objects and/or when there is a risk of impact to head	May be required if removal of contaminants from the air does not fall below permissible exposure level.	When there is a risk of falling from a height greater than 4ft GSO 6ft CSO 6ft MSO When working in confined space	Face shield can be used over the glasses if there is a presence of a lot of flying debris.	

HAZARDS

HAZARD CONTROLS & PROTECTION MEASURES

IF CONDITIONS CHANGE: STOP WORK IMMEDIATELY-REVIEW WITH SUPERVISOR-DOCUMENT HAZARD-REVIEW WITH SRM

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SAFE OPERATING PROCEDURES				
STEPS/TASKS		HAZARD POTENTIAL		HAZARD CONTROLS & PROTECTION MEASURES
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
NOTES				
IF CONDITIONS CHANGE: STOP WORK IMMEDIATELY-REVIEW WITH SUPERVISOR-DOCUMENT HAZARD-REVIEW WITH SRM				
EMERGENCY RESPONSE			EVACUATION ASSEMBLY POINT	
1	First Aid Kit			
2	AED			
3	Emergency phone	Campus Police- 707-654-1111 or 911		
REMINDER: IMMEDIATELY REPORT ALL INCIDENTS, REGARDLESS OF SEVERITY, TO YOUR SUPERVISOR AND THE DEPARTMENT OF SAFETY & RISK MANAGEMENT.				
HOUSEKEEPING & SECURITY		SHOP SUPERVISOR MUST BE PRESENT WHEN SHOP IS OCCUPIED		
1	Is the work area/site Clean?	Ensure work area is clean daily and that any hazardous materials are properly disposed of daily		
2	Is the work area/site Secure?	Ensure lights are turned off and building is locked upon exiting work for the day.		
3				

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Appendix D: UC San Diego Toxic Gas & Hazardous Gas Classifications

This table is a reference table with hyperlinks to UC San Diego reference table.

Individual Gas Safety Resources	Molecular Formula	CAS	Physical State & Description	Hazard Control Plan	Description	Hazards	CGSL Hazard Class
Acetylene	C2H2	74-86-2	Dissolved gas - Colorless, odorless	Compressed gas	Colorless, odorless	Flammable, unstable, reactive	IV
	—						
Ammonia	NH3	7664-41-7	Liquefied gas	Compressed gas	Colorless, strong pungent odor	Corrosive, non-flammable	III
	[Threshold Limit Values ppm: 25; Permissible Exposure Limit ppm: 50; Lethal Dose ppm: 7338; Immediately Dangerous to Life or Health ppm: 500]						
Argon	Ar	7440-37-1	Compressed gas	Compressed gas	Colorless, odorless	Simple asphyxiant	IV
	—						
Arsine	AsH3	7784-42-1	Compressed gas	Arsine	Colorless, garlic or fish-like scent	Highly toxic, flammable, pyrophoric	I
	[Threshold Limit Values ppm: 0.05; Permissible Exposure Limit ppm: 0.05; Lethal Dose ppm: 178; Immediately Dangerous to Life or Health ppm: 3]						
Boron tribromide	BBr3	10294-33-4	Liquid	Compressed gas	Colorless	Toxic, corrosive	II
	[Threshold Limit Values ppm: 1; Permissible Exposure Limit ppm: 1; Lethal Dose ppm: 380; Immediately Dangerous to Life or Health ppm: 50]						
Boron trichloride	BCl3	10294-34-5	Compressed gas	Compressed gas	Colorless	Corrosive	III
	[Threshold Limit Values ppm: 5; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 2541; Immediately Dangerous to Life or Health ppm: 25]						
Boron trifluoride	BF3	7637-07-2	Compressed gas	Compressed gas	Colorless, strong irritating pungent odor	Toxic, corrosive	II
	[Threshold Limit Values ppm: 1; Permissible Exposure Limit ppm: 1; Lethal Dose ppm: 864; Immediately Dangerous to Life or Health ppm: 25]						
Bromine	Br2	7726-95-6	Liquid	Bromine	Brownish red liquid, suffocating odor	Highly toxic, corrosive, oxidizer	I
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 113; Immediately Dangerous to Life or Health ppm: 3]						
Carbon dioxide	CO2	124-38-9	Compressed gas	Compressed gas	Colorless, odorless, tasteless	Simple asphyxiant	IV
	[Threshold Limit Values ppm: 5000; Permissible Exposure Limit ppm: 5000; Immediately Dangerous to Life or Health ppm: 40000]						
Carbon monoxide	CO	630-08-0	Compressed gas	Carbon monoxide	Colorless, odorless, tasteless	Toxic, flammable	III
	[Threshold Limit Values ppm: 25; Permissible Exposure Limit ppm: 25; Lethal Dose ppm: 3760; Immediately Dangerous to Life or Health ppm: 1200]						
Chlorine	Cl2	7782-50-5	Compressed gas	Chlorine	Greenish-yellow, pungent odor similar to bleach	Toxic, corrosive, oxidizer	II

