

## 1. Pre-Planning

- Despite adherence to cylinder safety practices, accidents involving gases may occur. Refer to ESH-(6000-S)-185207 Emergency Management Standard for addressing emergencies at SURF. The amount of damage sustained by personnel and property from these accidents is greatly influenced by the quality of the emergency plan. Users of compressed gas cylinders must be familiar with necessary safety precautions. ESH-(2000-S)-73320 Work Planning and Control Standard must be adhered to for using compressed gases and must include a discussion of possible accident scenarios, appropriate employee responses, and shall take into account the following factors:
  - The nature of the operation (e.g., experimental design, equipment used, and the types of injury that can possibly occur).
  - The potential location of a release or spill (e.g., outdoor versus indoor, in a laboratory, corridor or storage area, on a table, in a hood, or on the floor).
  - The quantities of material that might be released and the type of containment (e.g., compressed gas tank size, and manifold systems).
  - The chemical and physical properties of the compressed gas (e.g., its physical state, vapor pressure, and air and water reactivity).
  - The hazardous properties of the compressed gas (e.g., its toxicity, corrosiveness, and flammability).
  - The availability and locations of emergency supplies and equipment.
  - An emergency plan of action that identifies building evacuation routes, emergency telephone numbers, chemical containment procedures, fire extinguisher usage, etc.

## 2. Emergency Plan

- If your area is using a compressed gas, plans should be developed regarding how to handle a simple and major leak prior to using the gas. This plan should consider the nature of the gases being handled, which are their chemical and physical properties.
  - At a minimum, the plan should specify the following:
    - ◆ Alarm system & evacuation procedure
    - ◆ Response personnel
    - ◆ Emergency equipment
    - ◆ Containment or disposal methods
- Before use, consult with ESH for additional safety procedures and recommended methods for respond to leaks. Emergency plans for toxic and flammable gases must have approval from ESH.

## 3. Minor Leak

- Occasionally, a gas cylinder or one of its component parts may develop a leak. Most of these leaks occur at the top of the cylinder, in areas such as the valve threads, pressure safety device, valve stem, or the valve outlet. Here are some guidelines to dealing with minor leaks:

- For non-toxic gases, verify suspected leaks using a gas detector or soapy water solutions (a flame shall not be used for detection). If the leak cannot be stopped by tightening a valve gland or packing nut, notify the vendor. Do not try to fix a leak on a toxic or highly toxic gas cylinder; instead initiate emergency action procedure.
- For flammable (non-toxic), inert or oxidizing gases (non-toxic), move the cylinder to an isolated, well-ventilated area (within or next to a fume hood), away from combustible materials. Post signs that describe the hazard.
- For corrosive and toxic gas leaks, immediately contact the vendor for leak remediation or cylinder removal. Leave the area until the vendor corrects the leak or removes the cylinder. Do not remove a leaking toxic gas cylinder from a ventilated cabinet.

#### **4. Major Leaks**

- In the event of a large gas release or if an accident takes place, follow these emergency procedures:
  - Evacuate the area, secure entrances, and provide assistance to others on the way out.
  - Activate building and area fire alarms (or chemical safety alarms if applicable).
  - Follow the ESH-(6000-FD)-100304 Emergency Reporting System Flow Diagram and immediately report the incident as exact a location as possible.
  - Provide emergency response officials with the details of the problem upon their arrival.

#### **5. Accidents Involving Personnel Injury**

- For medical emergencies, utilize the Emergency Reporting System Flow Diagram and provide an exact location and condition of injured individual if known.
- Assist injured personnel and administer immediate first aid, which may include:
  - Use of emergency showers (in case of burning clothing or chemical exposure).
  - Removing contaminated clothing.
  - Irrigating the eyes at an eyewash station.
  - Administering cardiopulmonary resuscitation (CPR).
  - Notify personnel in adjacent areas of any potential hazards.
  - Move injured personnel only if necessary to prevent further exposure or harm.

#### **6. Fire and Fire-Related Emergencies**

- Small, isolated fires may be extinguished using the appropriate fire extinguisher if personnel are confident that they can safely extinguish the fire.
- Large or rapidly spreading fires, evacuate the area.

#### **7. Reporting of Incidents (excludes minor leaks)**

- All incidents require submission of the ESH-(3000-F)-173324 First Report and Incident Investigation form to a supervisor before the end of shift.

## **8. Spill Response**

- All leaking gas cylinders are an emergency. Leaks, which occur away from the cylinder in gas lines, tubing, or apparatus can generally be stopped by closing the main cylinder valve.

## **9. Compressed Gas Leak – Inert gas**

- If closing the cylinder valve cannot stop the leak, and it is an inert atmospheric gas (e.g., nitrogen, carbon dioxide, etc.) clear the affected area and/or floor.
  - Isolate any leaking cylinders of inert gases in a well-ventilated area.
  - Place cylinder in or next to a fume hood if available/possible.
  - Move leaking cylinders only if it can be done safely.
  - Remove any ignition sources.
  - Restrict access to the area.
  - Contact the Duty Officer.
  - Contact your supplier and return all problem cylinders to the supplier for proper repair.

## **10. Compressed Gas Leak – Major**

- If the leak is a flammable, toxic, or corrosive gas and is outside of a ventilated enclosure that will contain the gas, immediately activate the building fire alarm and evacuate the area.
- Follow the Emergency Reporting System Flow Diagram.

**Revision History**

<b>Rev</b>	<b>Date</b>	<b>Section</b>	<b>Paragraph</b>	<b>Summary of Change</b>	<b>Authorized by</b>
01	10/4/2023	NA	NA	Initial Release	CCR 835