Ownership matrix	**RPP-27195**

1.0 PURPOSE AND SCOPE

(5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5, 5.1.6, 5.1.7, 5.1.8, 5.1.9)

This standard provides requirements for storing, handling, and transporting portable compressed and liquefied gas cylinders related to the Tank Operations Contractor scope of work. This standard supports the core functions and guiding principles of TFC-PLN-41.

NOTE: Bulk gas systems are not addressed in this standard. Installation or modification of bulk compressed gas systems requires a permit from the Hanford Fire Marshal. (See TFC-ESHQ-FP-STD-01 for permit request requirements.)

Breathing cylinder specifics, including transportation requirements, are discussed first; then "other" compressed gas cylinders (including liquefied petroleum gas) specifics; and finally the general requirements for storing and handling pertinent to all compressed gas and liquefied gas cylinders.

2.0 IMPLEMENTATION

This standard is effective on the date shown in the header.

3.0 STANDARD

3.1 Compressed Breathing Air Cylinders

There are three groupings of compressed breathing air cylinders which are: Self-Contained Breathing Apparatus (SCBA) cylinders, Supplied Air Respirator units (including SKA PAK units) and breathing air bottles used in Bottle Carts, Cascade systems and manifolds.

Mission Support Alliance (MSA) handles all procurement, initial receiving, and inspection of cylinders to ensure they are properly equipped and marked, except for SCBA units which are purchased by WRPS. Additional requirements for inspection and use involved with breathing air cylinders are beyond the scope of this standard and are addressed in TFC-ESHQ-IH-STD-07.

3.1.1 Filling Breathing Air Cylinders

Breathing air shall meet at least Grade D quality as specified in DOE-0352 section 12.0

Refilling of SCBA cylinders and SKA PACK units is performed exclusively by the Hanford Fire Department using specific procedures. Only cylinders designed to be refilled can be refilled.

Refilling of breathing air bottles shall be performed by offsite vendors.

3.1.2 Storage

- Cylinders shall be secured to prevent falling or rolling.

- Properly secured gas cylinders may be stored in a horizontal position unless specified otherwise per Section 3.2 of this procedure.
- Stored containers shall not obstruct exit routes.
- Containers shall be protected from any object that will produce a harmful cut or other abrasion in the surface of the cylinder.
- Storage area temperature shall not exceed 125°F or not be placed in direct sunlight.
- Consideration should be given to separate storage of full and empty containers.

3.1.3 Handling

Personnel should never lift containers by using the container cap, valves, or magnets.

3.1.4 Transportation of Breathing Air Cylinders
(5.1.11)

Transport of SCBA cylinders exceeding an aggregate gross weight of 440 pounds per conveyance by a Department of Transportation complaint motor carrier in accordance with applicable Federal Motor Carrier regulations. This includes loading, unloading (delivery), and transportation of breathing air-bottles from the (200 Area) station to the mask stations and return – from the mask stations to the tank farms and return. This does not restrict individual SCBA users from transporting their own air bottles from the mask station to the tank farms or other work locations. For transportation of SCBA bottles less than 440 pounds per conveyance non CMV teamsters can be utilized.

NOTE: The SCBA units currently being utilized by the Tank Operations Contractor are transported in accordance with Exemption DOT-SP-10915, Rev. 21. The requirements listed in Sections 3.1.4.1 shall be met in their entirety.

The requirements governing the shipments are edited in this standard to only address those required to support Hanford Site activities (e.g., air packaging not included). These requirements apply to both full and empty cylinders.

3.1.4.1 Material of Trade Category for SCBA cylinders
(5.1.10)

- Packages may NOT exceed an aggregate gross weight of 440 pounds per conveyance.

  NOTE 1: The SCBA cylinders are carbon-wrapped with a CGA threaded valve with the following weights:

Cylinder Size	Scott cylinder part number	Weight with valve (empty)	Number to equal 440 pounds	Weight with valve (full)	Number to equal 440 pounds
30 minute	804721-01	7.65	57	11.01	39
60 minute	804723-01	12.20	36	18.92	23

NOTE 2: Combinations of cylinder sizes and status (empty or full) will impact the number that can be conveyed at one time. Care should be taken to ensure the 440 pound limit is not exceeded.

- Requirements are in accordance with 49 CFR 173.6.
- A Commercial Drivers' License (CDL) is NOT required.
- Cylinder labeling is NOT required.
- A placard is NOT required BUT the shipping box must be marked and labeled.
- Shipping papers are NOT required.
- Cylinder valves must be protected by boxing/crating and closing or by an approved method of securely bracing the cylinders in the motor vehicles. The securing method shall not scar, abrade, or dent the cylinder.
- SCBA and SKA-PAK cylinders shall be transported by properly equipped company-assigned or government vehicles in accordance with DOE/RL-2001-36.