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	[Threshold Limit Values ppm: 0.5; Permissible Exposure Limit ppm: 1; Lethal Dose ppm: 293; Immediately Dangerous to Life or Health ppm: 10]						
<u>Chlorine dioxide</u>	ClO2	10049-04-4	Gas	Compressed gas	Chlorine-like odor	Toxic, oxidizer	II
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 250; Immediately Dangerous to Life or Health ppm: 5]						
<u>Chlorine trifluoride</u>	ClF3	7790-91-2	Liquefied gas	Compressed gas	Colorless, strong irritating odor	Toxic, oxidizer, corrosive	II
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 299; Immediately Dangerous to Life or Health ppm: 20]						
<u>Deuterium</u>	H2	7782-39-0	Compressed gas	Compressed gas	Colorless	Flammable	IV
	—						
<u>Diborane</u>	B2H6	19278-45-7	Liquefied gas	Diborane	Colorless, repulsively sweet odor	Highly toxic, flammable, pyrophoric	I
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 80; Immediately Dangerous to Life or Health ppm: 15]						
<u>Dichlorosilane</u>	SiH2Cl2 (HCl)	4109-96-0	Liquefied gas	Compressed gas	Colorless	Toxic, corrosive, flammable	II
	[Threshold Limit Values ppm: 2; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 314; Immediately Dangerous to Life or Health ppm: 50]						
<u>Ethane</u>	C2H6	74-84-0	Compressed gas	Compressed gas	Colorless, odorless	Flammable	IV
	—						
<u>Ethylene</u>	C2H4	74-85-1	Compressed gas	Compressed gas	Colorless, sweet musky odor	Flammable	IV
	—						
<u>Ethylene oxide</u>	C2H4O	75-21-8	Liquefied gas	Ethylene oxide	Colorless, faintly sweet odor	Toxic, flammable	III
	[Threshold Limit Values ppm: 1; Permissible Exposure Limit ppm: 1; Lethal Dose ppm: 2900; Immediately Dangerous to Life or Health ppm: 800]						
<u>Fluorine</u>	F2	7782-41-4	Compressed gas	Hydrogen fluoride	Pale yellow, strong, irritating, pungent	Highly toxic, corrosive, oxidizer	I
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 185; Immediately Dangerous to Life or Health ppm: 25]						
<u>Germane</u>	GeH4	7782-65-2	Liquefied gas	Germane	Colorless	Highly toxic, flammable, pyrophoric	II
	[Threshold Limit Values ppm: 0.2; Permissible Exposure Limit ppm: 0.2; Lethal Dose ppm: 620]						
<u>Helium</u>	He	7440-59-7	Compressed or Liquefied gas	Compressed gas	Colorless, odorless, tasteless	Simple asphyxiant	IV
	—						
<u>Hydrogen</u>	H2	1333-74-0	Compressed gas	Compressed gas	Colorless, odorless, tasteless	Flammable	IV
	—						
<u>Hydrogen bromide</u>	HBr	10035-10-6	Compressed gas	Compressed gas	Colorless, sharp, unpleasant, pungent odor	Toxic, corrosive	III

