

OUTLINE OF MAJOR PROGRAM POINTS

The following outline summarizes the major points of information presented in the program. The outline can be used to review the program before conducting a classroom session, as well as in preparing to lead a class discussion about the program.

- **When a gas is put into its cylinder, it is "compressed" significantly.**
 - For instance, 260 cubic feet of acetylene fits in a normal size cylinder.

- **Compressing gas puts it under a lot of pressure.**
 - That can lead to dangerous situations.

- **A small leak in a cylinder full of a compressed flammable gas, for example, can cause major problems.**
 - High pressure forces out the gas.
 - The gas can then spread over great distances.
 - It can pass ignition sources, such as electric equipment, sparks or open flames... which could cause a fire or explosion.

- **In a situation like this, there are three major things occurring:**
 - A leak in the system.
 - The spread of the gas due to high pressure.
 - Exposure to the specific hazards of the gas itself.

- **There are other hazards that we need to watch out for when dealing with compressed gases as well. So we need to:**
 - Learn about the hazards of the gas itself.
 - Pay attention to labels and warning signs.
 - Consult the MSDS, or your supervisor, if you have any questions.

- **Compressed cryogenic materials have special hazards.**
 - They produce extremely low temperatures.
 - This can cause severe burns to the skin, or even frostbite.
 - Low temperatures can also make valves and washers brittle and break (resulting in leaks).
 - The steel cylinder might even rupture on impact.

- **These hazards are especially dangerous because compressed cryogenic liquids produce a great deal of gas when released into the atmosphere.**
 - If the gas is oxygen it can make it much easier for a fire or an explosion to occur.
 - Other gases may push breathable oxygen out of the room, leading to asphyxiation.

- **With hazards such as cryogenics, wearing PPE is especially important. This should include:**
 - Goggles.
 - Impervious gloves.
 - Even body suits.

- **Damaged cylinder valves can also cause serious problems.**
 - The rapid release of gas can turn the cylinder into a virtual "rocket".
 - The cylinder can also spin at very high speeds, wiping out everything in its path.

- **Special care should also be taken when storing compressed gas cylinders. You should:**
 - Keep them in a cool, dry, well-ventilated space.
 - Secure them in an upright position (loosely draped chains are not adequate).
 - Keep them out of direct sunlight.
 - Separate flammable gases and oxidizers (or keep them at least 20 feet apart).
 - Keep oxidizers and flammables away from live electrical equipment and other ignition sources.
 - Some states have even more rigorous storage laws (ask your supervisor if you have questions).

- **Smoking should not be permitted in any cylinder storage area.**
- **It is essential to know what is inside any gas cylinder:**
 - So don't tamper with the cylinder's identifying labels or stencils.
- **Don't assume that the color of the cylinder will tell you what type of gas is inside.**
 - Colors are chosen by the cylinder owner.
 - There is no standard "color-coding" for cylinders.
- **Be extremely careful whenever you are handling compressed gas cylinders.**
 - Never drag them across the floor (this can cause damage).
 - Don't hand roll cylinders for more than a few feet.
 - Make sure a cylinder's "safety cap" is on whenever it is moved.
 - In most situations, cylinders should be moved with a "cylinder handtruck".
- **If a compressed gas cylinder falls, don't try to catch it.**
 - More people are injured while trying to catch heavy falling cylinders than by any other compressed gas hazard.
 - Always wear safety shoes to protect your feet when handling cylinders.
- **Whenever you detect a leaking cylinder, report it to your supervisor immediately.**
 - Leaking cylinders should be removed from service at once.
 - Rusty or corroded cylinders should be "retired" as well, since they could develop leaks at any time.
- **Before "hooking up" a compressed gas cylinder there are several pieces of equipment that you must be familiar with.**

- **The first piece of equipment is a "regulator."**
 - It controls the speed at which a gas comes out of the cylinder.
 - It is essential to the safe use of compressed gas.

- **A second device is called a "CGA fitting."**
 - It should be permanently attached to the regulator.
 - It connects to the cylinder's valve, to allow the gas to leave the cylinder.
 - The size and design of CGA's vary, depending upon the type of gas in the cylinder.
 - Never attempt to force a CGA onto a valve (if it isn't fitting correctly, something is probably wrong).

- **The third piece of equipment you need to be familiar with is the "pressure relief device."**
 - It prevents rupture or violent pressure releases if cylinders are exposed to extreme heat.
 - It allows a controlled release of the compressed material, which prevents the cylinder from exploding.
 - There are no release devices on cylinders of toxic or poisonous gases (because of the hazards that these gases present).

- **After you have hooked a compressed gas cylinder into a system, check the fittings and valves for leaks.**
 - Cover surfaces with a diluted soap solution.
 - Any sign of bubbles will indicate a leak.
 - Often, leaky valves can be repaired by just tightening them.

- **If you suspect that a cylinder is leaking and you can't fix it, there are several things you should do.**
 - Alert other employees in the area (evacuation may be needed).
 - Unplug potential sources of ignition (if flammables are involved).

- If you are called on to repair a compressed gas cylinder that is known to be leaking:
 - Make sure you wear a self-contained breathing apparatus (you must be trained on its use).
 - Have backup personnel in place to assist you, if needed.
 - If a problem (such as a fire or explosion) occurs, follow your facility's emergency plan.
 - Consult the MSDS for the substance involved, to determine its hazards.

* * * SUMMARY * * *

- Working with compressed gas cylinders is not difficult if you have learned how to handle them.
- Know the properties and hazards of the compressed gases that you work with.
- Use proper equipment to transport and store cylinders.
- Follow standard operating procedures in hooking up and operating compressed gas cylinders.