Compressed gas storage

By Connie L. Muncy

If you do not respect me ...

I will jet away faster than any dragster. I will smash through brick walls.

I will spin, ricochet, crash and splash through anything in my path.

(Compressed Gas Association)

Before you begin
Review this information and your organization's policies with respect to safe storage of compressed gases. Prepare a list of the types of compressed gases used in your facility along with a list of the locations of your compressed gas storage areas.

Workplaces often use a wide variety of compressed gases for a broad spectrum of purposes. Yet these fascinating materials all have one thing in common – if stored improperly, they can be deadly. Storage hazards may include injury from falling cylinders, exposure to toxic gases, asphyxiation, frozen body tissues, fire or explosion. Studies have shown that a typical "K" size nitrogen compressed gas cylinder (5-feet tall by 9-1/4 inches in diameter) has stored energy equivalent to half a pound of TNT. Mishandle such a cylinder, and it could behave like a bomb or missile.

To keep tragedy from occurring in compressed gas storage areas:

- Always store cylinders upright;
- Install "no smoking" signs where flammable gases are stored;
- Secure gas cylinders at all times to prevent falling;
- Use caps on all cylinders designed to accept a cap except when connected for use;
- Segregate incompatible gases;
- Segregate full and empty cylinders;
- Ensure all labels can be read;
- Keep heat and flame away;
- Keep electrical devices and combustible materials away;
- Do not store cylinders in direct sunlight, or near sources of heat or spark;
- Do not store cylinders in aisles or hallways, or under staircases.

Do not store cylinders in unventilated areas (e.g., closets and footlockers); ask the group why storing cylinders in such locations could prove hazardous. Answers should include a discussion of how undetected build-up of gases from a leaking cylinder could result in a flammable, explosive, toxic or asphyxiating atmosphere.

Ask the group what extra precautions should you take in outdoor cylinder storage areas. Answers might include:

- Not storing near electrical wires;
- Protecting cylinders from impact;
- Forbidding smoking, open flame or combustion sources within 20 feet;
- Storing cylinders on a flat, dry surface as well as protecting them from damage caused by the elements (rain, snow, wind, direct sunlight, etc).

Point out that some compressed gases possess additional, unique hazards. For this reason it is important for workers to maintain and familiarize themselves with the material safety data sheet (MSDS) for all compressed gas cylinders in your workplace. These sheets contain important information on proper handling, storage, usage, emergency procedures and first-aid instructions. Below are examples of unique requirements for particular gases.

- Keep oxygen, a potent oxidizer, from contact with oils, dirt, fuel gases (e.g., propane and acetylene), hydrocarbons and any other combustible materials. Not taking these precautions could cause an explosion. Keep oxygen at least 20 feet away from these materials, or install a non-combustible barrier of at least 5 feet with a fire-resistance rating of at least 30 minutes.
- Never generate, pipe or use acetylene at >15 psig. Under certain conditions, acetylene readily forms explosive compounds with copper, silver and mercury. Keep acetylene from contacting these metals. Also, store acetylene cylinders in an upright position to allow the proper functioning of a porous calcium silicate filler and solvent, such as acetone. Such materials are added to the cylinders to help stabilize this gas.

Group activity

- Supply the group with a MSDS for a compressed gas used in your workplace. Ask group members to identify requirements for handling and storage noted therein.
- Emphasize they must periodically inspect storage areas. Have the group walk to a nearby compressed gas storage area and complete a practice inspection. Use the Compressed Gases Self Inspection check list located on the National Institute for Safety and Health's Web site: http://www.cdc.gov/niosh/docs/2004-101/chklists/r1n29c~1.htm

Connie Muncy, a certified industrial hygienist, is the safety officer for Montgomery County Sanitary Engineering water utility in Kettering, Ohio.