

Chapter 2. Setting Up Hazardous Material Storage Areas

References:

- 29 Code of Federal Regulations (CFR) Part 1910.101 (compressed gases, general requirements)
- 40 CFR Part 264.175 (hazardous waste storage requirements)
- Ohio Administrative Code (OAC) 3745-55-75 (HM and HW storage requirements)
- Army Regulation 200-1, *Environmental Protection and Enhancement*, Chapter 9 (materials management)
- Army Regulation 200-1, *Environmental Protection and Enhancement*, Chapter 10 (waste management)
- Technical Manual (TM) 38-410, *Storage and Handling of Hazardous Materials*
- Military Standard (MIL STD) 101 (color coding and marking compressed gas cylinders)
- Compressed Gas Association Pamphlet P-1-1965 (handling, storage, and use of all compressed gas cylinders)
- American National Standards Institute (ANSI) Z-49.1 (handling, storage, and use of all compressed gas containers for welding and cutting)
- National Fire Prevention Association (NFPA) 55, *Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders*

This chapter addresses the following topics:

2.1	Storage Cabinets.....	2-1
2.2	Storage Rooms and Buildings	2-3
2.3	Storage Racks.....	2-5
2.4	Storage for Compressed Gases.....	2-6
2.5	Resources.....	2-10

2.1 Storage Cabinets

All cabinets must meet National Fire Protection Association (NFPA) Code 30 and OSHA requirements for approved storage cabinets.

The cabinet color depends on the HM type. **If you have an older version of a cabinet, you are not required to repaint it.**

HM Type	Cabinet Color
Flammables	Yellow
Corrosives	Blue
Oxidizers	Red
Pesticides	Green

Keep cabinets clean and orderly, and maintain all structural integrity and hardware, including doors, hinges, and shelves. Do not remove the door or ventilation bungs, penetrate the wall, modify ventilation, or otherwise modify the cabinet. Keep cabinet doors closed when materials are not being transferred.

To set up a cabinet, complete the following steps:

- Step 1.** Coordinate with the Battalion S4 to request a DA Form 3953 to obtain a HM cabinet and submit to Environmental Office for approval.
- Step 2.** Use the following guidelines to select a location for the cabinet:
 - a. Locate the cabinet indoors in a well-ventilated area near the location that HM will be used.
 - b. Maintain easy access to the cabinet.
 - c. Do not block doors.
 - d. Do not place the cabinet near doors, exits, pathways, or stairs.
 - e. Do not place the cabinet in break rooms, latrines, and offices.
 - f. Do not place the cabinet near floor drains, drainage channels, or areas with high foot or vehicle traffic.
 - g. As a BMP, properly ground flammable material cabinets.
- Step 3.** Assign a four-character identifier to each cabinet and mark it on the front top right corner. This identifier will consist of one of the four abbreviations listed below used to differentiate cabinet contents and a two-digit sequential number (e.g., FL

01, FL 02, etc.). For example, the cabinet shown below in Figure 2-1 is identified as FL 01. This number is needed for inventory and inspection purposes.

FL – Flammable cabinets

CL – Corrosive cabinets

OL – Oxidizer cabinets

PL – Pesticide cabinets

Figure 2-1. Flammable Storage Cabinet



- Step 4.** Post any warning signs required by the SOHM. Do not place unauthorized signs, labels, stickers, or markings on the cabinet.
- Step 5.** Ensure that an appropriately rated fire extinguisher (contact SOHM) and spill response equipment are located nearby.

Note: Each cabinet must have a unique four-character identifier. If another unit/activity shares a work area, coordinate with them so each number is used only once. If sharing an area with another activity, identify unit/activity on front top left corner. Not all HMs can be stored outdoors or in freezing environments. Check product labels and SDS to ensure proper storage of the HM.

2.2 Storage Rooms and Buildings

The Environmental Office must be notified prior to establishing an HM storage room or building, or modifying an existing location. Keep storage rooms and buildings clean and orderly. Maintain their structural integrity and hardware including doors, hinges, and shelves. Do not

remove doors, penetrate walls, alter the ventilation, or otherwise modify the room or building. Place HM containers with a total capacity of five gallons or more in a POL shed or portable secondary containment device. (If these storage means are not available, the storage area must be bermed to contain the volume of the area's largest container **OR** 10 percent of the total volume of all the area's containers, whichever is greater.)