3.1.4.2 Transporting Breathing Air Units in excess of 440 pounds

- Packages may NOT exceed an aggregate gross weight of 1,000 pounds per conveyance.
- Requirements are in accordance with 49 CFR 173-301.
- A Commercial Drivers' License (CDL) IS required.
- A placard IS required, AND the shipping box must be marked and labelled.
- A Hazardous Material Shipment Record (HMSR) (available from WRPS Transportation & Packaging (372-1322) IS required.
- Cylinder valves must be protected by boxing/crating and closing or by an approved method of securely bracing the cylinders in the motor vehicles. The secure method shall not scar, abrade, or dent the cylinder.
- SCBA and SKA-PAK cylinders shall be transported by properly equipped, commercial carrier, company assigned, or government vehicles in accordance with DOE/RL-2001-36.

3.1.5 Other Compressed Gas Cylinders

For specific guidance on these materials, refer to NFPA 400, "Hazardous Materials Code."

- **Acetylene cylinders** requirements are in accordance with 29 CFR 1910.102. Handling, storage, and utilization of acetylene in cylinders shall be in accordance with this standard and the Compressed Gas Association (CGA) pamphlet, CGA P-1.

Store, transport, and use in vertical position only.

- **Anhydrous Ammonia** cylinders are not a normal WRPS inventory, and any procurement should be carefully evaluated. Anhydrous ammonia shall be handled, stored, and utilized in accordance with this standard and 29 CFR 1910.111.

- **Breathing-air bottles** are purchased bottles for use in Bottle Carts, Cascade systems and manifolds. A sampling of breathing-air bottles are analyzed in accordance with DOE-0352, "Hanford Site Respiratory Protection Program." Section 12.2.2.

- **Chlorine cylinders** are not a normal WRPS inventory, and any procurement should be carefully evaluated. Chlorine cylinders must not be stored next to cylinders containing other compressed gases. Additional information on chlorine can be found in publications by the Chlorine Institute.

- **Hydrogen cylinders** are not a normal WRPS inventory, and any procurement should be carefully evaluated. Hydrogen cylinders must not be stored next to cylinders containing other compressed gases. Additional information can be found in 29 CFR 1910.103.

- **Liquefied Petroleum Gas (including propane)** handling, storage, and utilization shall be in accordance this standard and 29 CFR 1910.110.

  Store, transport, and use without obstructing the relief valve.

- **Oxygen cylinders** are used on a regular basis at the 222-S Laboratory. Oxygen cylinders must not be stored next to cylinders containing other flammable compressed gases. Additional information can be found in 29 CFR 1910.104.

- **Portable fire extinguishers** frequently involve compressed gas cylinders but are excluded from this standard. See TFC-ESHQ-FP-STD-01 for fire extinguisher requirements.

- **Specialty Gases** are used on a regular basis at the 222-S Laboratory. For requirements regarding specific gases such as acetylene, hydrogen, oxygen, or for toxic or corrosive gases, consult the Safety Data Sheets (SDS) for appropriate guidance on the storage and compatibility requirements of the materials in question and/or contact the gas supplier.

3.1.6 Filling Cylinders

Cylinders are filled by offsite vendors. Contracts with these vendors impose the appropriate regulations and requirements for filling. Only cylinders designed to be refilled can be refilled.

3.1.7 Handling Cylinders

1. Personnel who handle compressed gas cylinders shall be trained in the safe handling and storage of compressed gases in cylinders (course 020049, "Compressed Gas Cylinder Safety"). (See TFC-ESHQ-IH-C-02.) The training does not apply to SCBA cylinders.

2. Do not use cylinders as rollers, supports, or for any purpose other than to contain and use the original contents.

3. Do not drag, strike, drop, roll cylinders in the horizontal position, or allow them to violently strike each other or another surface.

4. Use a suitable hand truck, forklift truck, or similar handling device with the cylinder properly secured to the device when transporting cylinders.

5. Roll cylinders (milk churning) only for short distances using the curved bottom edge of the cylinder.

6. Do not lift cylinders using the protective cap or with a magnet.

7. Do not use ropes, chains, or slings to suspend cylinders unless the cylinder has appropriate lifting attachments. When appropriate lifting attachments have not been provided, use suitable cradles or platforms to hold the cylinder for lifting.

8. Inspect cylinders prior to use. Check for dents, bulges, cracks, evidence of excess heat, rust, etc. Notify your Supervisor if the cylinder is damaged so it can be taken out of service.