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	[Threshold Limit Values ppm: 3; Permissible Exposure Limit ppm: 3; Lethal Dose ppm: 2860; Immediately Dangerous to Life or Health ppm: 30]						
Hydrogen chloride	HCl	7647-01-0	Compressed gas	Compressed gas	Colorless, strongly irritating	Toxic, corrosive	III
	[Threshold Limit Values ppm: 5; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 2810; Immediately Dangerous to Life or Health ppm: 50]						
Hydrogen cyanide	HCN	74-90-8	Liquid	Hydrogen cyanide	Colorless, faint almond-like odor	Highly toxic, flammable	I
	[Permissible Exposure Limit ppm: 4.7; Lethal Dose ppm: 40; Immediately Dangerous to Life or Health ppm: 50]						
Hydrogen fluoride	HF	7664-39-3	Liquefied gas	Hydrogen fluoride	Colorless, strong irritating odor	Toxic, corrosive	II
	[Threshold Limit Values ppm: 0.5; Permissible Exposure Limit ppm: 3; Lethal Dose ppm: 1300; Immediately Dangerous to Life or Health ppm: 30]						
Hydrogen iodide	HI	10034-85-2	Liquefied gas	Compressed gas	Colorless, pungent odor	Toxic, corrosive	III
	[Lethal Dose ppm: 2860]						
Hydrogen selenide	H ₂ Se	7783-07-5	Compressed gas	Hydrogen selenide	Colorless, very irritating odor like rotten eggs	Highly toxic, flammable	I
	[Threshold Limit Values ppm: 0.05; Permissible Exposure Limit ppm: 0.05; Lethal Dose ppm: 51; Immediately Dangerous to Life or Health ppm: 1]						
Hydrogen sulfide	H ₂ S	7783-06-4	Liquefied gas	Compressed gas	Colorless, foul odor like rotten eggs	Toxic, flammable, corrosive	II
	[Threshold Limit Values ppm: 10; Permissible Exposure Limit ppm: 10; Lethal Dose ppm: 712; Immediately Dangerous to Life or Health ppm: 100]						
Krypton	Kr	7439-90-9	Compressed gas	Compressed gas	Colorless, odorless, tasteless	Simple asphyxiant	IV
	—						
Methane	CH ₃	74-82-8	Compressed gas	Compressed gas	Colorless, odorless	Flammable	IV
	—						
Methyl bromide	CH ₃ Br	74-83-9	Compressed gas	Compressed gas	Colorless, odorless, nonflammable	Toxic, flammable	II
	[Threshold Limit Values ppm: 1; Permissible Exposure Limit ppm: 1; Lethal Dose ppm: 850; Immediately Dangerous to Life or Health ppm: 250]						
Methyl chloride	CH ₃ Cl	74-87-3	Compressed gas	Compressed gas	Colorless, mildly sweet odor	Flammable	IV
	[Threshold Limit Values ppm: 50; Permissible Exposure Limit ppm: 50; Immediately Dangerous to Life or Health ppm: 2000]						
Methyl isocyanate	CH ₃ NCO	624-83-9	Liquid	Methylisocyanate	Colorless	Highly toxic, flammable	I
	[Threshold Limit Values ppm: 0.02; Permissible Exposure Limit ppm: 0.02; Lethal Dose ppm: 22; Immediately Dangerous to Life or Health ppm: 3]						
Methyl mercaptan	CH ₃ SH	74-93-1	Liquefied gas	Compressed gas	Colorless, cabbage-like odor	Toxic, flammable	II
	[Threshold Limit Values ppm: 0.5; Permissible Exposure Limit ppm: 0.5; Lethal Dose ppm: 1350; Immediately Dangerous to Life or Health ppm: 150]						

