SECTION: CAMPUS OPERATIONS
AREA: GENERAL AND OCCUPATIONAL SAFETY
SUBJECT: COMPRESSED GAS

PURPOSE

UAMS is committed to providing a safe environment for employees and students who need to work with and around compressed gas containers. This policy is written to provide general guidance in the use, handling, transport and storage of compressed gases.

SCOPE

All UAMS employees, faculty and staff.

RESPONSIBILITIES

Principal Investigators, Managers, Supervisors

- Ensures that University policies are enforced and safe work practices are followed.
- Provides for and requires adequate instruction in the use and maintenance of gas cylinders by employees.

Employees, Students

- Performs all work with compressed gases in accordance with UAMS policies and prudent safe work practices.

Occupational Health & Safety (OH&S)

- Ensures that University policies are enforced and safe work practices are used.
- Assists, advises and provides training as necessary.
- Reviews and approves procedures for all controlled, highly toxic or hazardous gases.
- Assists, advises and instructs University employees in the care and handling of compressed gas cylinders and gas systems.

General Guidelines

Read the label on the cylinder and identify the contents before using. If the label is illegible or missing, return the cylinder to the supplier. Don't rely on stenciling or color of the cylinder. Do not use a cylinder with unidentified contents. All cylinders must be permanently labeled as to their contents and if they are full or empty (example - an empty cylinder may be marked “MT”. Empty cylinders must also be separated from full cylinders. Know the hazards of the contents

and follow appropriate safe use practices for the material inside. Reference the substance's Material Safety Data Sheet (MSDS) for additional information.

1. All compressed gas cylinders must be properly stored in compliance with the Arkansas Fire Prevention Code (AFPC) and National Fire Protection Association (NFPA) standards. All cylinders whether empty or full must be stored upright and secured by chains, straps or in racks to prevent them from falling.
2. Gas cylinders must be secured to prevent falling due to accidental contact, vibration, or earthquakes. Cylinders must be secured in one of the following ways:
    - By a noncombustible, restraint system (e.g., chains) that secures the cylinder at the top one-third.
    - By a noncombustible rack, framework, cabinet, approved strapping device, secured cylinder cart, or other assembly that prevents the cylinder from falling.
3. Cylinders must be segregated by contents. For example, flammable gases must be stored separately from oxidizing gases.
4. Compressed gas cylinders must be transported with protective caps in place. Cylinders may be moved on chain equipped hand trucks or carts; they must never be rolled or dragged.
5. Cylinders without regulators must be chained or strapped at an angle on carts designed for such cylinders. Cylinders with regulators must be upright, attached to the wall or a sturdy structure.
6. If a cylinder valve cannot be opened, the valve should never be forced. If a valve cannot be opened by hand, the cylinder should be returned and another obtained. Employees must not attempt to repair cylinders or cylinder valves, or to force stuck or frozen cylinder valves.
7. All cylinder storage areas, outside or inside, shall be protected from extreme heat and cold and from access by unauthorized personnel.
8. Do not allow grease or oil to come in contact with oxygen cylinder valves, regulators, gauges or fittings. An explosion or fire can result. Oxygen cylinders and apparatus must be handled with clean hands and tools.
9. Open cylinder valves slowly, directed away from your face.
10. Report all suspected leaks immediately.
11. If the material in the tank is highly toxic or flammable and you suspect a leak, evacuate everyone out of the area and report it to the appropriate person in your department.
12. Compressed gas cylinders, valves, regulators or other assemblies included with cylinders shall not be present in the same room as a Magnetic Resonance Imaging (MRI) device unless proven nonmagnetic and/or tested and deemed suitable for this environment.

Cryogenic Liquids

1. All cryogenic liquids should be used with caution due to the potential for skin or eye damage due to the low temperature, and the hazards associated with pressure buildups in enclosed piping or containers.
2. A full face shield, loose fitting cryogenic handling gloves, apron, and cuff-less pants are the recommended equipment for transferring cryogenic fluids.

3. Portable containers should only be used where there is sufficient ventilation. Do not place containers in a closet or other enclosed space where there is no ventilation supply to the area. The buildup of inert gas in such an area could generate an oxygen deficient atmosphere.
4. Special vacuum jacket containers with loose fitting lids should be used to handle small quantities. Vacuum jacketed containers provided by the gas supplier will have overpressure relief devices in place.
5. Any space where cryogenic fluids may accumulate (consider leakage into enclosed equipment) must be vented or protected by overpressure relief devices. Tremendous pressures can result in enclosed spaces as the liquid converts to gas. For example, one cubic centimeter of liquid nitrogen will expand to 700 times this volume as it converts (warms) to its gaseous state.
6. Containers to be filled with cryogenic liquids should be filled slowly to avoid splashing.
7. Cryogenic containers showing evidence of loss of vacuum in their outer jacket (ice buildup on the outside of the container) should not be accepted from the gas supplier. Contact with air (or gases with a higher boiling point) can cause an ice plug in a cryogenic container.

Transporting Gas Cylinders

1. Leave the valve protection cap in place until the cylinder has been secured against a wall or bench or placed in a cylinder stand and is ready for use.
2. Use a hand truck, cylinder cart or other suitable device to transport cylinders, even short distances. Secure the cylinder to the hand truck with a chain or strap.
    - Do not roll drag or slide containers.
    - Do not lift cylinders by the cap.
    - Do not transport cylinders with the regulator attached.
    - Do not transport by hand without the aid of a carrying device.

Training Requirements and Competency Assessment

All personnel handling or using cylinders must have general training initially at time of employment. Supervisors are required to attend initial training only. All others are required annual refresher training in addition to initial training.

Training will include review of information on the hazards associated with compressed gas covering oxygen displacement, fires, explosions, toxic effects from certain gases and the physical hazards associated with pressurized systems. Special storage, use and handling precautions necessary to control these hazards will also be covered.

Employees will require refresher training under any of the following conditions: previous training obsolete.

- Changes in the types of cylinder systems or equipment used render previous training obsolete.

- Inadequacies in an employee's knowledge of compressed gas cylinders or equipment or observed behavior indicate that the employee has not retained the required training.

The training program will be provided by OH&S and will include classroom instruction and operational training on specific compressed gas cylinder hazards on campus. Affected laboratory personnel shall receive this training during annual chemical hygiene safety training. All other affected University employees shall receive this training through departmental or hazard communication training.

Incident Reporting

In the event of an accident, unsafe condition or other situation involving a gas cylinder of any size or pressure, report the incident to OH&S 686-5536.

In case of a leak or other emergency requiring immediate assistance contact:

- OH&S 686-5536: Mon-Fri 7:30 AM to 4:00 PM
- Campus Operation Call Center 686-5891: Mon- Fri 4:00 PM to 7:30 AM and all day on weekends & holidays.

Signature: _____

Date: February 24, 2011