To set up a storage room or building, complete the following steps:

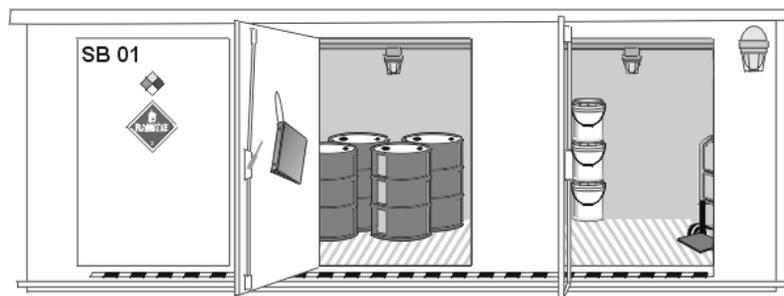
- Step 1.** The Environmental Office must approve the proposed storage area.
- Step 2.** Provide primary and secondary containment. (See Appendix A) Secondary containment capacity must be the volume of the area's largest container **OR** 10 percent of the total volume of all the area's containers, whichever is greater.

Note: The room floor space itself usually provides enough secondary containment; however, you need to ensure the spill cannot escape the room. You could equip, for example, each door with a sealed threshold. You can also store HM in pans or tubs on the shelf, making sure the HM is compatible with the container (for example, store acids in plastic tubs).

- Step 3.** Ensure that an appropriately rated fire extinguisher (contact the SOHM for approval) and spill response equipment are located nearby.
- Step 4.** Assign a four-character identifier to the storage room (SR) or storage building (SB) and mark it on all doors to the room. This identifier will consist of one of the two abbreviations used to identify a storage room or storage building and a two-digit sequential number (e.g., SB 01). See Figure 2-2. The number is needed for inventory and inspection forms. Ensure the HM storage is clean and organized and that all materials are compatible.

Note: Shelves and products in storage rooms and buildings do not have to be labeled. SDSs and inventories are still required.

Figure 2-2. Storage Building



- Step 5.** Post warning signs required by the SOHM. Do not place unauthorized signs, labels, stickers, or markings on the room or building.

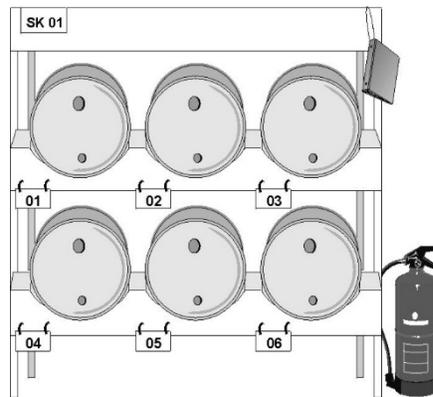
2.3 Storage Racks

Notify the Environmental Office for approval to establish a HM storage rack or to modify an existing location.

To set up a storage rack, complete the following steps:

- Step 1.** Notify the Environmental Office of the proposed location before use.
- Step 2.** Provide primary and secondary containment. Secondary containment capacity must be the volume of the rack's largest stored container **OR** 10 percent of the total volume of all rack's containers, whichever is greater. Place drip pans under active spouts, faucets, valves, and bungholes.
- Step 3.** Ensure that an appropriately rated fire extinguisher (contact SOHM) and spill response equipment are located nearby.
- Step 4.** Assign a two-letter, two-number identifier and mark it on the rack or on a sign near the rack. This identifier will consist of the abbreviation SK for Storage Rack and a two-digit sequential number (e.g., SK 01). See Figure 2-3 as an example.
- Step 5.** Post any warning signs required by the SOHM. Do not place unauthorized signs, labels, stickers, or markings on the rack.

Figure 2-3. Storage Rack



Note: Each rack must have a unique four-character identifier. If another unit/activity shares this rack, coordinate with them so the number is used only once. You may also identify unit/activity on rack or a sign near the rack.

2.4 Storage for Compressed Gases

Caution: **DO NOT** store compressed gas cylinders or bottles in an HM cabinet.

DO NOT use gas cylinders as rollers, supports, or any other unintended purpose.

DO NOT accept, issue, or use a gas cylinder with unidentified contents. If the contents are unknown label the cylinder “Contents Unknown” and return it to the supplier.

DO NOT place cylinders where they could become part of an electrical circuit.

DO NOT drop cylinders or allow them to strike against each other.

DO NOT alter or mark directly on the cylinders.

DO NOT remove labels applied by the gas manufacturer.

DO NOT lift cylinders with cranes or mechanical lifts unless properly fastened in appropriate containers, racks, or cradles.

DO NOT use rope, chain slings, or electromagnets to lift cylinders.

DO store liquefied flammable gas cylinders upright so the pressure relief valve is in direct contact with the vapor space in the cylinder.

DO separate all cylinders by compatibility.

DO keep cylinders at least 20 feet away from combustible materials or isolate them with five-foot high barriers of non-combustible materials with a minimum 30-minute fire resistance rating.

DO use a carton or crate to store small cylinders and bottles of compressed gas. Store the cartons or crates in low traffic areas or, preferably, on top of storage cabinets in HM storage areas. They must be in sight at all times.