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Compressed Gas Safety Plan

Neon	Ne	1/9/7440	Compressed gas	Compressed gas	Colorless, odorless, tasteless	Simple asphyxiant	IV
	—						
Nickel carbonyl	Ni(CO) ₄	13463–39–3	Liquid	Forbidden at UCSD	Musty or sooty odor	Highly toxic, flammable	I
	[Threshold Limit Values ppm: 0.001; Permissible Exposure Limit ppm: 0.001; Lethal Dose ppm: 18; Immediately Dangerous to Life or Health ppm: 2]						
Nitric oxide	NO	10102–43–9	Compressed gas	Nitric oxide	Colorless, irritating odor	Highly toxic, oxidizer, corrosive	I
	[Threshold Limit Values ppm: 25; Permissible Exposure Limit ppm: 25; Lethal Dose ppm: 115; Immediately Dangerous to Life or Health ppm: 100]						
Nitrogen	N ₂	7727-37-9	Compressed or Liquefied gas	Compressed gas	Colorless, odorless, tasteless	Simple asphyxiant	IV
	—						
Nitrogen dioxide	NO ₂	10102–44–0	Liquefied gas	Nitrogen dioxide	Reddish-brown color, irritating odor	Highly toxic, oxidizer, corrosive	I
	[Threshold Limit Values ppm: 3; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 115; Immediately Dangerous to Life or Health ppm: 20]						
Nitrous oxide	N ₂ O	10024-97-2	Compressed gas	Compressed gas	Colorless, faint sweet odor	Oxidizer	IV
	[Threshold Limit Values ppm: 50; Permissible Exposure Limit ppm: 50]						
Oxygen	O ₂	7782-44-7	Compressed gas	Compressed gas	Colorless, odorless, tasteless	Oxidizer	IV
	—						
Ozone	O ₃	10028-15-6	In situ, dissolved gas	Ozone	Colorless, sharp odor	Highly toxic, oxidizer	I
	[Threshold Limit Values ppm: 0.05; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 9; Immediately Dangerous to Life or Health ppm: 5]						
Phosgene	COCl ₂	75–44–5	Liquefied gas	Phosgene	Colorless, odor like freshly cut hay or grass	Highly toxic	I
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 5; Immediately Dangerous to Life or Health ppm: 2]						
Phosphine	PH ₃	7803–51–2	Liquefied gas	Phosphine	Colorless, odorless	Highly toxic, flammable, pyrophoric	I
	[Threshold Limit Values ppm: 0.3; Permissible Exposure Limit ppm: 0.3; Lethal Dose ppm: 20; Immediately Dangerous to Life or Health ppm: 50]						
Phosphorus oxychloride	POCl ₃	10025–87–3	Liquid	Phosphorus oxychloride	Colorless	Highly toxic	I
	[Threshold Limit Values ppm: 0.1]						
Phosphorus pentafluoride	PF ₅	7647-19-0	Liquefied gas	Compressed gas	Colorless, strong, irritating, pungent odor	Toxic, oxidizer, corrosive	II
	[Permissible Exposure Limit ppm: 261]						
Phosphorus trichloride	PCl ₃	12/2/7719	Liquid	Compressed gas	Colorless fuming liquid, pungent odor	Toxic, corrosive	II
	[Threshold Limit Values ppm: 0.2; Permissible Exposure Limit ppm: 0.2; Lethal Dose ppm: 208; Immediately Dangerous to Life or Health ppm: 25]						

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Compressed Gas Safety Plan

Propane	C3H8	74-98-6	Liquefied gas	Compressed gas	Colorless	Flammable	IV
	[Permissible Exposure Limit ppm: 1000]						
Selenium hexafluoride	SeF6	7783-79-1	Compressed gas	Selenium hexafluoride	Colorless, strong, irritating, repulsive odor	Highly toxic, corrosive	I
	[Threshold Limit Values ppm: 0.05; Permissible Exposure Limit ppm: 0.05; Lethal Dose ppm: 50; Immediately Dangerous to Life or Health ppm: 2]						
Silane	SiH4	7803-62-5	Compressed gas	Silane	Colorless, sharp repulsive odor	Pyrophoric	I
	[Threshold Limit Values ppm: 5; Permissible Exposure Limit ppm: 5]						
Silicon tetrachloride	SiCl4	10026-04-7	Liquid	Compressed gas	Colorless fuming liquid, irritating odor	Toxic, corrosive	II
	[Threshold Limit Values ppm: 2; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 750; Immediately Dangerous to Life or Health ppm: 100]						
Silicon tetrafluoride	SiF4 (HF)	7783-61-1	Compressed gas	Compressed gas	Colorless, strong irritating disagreeable odor	Toxic, corrosive	II
	[Threshold Limit Values ppm: 3.2; Permissible Exposure Limit ppm: 3.2; Lethal Dose ppm: 922; Immediately Dangerous to Life or Health ppm: 30]						
Stibine	SbH3	7803-52-3	Compressed gas	Stibine	Colorless, odor like rotten eggs	Highly toxic, flammable	I
	[Threshold Limit Values ppm: 0.1; Permissible Exposure Limit ppm: 0.1; Lethal Dose ppm: 178; Immediately Dangerous to Life or Health ppm: 5]						
Sulfur dioxide	SO2	7446-09-5	Liquefied gas	Compressed gas	Colorless, pungent odor	Toxic, corrosive	III
	[Threshold Limit Values ppm: 2; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 2520; Immediately Dangerous to Life or Health ppm: 100]						
Sulfur hexafluoride	SF6	2551-62-4	Liquefied gas	Compressed gas	colorless, odorless, tasteless	Simple asphyxiant	IV
	-						
Sulfuryl fluoride	SO 2F2	2699-79-8	Liquefied gas	Compressed gas	Colorless, odorless, strong irritating	Toxic, corrosive	III
	[Threshold Limit Values ppm: 5; Permissible Exposure Limit ppm: 5; Lethal Dose ppm: 3020; Immediately Dangerous to Life or Health ppm: 1000]						
Tellurium hexafluoride	TeF6	7783-80-4	Compressed gas	Tellurium hexafluoride	Colorless gas, repulsive odor, strong irritating	Highly toxic, corrosive	I
	[Threshold Limit Values ppm: 0.02; Permissible Exposure Limit ppm: 0.02; Lethal Dose ppm: 25; Immediately Dangerous to Life or Health ppm: 1]						
Titanium tetrachloride	TiCl4	7550-45-0	Liquid	Titanium tetrachloride	Colorless, yellow or reddish brown	Highly toxic, corrosive	I
	[Permissible Exposure Limit ppm: 1.3; Lethal Dose ppm: 119; Immediately Dangerous to Life or Health ppm: 1.3]						
Tungsten hexafluoride	WF6 (HF)	7783-82-6	Compressed gas	Compressed gas	Colorless, strong irritating	Toxic, corrosive	II
	[Permissible Exposure Limit ppm: 30; Lethal Dose ppm: 218; Immediately Dangerous to Life or Health ppm: 30]						
Vinyl bromide	C2H3Br	593-60-2	Liquefied gas	Compressed gas	Colorless, sweet odor	Toxic, flammable	IV

