Title: Standard Operating Procedure for Compressed Gas Cylinder Handling		
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1. INTRODUCTION AND SCOPE

Compressed gas cylinders are used in a variety of applications involved with ambient air monitoring. Safe handling of these cylinders is required for all concerned. This procedure is intended to outline handling practices and procedures for all types of compressed gasses.

2. PRINCIPLE OF THE METHOD

Principle is not applicable to this procedure

3. MEASUREMENT RANGE AND SENSITIVITY

Range and Sensitivity are not applicable to this procedure

4. EQUIPMENT AND APPARATUS

Equipment required for proper handling of cylinders can include the following items:

Cylinder dolly with chains for manual, local cylinder moves

Cylinder wall clamps for proper storage

Established cylinder storage racks

Ratchet straps for vehicular transportation

5. INTERFERENCES

Interferences are not applicable to this procedure

6. PRECISION AND ACCURACY

Precision and accuracy are not applicable to this procedure

7. SITE REQUIREMENTS

For cylinder storage the site requirements are best accomplished by an installed cylinder rack constructed of steel with chains to secure the cylinders in place.

McIntyre Centre has cylinder storage racks in all the rooms where cylinders are required to be. In some cases, where a cylinder in needed at a workbench where there is no cylinder rack, a temporary cylinder clamp can be secured to the workbench in order to strap the cylinder in place while in use.

The ambient monitoring station typically have a cylinder rack installed in each station. Where there is no rack, cylinder wall clamps are to be used.

8. INSTALLATION REQUIREMENTS

Not applicable

9. OPERATIONAL REQUIREMENTS

Handling Procedures

The following procedures define the proper receiving, transporting, handling and use and disposal of compressed gas cylinders at AENV.

RECEIVING

1. Review MSDSs
2. When a cylinder is received from a supplier it should have a valve protection cap, a DOT label, the date of the last hydrostatic test and labels identifying the contents.
3. Cylinders received with only color coding should NOT be accepted, as there is no universal color code for identifying gas cylinders.
4. Cylinders must be secured against falling upon receipt, or transferred to the point of use and secured there.

STORAGE

1. Compressed gas cylinders should be stored in a level, dry fire resistant area that is well ventilated. The storage area should be separated from the area where the gas cylinders are used by distance or by physical barriers.

2. Store cylinders away from sources of ignition or excessive heat. Pressure-relief devices are installed on flammable gas cylinders and most other cylinders to prevent cylinder rupture in the event of fire or high temperatures.

3. Store oxygen away from flammable gases. Oxygen should be stored at least 25 feet away from flammable gases or separated by a five ft. high non-combustible wall.

4. Do not store cylinders near elevators, gangways or in locations where moving objects may strike or fall on them.

5. Cylinders must be chained or strapped in place to prevent then from falling over. A falling cylinder may shear off its valve causing the escape of high pressure gas resulting in an explosion or the rapid projection of the bottle and/or valve. A 250 cu . ft. cylinder pressurized at 2500 psi, with the valve broken off, becomes a rocket and attains a speed of 35 MPH in 0.1 second. Store cylinders with valve caps securely attached whenever cylinders are not in use.

6. Corrosive gases should be stored for the shortest possible time period to prevent corrosion of valves, labels and regulators, and to avoid potential leakage.

7. Signage requirements for storage area i.e. ANOXIA etc. N2 hazards.

TRANSPORTING

1. Always use a hand truck (dolly) to transport cylinders. Do not drag, roll or slide cylinders. Leave the valve protection cover ON until cylinders are secured and ready to use. Do not transport a cylinder with the regulator installed. Do not use a transport device to hold a cylinder in use unless it is adequately secured from falling.

2. Do not transport compressed gases in closed vehicles. Cylinders must be chained or otherwise secured during transporting in a open or well ventilated vehicle.

3. Flammable gases and oxygen should not be transported in the same vehicle.

4. Always handle cylinders as if they were full. Accidents have occurred when containers were under partial pressure and were thought to be empty.

5. If it is necessary to transport gas bottles with a crane, forklift, or other lifting fixture, an approved carrier designed for that purpose must be used.

HANDLING AND USE

1. Before use, an evaluation of the operation should be made and appropriate safeguards instituted. The major hazard of a compressed gas is often a function of how and where it is used.

2. The cylinder valve should be positioned so that it is accessible at all times. The main valve MUST be closed when the cylinder is not in active use. NEVER use wrenches or pliers to open the main valve unless it is a specially designed key provided by the supplier. Most cylinders are equipped with a hand wheel valve. If the valve is not operational, return to supplier labeled "inoperable".

3. NEVER crack open valves on unregulated cylinders. The main valve on a regulated cylinder should be opened slowly. The main valve should NOT be opened all the way. Never face a gage while opening a cylinder. Stand to the side in case of a malfunctioning valve.

4. With the cylinder valve open and the flow control valve in the closed position, set the desired delivery pressure by turning the delivery pressure adjusting screw clockwise until the desired pressure is reached. While the function of the regulator is to set and maintain a given gas delivery pressure, flow control is achieved by the use of the flow control valve located at the regulator outlet or by a supplementary needle valve.

5. Always turn off the cylinder by first closing the main cylinder valve and then the regulator. The pressure gages should be brought back to zero.

6. When cylinders containing different gases are manifolded, one way or check valves should be placed on line to prevent accidental gas mixtures due to pressure differences.

7. NEVER strike an electric arc on or direct a flame at a cylinder.

8. Appropriate personal protective equipment (goggles, face shields, gloves) should be worn with compressed gases. See MSDS first.

9. Never pressurize a sealed system unless a pressure relief valve is installed on the system or it is rated to take the full bottle pressure without explosion.

ADDITIONAL CONSIDERATIONS FOR TOXIC AND FLAMMABLE GASES

1. Toxic, flammable and corrosive gases should be used in a well ventilated area or fume hood. Gases with a health hazard label of 3 or 4 must be used in an approved gas cylinder cabinet.

2. Users of flammable gas cylinder sizes in laboratories must consider fuel loading when choosing the size and number of cylinders. The amount of cylinder gas necessary to stay below the lower explosive limit should be evaluated.

3. Ground all cylinders and piping containing flammable gases to prevent the hazards caused by the buildup of static electricity.

4. NEVER use oil or grease on valves or gages intended for oxygen cylinders. Use only oxygen service regulators and components.

DISPOSAL

1. Mark empty cylinders "empty" and store separately from full ones. Ensure the gas supplier is aware of the location of the empty cylinders for pickup and that a “receipt” is obtained for returned cylinders.

2. A cylinder is considered empty at 50 psi. DO NOT EMPTY COMPLETELY as suction and backflow can occur contaminating the cylinder.

10. CALIBRATION

Not applicable.

11. APPLICABLE DOCUMENTS

None

12. LITERATURE REFERENCES

- Canadian Centre for Occupational Health and Safety (CCOHS); Compressed Gas Cylinder Handling. Publication I07

13. REVISION HISTORY

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14. APPROVAL

Approved by: **Harry Benders** **Date: June 20, 2008**

Title: **Air Monitoring Team Leader**