Compressed gases are packaged under charged pressure in metal cylinders and must be handled with extreme care, particularly flammable and explosive gases.

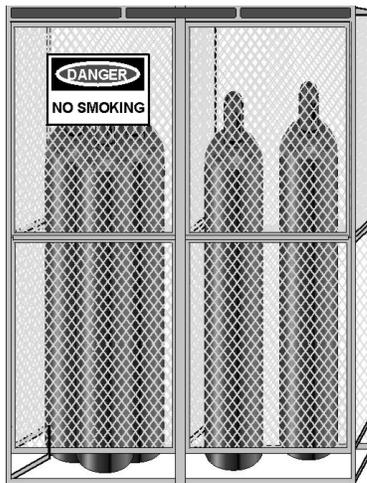
When storing compressed gases, excluding fire extinguishers and aerosol cans, additional guidelines must be followed. A compressed gas is a gas that is packaged under charged pressure. Because compressed gases are under pressure, handle such gases with extreme care, particularly the flammable and explosive gases. For additional guidance concerning compressed gas storage requirements reference AR-700-68.

The SOHM is responsible for designing and approving compressed gas storage areas. The guidelines listed below will help you maintain those areas properly to protect human health and the environment.

- a. Contact the SOHM for specific guidance in selecting or constructing a safe compressed gas storage location.
- b. Ensure that all electrical installations meet electric code requirements.
- c. Use skylights, if possible.
- d. Construct storage area shelves, racks, and floors with noncombustible materials. Design them to safely support the cylinder weight.
- e. Use chains or other clamps to anchor the cylinders to the wall or a stable structure to prevent them from falling over.
- f. Label cylinders IAW MIL STD-101. Fill out tags with the proper name of the cylinder contents.
- g. Ensure the area is well ventilated (complete change of air at least six times each hour).
- h. Separate storage facilities from other buildings by at least 50 feet.
- i. Store gases that support combustion in different sheds separated by 50 feet.

- j. Keep dry vegetation and combustible materials at least 15 feet away from storage areas.
- k. Keep cylinders out of the sun and off the ground (earth).
- l. Protect storage areas from vehicular traffic.
- m. Lock storage areas to prevent unauthorized entry.
- n. Post NO SMOKING signs (see Figure 2-4). These can be ordered through SOHM.

Figure 2-4. Properly Stored Cylinders with NO SMOKING Sign



- o. Do not allow open flames within 50 feet.
- p. Place hazard identification signs such as FLAMMABLE at all entrances.
- q. Ensure all cylinders are properly labeled (do not alter or remove the manufacturer's label from cylinders).
- r. Store cylinders with the valve protection cap secured.
- s. Store liquefied flammable gas cylinders upright or so the pressure-relief valve directly communicates with the vapor space of the cylinder.
- t. Ensure cylinders are not located where they could become part of an electrical circuit.

- u. Segregate incompatible or combustible materials by at least 20 feet (see “Determining Hazardous Material Compatibility” in this chapter for more information).
- v. Isolate incompatible or combustible materials with a barrier of non-combustible material at least five feet high and with a minimum fire resistance rating of 30 minutes.

Inspecting Cylinders

Compressed gas cylinders must be included in the HMs inspection program. During cylinder inspection, check for the following:

- a. Valve outlet connectors of both full and empty cylinders must have an authorized dust cap.
- b. Oxygen cylinders must be free from grease and oil.
- c. Empty cylinders must be tagged as “Empty” and stored away from full cylinders with the valves closed and protective valve caps in place.

Moving Cylinders

If you must move cylinders, note the following precautions:

- a. Close cylinder valves before moving.
- b. Do not lift cylinders by the valve protection cap.
- c. Do not lift cylinders by cranes or mechanical lifts unless fastened in proper containers, racks, or cradles.
- d. Do not use rope and chain slings or electromagnets to lift cylinders.
- e. Only handle, ship, or store cylinders if they have valve protection caps.
- f. Ensure that valve protection caps are installed before handling, shipping, or storage, except for the following cylinder types:
 - Cylinders with less than 40 pounds capacity
 - Cylinders with less than 625 cubic inch volumetric capacity
 - Ram-bottom cylinders

Note: Not all HMs can be stored outdoors or in freezing environments. Check product labels and SDS to ensure proper storage of the HM.