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	<i>[Permissible Exposure Limit ppm: .01; Lethal Dose ppm: >40,000]</i>						
<u>Vinyl chloride</u>	C2H3Cl	75-01-4	Liquefied gas	Compressed gas	Colorless, sweet odor	Toxic, flammable	IV
	<i>[Lethal Dose ppm: 150.000]</i>						
<u>Xenon</u>	Xe	7440-63-3	Compressed gas	Compressed gas	Colorless, odorless, tasteless	Simple asphyxiant	IV
	—						

Appendix E: Common Industrial Cylinder Dimensions

Standard High Pressure Cylinders



Size	20	40	60	80	125	150	200	300
Volume (cf)	20	40	60	80	125	150	200	300
Tare Weight (lbs)	11	24	29	47	58	61	117	139
Height (inches)	14	17	23	32	43	47	51	55
Diameter (inches)	5	7	7	7	7	7	9	9
Water Capacity (liters)	3.5	7.8	10.3	15.4	21.6	23.4	43.2	49

All values are approximate
Tare weight includes valve but excludes cap. Standard cap is 5 inches in length and 2 pounds in weight

Propane* Cylinders



Size	20	33	60	100
Volume (lbs)	20	33	60	100
Tare Weight (lbs)	26	36	48	77
Height (inches)	19	27	44	49
Diameter (inches)	12	12	12	15
Water Capacity (liters)	21.6	36.3	64.8	108.4

All values are approximate
Tare weight includes valve but excludes cap. Standard cap is 5 inches in length and 2 pounds in weight
*Measurements represent steel cylinders. Aluminum cylinders also available.

Propylene Cylinders



Size	6	25.5	60	100
Volume (lbs)	6	25.5	60	100
Tare Weight (lbs)	8	25.9	48	75
Height (inches)	22	33	44	48
Diameter (inches)	6	9	12	15
Water Capacity (lbs)	8	26	48	75

All values are approximate
Tare weight includes valve but excludes cap. Standard cap is 5 inches in length and 2 pounds in weight

Acetylene Cylinders



Size	MC	B	AC75	SM	MED	LG310	LG390	LG420
Volume (cf)	10	40	60-75	110-140	200-250	300-340	397	420
Tare Weight (lbs)	8	25	43	70	120	168	170	178
Height (inches)	13	20	26	34	38	41	46	49
Diameter (inches)	4	6	7	8	10	12	12	12
Water Capacity (liters)	2.0	7.6	14.0	25.0	42.7	53.3	68.0	71.7

All values are approximate
Tare weight includes valve but excludes cap.
Standard cap is 5 inches in length and 2 pounds in weight



Appendix F: Cylinder Color Chart

CYLINDER COLOR CHART

Welding & Industrial Pure Gases High Pressure Cylinders

GAS: Argon	GAS: Argon Pre-Pure	GAS: Helium	GAS: Helium Pre-Pure	GAS: Hydrogen	GAS: Hydrogen Pre-Pure	GAS: Nitrogen	GAS: Nitrogen Pre-Pure	GAS: Oxygen	GAS: Carbon Dioxide	GAS: Air, Compressed
CGA 580	CGA 580	CGA 580	CGA 580	CGA 350	CGA 350	CGA 580	CGA 580	CGA 540	CGA 320	CGA 590

Welding Gas Mixtures High Pressure Cylinders

1% Oz. Argon	2% Oz. Argon	5% Oz. Argon	8% CO2 Argon	25% CO2 Argon	Hydrogen Argon	25% Ar Helium	2.5% CO2 90 He	7.5% Ar	Forming Gas N2/H2
CGA 580	CGA 350	CGA 580	CGA 580	CGA 580	CGA 350				

Medical Gases & Mixtures High Pressure Cylinders

GAS: Oxygen USP	GAS: Nitrogen N.F.	GAS: Breathing Air	GAS: Carbon Dioxide USP	GAS: Nitrous Oxide USP	GAS: Helium USP	GAS: CO2 Oxygen Mix	GAS: Helium Oxygen Mix	GAS: CO2 Hydrogen Nitrogen Mix	GAS: CO2 Oxygen Nitrogen Mix (Blood Gas)	GAS: CO2 Oxygen Nitrogen Mix (Lung Diff.)	GAS: CO Helium Oxygen Nitrogen Mix	GAS: CO Helium Oxygen Nitrogen Mix
Threaded 540	580	346	320	326	580	280	280	350	500	500	500	500
Pin-Index 870	960	950	940	910	930	500*	880	890	930	940*	930	930

*CO2 > 7% * He > 80%

Fuel Gases Low Pressure Cylinders

ACETYLENE CGA 510	MAPP CGA 510
CGA 300	70 lb. cylinder

CAUTION

DO NOT USE CYLINDER COLOR ALONE TO IDENTIFY GAS CONTENTS
ALWAYS IDENTIFY CONTENTS BY CYLINDER LABELING

The color of paint on the cylinders is used by manufacturers to aid easy recognition of the service in which these cylinders are usually used. Color coding should never be used as the means of identifying the gas content in a cylinder. A particular gas may have as many as four (4) different colors on the cylinder depending upon the gas manufacturer or private owner of the cylinder. In addition, dirt, grime, foreign matter and the infinite number of paint shades makes positive identification by color alone impossible. The contents of a cylinder should always be identified by a legible label attached by the supplier. (Typical labels are illustrated.)

The fill pressure should be determined by the DOT rating stamped on the cylinder with due allowance for 10% overfilling where applicable.

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Appendix G: Welding, Cutting & Brazing Safety Checklist

Activity or Operation	Welding, Cutting and Brazing		
Inspection Performed By		Date	
Checklist	Needs to be Addressed	Completed	Not Applicable
Are only authorized and trained personnel permitted to use welding, cutting, or brazing equipment?			
Does each operator have a copy of the appropriate operating instructions and are they directed to follow them?			
Are compressed gas cylinders regularly examined for obvious signs of defects, deep			
Is care used in handling and storing cylinders, safety valves, and relief valves to prevent damage?			
Are precautions taken to prevent the mixture of air or oxygen with flammable gases, except at a burner or in a standard torch?			
Are only approved apparatus (torches, regulators, pressure reducing valves, acetylene			
Are cylinders kept away from sources of heat?			
Are the cylinders kept away from elevators, stairs, or gangways?			
Is it prohibited to use cylinders as rollers or supports?			
Are empty cylinders appropriately marked and their valves closed?			
Are signs reading: DANGER, NO SMOKING, MATCHES, OR OPEN LIGHTS, or the equivalent, posted?			
Are cylinders, cylinder valves, couplings, regulators, hoses, and apparatus kept free of oily or greasy substances?			
Is care taken not to drop or stroke cylinders?			
Unless secured on special trucks, are regulators removed and valve-protection caps put in place before moving cylinders?			
Do cylinders without fixed hand wheels have keys, handles, or non-adjustable wrenches on stem valves when in service?			
Are liquefied gases stored and shipped valve-end up with valve covers in place?			
Are provisions made to never crack a fuel gas cylinder valve near sources of ignition?			