Follow these guidelines to store gas cylinders outside:

- a. Store cylinders outside only if the climate is favorable (i.e., not in extreme cold or heat). Keep cylinders out of the sun, directly off the ground, and away from areas where water can accumulate.
- b. Store in covered, open-sided, non-combustible sheds on an above-grade concrete slab.
- c. Do not heat the sheds, and store cylinders away from radiators and other sources of heat.
- d. Separate cylinder storage facilities from other buildings, and segregate gases that support combustion with other gases within sheds by at least 50 feet.
- e. Store oxygen cylinders and fuel gas cylinders (e.g., acetylene, propane, butane, etc.) in areas separated by at least 20 feet.
- f. If the shed has one or more walls, ensure that air circulation is sufficient to provide a complete air exchange at least six times each hour.
- g. Keep storage areas clear of dry vegetation and combustible materials by at least 15 feet.
- h. Protect storage areas from vehicular traffic.

Note: See Waste Protocol Sheet for acetylene cylinders in Appendix B

2.5 Resources

Storage cabinets, buildings, and racks

Step 1. Contact the Environmental Office. The Environmental Office may have access to excess storage cabinets, buildings, and racks. If excess assets are not available, the Environmental Office can assist you with specifications for the purchase of approved storage cabinets, buildings, and racks and identify any facility specific requirements (gravel pads, secondary containment, etc.).

Note: The Environmental Office will work with state maintenance repair workers to obtain required storage cabinets through the AQG's state property manager.

Step 2. Coordinate purchase through DCSLOG-LMO. Contact the DCSLOG-LMO to determine proper procurement procedures. DCSLOG-LMO may authorize the use of a Government Purchase Card (GPC) for the purchase. If DCSLOG-LMO does not authorize the use of the GPC for the purchase, a purchase request will be required. All purchase requests must be approved by DCSLOG-LMO. Units must submit purchase requests through the Battalion S4. AASFs must submit purchase requests through the SAO. FMSs, the CSMS, and the UTES must submit purchase requests through the SMO. The Warehouse must submit purchase requests through the USPFO.

Signage and Placards

Step 1. Contact the SOHM. The SOHM may have required signage and placards on-hand. If the signage or placards are not on-hand, the SOHM may be able to purchase them for you. If the SOHM cannot provide the signage or placards they can help you put together a purchase request for DCSLOG-LMO. Placards may also be fabricated by the CSMS upon request.

Note: The Environmental Office will work with State Maintenance Repair workers to obtain required signage and placards through the AQM's state property manager.

Step 2. Coordinate purchase through DCSLOG-LMO. Contact the DCSLOG-LMO to determine proper procurement procedures. DCSLOG-LMO may authorize the use of a Government Purchase Card (GPC) for the purchase. If DCSLOG-LMO does not authorize the use of the GPC for the purchase, a purchase request will be required. All purchase requests must be approved by DCSLOG-LMO. Units must submit purchase requests through the Battalion S4. AASFs must submit purchase requests through the SAO. FMSs, the CSMS, and the UTES must submit purchase requests through the SMO. The Warehouse must submit purchase requests through the USPFO.

Secondary Containment and Spill Response Equipment

Step 1. Contact the Environmental Office. The Environmental Office may have what you need on-hand or have access to excess secondary containment (berms, plugs, etc.) or spill response equipment (spill kits, absorbents, etc.). If the assets are not readily available, the Environmental Office can assist you with specifications for the purchase of secondary containment and spill response equipment.

Note: The Environmental Office will work with State Maintenance Repair workers to obtain secondary containment and spill response equipment through the AQM's state property manager.

Step 2. Coordinate purchase through DCSLOG-LMO. Contact the DCSLOG-LMO to determine proper procurement procedures. DCSLOG-LMO may authorize the use of a Government Purchase Card (GPC) for the purchase. If DCSLOG-LMO does not authorize the use of the GPC for the purchase, a DA purchase request will be required. All purchase requests must be approved by DCSLOG-LMO. Units must submit purchase requests through the Battalion S4. AASFs must submit purchase requests through the SAO. FMSs, the CSMS, and the UTES must submit purchase requests through the SMO. The Warehouse must submit purchase requests through the USPFO.

Compressed Gas Cylinder Cages, Racks, Cradles, etc.

Step 1. Contact the SOHM. The SOHM may be able to purchase cylinder cages, racks, and cradles for you. They may also be able to provide cylinder rings and tags. If the SOHM cannot purchase these items they can help you put together a purchase request for DCSLOG-LMO.

Note: State Maintenance Repair workers can obtain required compressed gas cylinder equipment directly through the AQM's state property manager.

Step 2. Coordinate purchase through DCSLOG-LMO. Contact the DCSLOG-LMO to determine proper procurement procedures. DCSLOG-LMO may authorize the use of a Government Purchase Card (GPC) for the purchase. If DCSLOG-LMO does not authorize the use of the GPC for the purchase, a purchase request will be required. All purchase requests must be approved by DCSLOG-LMO. Units must submit purchase requests through the Battalion S4. AASFs must submit purchase requests through the SAO. FMSs, the CSMS, and the UTES must submit purchase requests through the SMO. The Warehouse must submit purchase requests through the USPFO.