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Appendix H: Hot Work Permit SAMPLE



HOT WORK PERMIT

NAME OF COMPANY			PRECAUTIONS CHECKLIST <input type="checkbox"/> Y <input type="checkbox"/> N/A	
DATE	TIME ISSUED	PERMIT EXPIRES AM PM		
LOCATION/BUILDING & FLOOR (Be Specific)			Requirements within 35 ft. (11m) of work <input type="checkbox"/> Flammable liquids, combustible dust, and oily deposits removed. <input type="checkbox"/> Explosive atmosphere in area eliminated. <input type="checkbox"/> Floors swept clean. <input type="checkbox"/> Combustible building construction covered with fire resistive covering. <input type="checkbox"/> Remove other combustible materials where possible. Otherwise protect them with fire-resistive coverings.	
NAME OF PERSON AUTHORIZING HOT WORK			<input type="checkbox"/> All wall, floor, and machinery openings covered. <input type="checkbox"/> Fire-resistive tarpaulins suspended beneath work. <input type="checkbox"/> Electrical cable trays and switch gear protected with fire-resistive tarpaulins or metal shields. <input type="checkbox"/> Ducts and conveyors, systems cleaned, protected and/or shut off.	
PERSON (S) PERFORMING HOT WORK			Work on walls or ceilings <input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation. <input type="checkbox"/> Combustibles on other side of walls moved away or a fire watch provided on the opposite side of the wall from the work.	
DESCRIPTION OF WORK BEING PERFORMED			Work on enclosed equipment <input type="checkbox"/> Enclosed equipment cleaned of all combustibles. <input type="checkbox"/> Container purged of flammable liquids/vapors. <input type="checkbox"/> Pressurized vessels, piping and equipment removed from service, isolated and vented.	
PERSON (S) PERFORMING FIRE WATCH			Fire Watch / Hot Work area monitoring <input type="checkbox"/> Fire watch will be provided during and for 60 minutes after hot work is completed. <input type="checkbox"/> The hot work area will be periodically inspected during the three hours after the fire watch leaves the high hazard area. <input type="checkbox"/> Proper class of extinguisher must be within 10 feet. <input type="checkbox"/> Fire watch is trained in their duties. <input type="checkbox"/> Fire watch is required for adjoining areas above & below.	
OTHER INFORMATION:			OTHER PRECAUTIONS TAKEN _____ _____	

Front



HOT WORK PERMIT

The supervisor, in issuing this permit, certifies that all the safety factors have been considered and cared for satisfactory. Return this permit upon completion of the job which it is to cover to the authorizing supervisor. The supervisor will write "complete", date and initial across the face of the permit.

AREA OF HOT WORK:

WORK TO BE DONE:

	YES	NO	N/A
1. Read the Hot Work Permit Procedure			
2. Work area and equipment has been made free of flammable, combustible, and hazardous materials.			
3. Gas test taken.			
4. Is a fire extinguisher on the job?			
5. Smoke alarms covered?			
6. Lines disconnected and/or blanked?			
7. Is a fire watch provided?			
8. Adjusting equipment and operations eliminated on from standpoint of possible effect on the job.			
9. Other necessary precautions SPECIFY _____			

APPROVAL I have personally checked the conditions necessary and as specified authorize this "Hot" work to begin.
 APPROVED BY _____ TIME _____ DATE _____

HOT WORK PERMIT IS GOOD FOR _____ HOURS ONLY
 THIS PERMIT CAN BE ISSUED FOR ONLY ONE SHIFT. IT BECOMES VOID AT THE END OF WORK SHIFT DAY.

Back



HOT WORK PERMIT

DO NOT REMOVE THIS TAG!

TO DO SO WITHOUT AUTHORITY WILL MEAN DISCIPLINARY ACTION!

IT IS HERE FOR A PURPOSE

Remarks: _____

SEE OTHER SIDE

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Appendix I: Emergency Response

To download and/or print poster refer to SRM website: Campus Emergency Poster , Campus Emergency Response Guide


911
EMERGENCY PROCEDURES

Evacuation	Fire	Hazardous Spill	Medical	
 <ul style="list-style-type: none"> Do not use elevators, use nearest stairs and exit. Follow directions given by the building monitors or Campus Officials Go to designated evacuation point and do not return to building until instructed to do so. Assist persons with mobility needs. 	 <ul style="list-style-type: none"> Evacuate the building and notify occupants as you leave. Do not return until authorized by emergency personnel Do not use elevators Fire Extinguisher Instructions if trained: <ul style="list-style-type: none"> • P- Pull pin • A- Aim at the base of fire • S-Squeeze handle • S-Sweep from side to side 	 <ul style="list-style-type: none"> For spills not involving immediate danger, that are confined; contain and notify the Department of Safety & Risk Management (SRM) at 707-654-1076. For uncontained spill, contact Cal Maritime Police Department & SRM If immediate hazard or emergency exists, dial 911. Move away or evacuate the area. 	 <ul style="list-style-type: none"> For all medical emergencies dial 911 Be ready to describe natures and severity of the medical emergency. Provide the Campus location. Keep the victim calm and comfortable. Provide basic first aid/CPR/AED if trained. Report all work related injuries immediately to: Department of Safety & Risk Management and to Human Resources 	
Earthquake	Bomb Threat	Shelter in Place	Active Shooter	
 <ul style="list-style-type: none"> Drop, Cover, Hold under a table or desk or against an interior wall until the shaking has stopped. After shaking has stopped check yourself and others for injuries. Evacuate the building. Move towards the safest location away from building, tree's, power lines. Follow the instruction of the building monitors or Campus officials and be prepared for aftershocks 	 <ul style="list-style-type: none"> Report all threatening calls to Cal Maritime Police Department Ask Caller: When the bomb is going to explode. Where the bomb is located? What does the bomb look like? Why did you place the bomb? If suspicious object is found: Do not handle and dial 911 immediately 	 <ul style="list-style-type: none"> Stay in building; close and lock doors and windows. Move away from windows Do not use elevators Remain in shelter area until emergency personnel announce that it is safe 	 <ul style="list-style-type: none"> RUN: leave your belongings behind. If there is an escape path attempt to evacuate. Help others if possible HIDE: If you cannot get out safely. Hide. Lock or barricade doors. Silence your cell phone and stay quiet. FIGHT: as a last resort, and if you life is in danger, you may attempt to incapacitate the shooter. Work in unison with others. 	
Non-Emergency M-F Business Hours	Campus Police Department 707-654-1176	Safety & Risk Management 707-654-1076	Facilities & Maintenance 707-654-1120	Human Resources 707-654-1139
For more information and training, contact the Cal Maritime Police Department or the Department of Safety & Risk Management				Rev.2019

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Appendix J: Accident Incident Management

To download and/or print poster refer to SRM website: Accident Incident Management Poster

ACCIDENT INCIDENT MANAGEMENT

IN CASE OF INJURY OR ILLNESS AT WORK

Prompt reporting and treatment provides the initial attention to the person suffering the injury or illness as well as address the work condition that contributed to the incident. Its not about blame, its about finding a gap in the system and improving it.

If Serious*
IMMEDIATELY

Call

911

1
2
3

PROMPTLY NOTIFY

Your Supervisor & Complete an Incident Report

TREAT

Injury or Illness Promptly & Appropriately

RETURN TO WORK

Supervisor promptly notifies Safety & Risk Management

First Aid

Supervisor promptly notifies VP of all Serious Injuries

Contact Human Resources to coordinate care at designated treating facility

Complete an Incident Report Online

<https://www.csun.edu/web/safety/home>

Non-Emergency M-F Business Hours	Campus Police Department	Safety & Risk Management	Human Resources-Workers Comp
	707-654-1176	707-654-1076	707-654-1021

For more information and training, contact the Department of Safety & Risk Management Rev.2.2019

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Appendix K: Training Log



TRAINING SIGN IN SHEET

Subject		Date	
Instructor Name			
Department			
Course Level	<input type="checkbox"/> Awareness	<input type="checkbox"/> Competent Person	<input type="checkbox"/> Certified Person <input type="checkbox"/> Other
Frequency	<input type="checkbox"/> Initial	<input type="checkbox"/> Annual-Refresher	<input type="checkbox"/> Process Change <input type="checkbox"/> Post Incident

The attendees listed have satisfactorily participated and been tested per Regulation/University training requirements.

	PRINT NAME	STATUS (Staff, Faculty, Student)	SIGNATURE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Retain Original at Department Level & Submit Copy to Risk Management

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