9. Ensure that all connecting devices are free of oil, grease, or other contaminants.

10. When valve protection caps or valve outlet caps and/or plugs are provided by the manufacturer, keep the items on the cylinder at all times except when the cylinder is secured and connected to dispensing equipment.

11. Secure all gas cylinders, whether in transport, service or storage, to prevent falling.

When a container or valve is noticeably corroded, notify the gas supplier and comply with instructions/recommendations.

3.1.8 Procuring, Receiving, and Marking Cylinders
(5.1.12, 5.1.13, 5.1.14)

This requirement for procuring, receiving, and marking compressed gas cylinders is addressed in TFC-ESHQ-IH-C-02. Requirements for inventory management are addressed in TFC-OPS-WM-C-35.

Mission Support Alliance (MSA) handles all procurement, initial receiving, and inspection to ensure cylinders are properly equipped and marked. Portable cylinders for compressed gas are constructed and maintained in accordance with DOT regulations (U.S. Department of Transportation, 49 CFR, Parts 171-179). Cylinders are equipped with devices identified in Occupational Safety and Health Administration (OSHA) 29 CFR 1910, Subpart H, and CGA publications incorporated into OSHA by reference.

Buildings used for storage, handling, or dispensing of large quantities of compressed or liquefied gases shall be designed and built to meet TFC-ESHQ-FP-STD-02. NFPA 1, NFPA 400, and International Building Code contain guidance maximum allowable quantities of compressed and liquefied gases.

Lecture bottles are very small compressed gas cylinders, typically 2-3 inches in diameter and 12-18 inches high. While most gas suppliers offer lecture bottles for purchase, many will not accept the empty or partially full cylinders back for disposal. Lecture bottle disposal can be

very costly, depending on the original contents. In order to avoid costly disposal fees and potential hazards, employees should only purchase lecture bottles that can be returned to the distributor. Most distributors do offer a returnable cylinder, although in some cases, these cylinders are slightly larger than typical lecture bottles. Also, keep in mind that distributors' policies toward lecture bottles are subject to change.

1. Store and post gases according to their hazard class (flammable, asphyxiant, etc.) or name of gas to be stored.

2. Construct storage areas so that they are dry, well-ventilated, and made with non-combustible materials. Shelves must be able to support cylinders.

3. Use non-combustible or limited combustible construction (concrete/asphalt is the preferred building material) for the floors of storage areas.

4. Consideration should be given to separating empty cylinders from full ones. It is also suggested that all empty cylinders be marked "empty," unused cylinders "full," and those in service "In Use."

5. Close and cap (when applicable) the valves on the empty cylinders and secure the cylinders to prevent falling. Liquefied flammable gas cylinders shall be stored with pressure relief valve in communication with vapor space. Many liquefied flammable gas cylinders, such as those for forklifts, are designed to be stored in the horizontal position in order that the relief valve is in communication with the vapor phase.

6. Do not store cylinders at temperatures above 125°F or do not place in direct sunlight.

7. Avoid prolonged exposure to the ground (earth) or to damp environment. Avoid subsurface storage locations.

8. Protect cylinders from any object that will produce a harmful cut or other abrasion in the surface of the metal. Do not store cylinders near elevators, walkways, unprotected platform edges, or in locations where heavy moving objects may strike or fall on them.

9. Post NO SMOKING signs at all flammable gas storage areas.

10. Store oxidizers and flammable gas containers or combustible materials (especially oil or grease) separately. A distance of twenty feet (six meters) or a non-combustible barrier at least five feet high having a fire resistance rating of at least one half hour is considered a minimum requirement.

11. For requirements regarding specific gases such as acetylene, hydrogen, oxygen, or for toxic or corrosive gases, consult the SDSs for appropriate guidance on the storage and compatibility requirements of the materials in question and/or contact the gas supplier.

12. When using compressed gas for welding operations, use additional requirements found in 29 CFR 1910.252(b)(4)(vi) and 1910.253.

3.1.9 Transporting Cylinders

After procurement, receiving, and inspection, cylinders are transported by Mission Support Contractor to individual facilities where the cylinders are stored, used, and handled in accordance with this standard. Transportation details are addressed in DOE/RL-2001-36.

1. Secure cylinders and verify that protective valve caps are in place when provided by the manufacturer.

2. Transporting compressed gas cylinders is allowed in a properly equipped government vehicle or commercial carrier (DOE/RL 2001-36). Shipping compartments should be adequately ventilated.

4.0 DEFINITIONS

No terms or phrases unique to this standard are used.

5.0 SOURCES

5.1 Requirements

5.1.1 29 CFR 1910, Subpart H, “Hazardous Materials,” Section 101, “Compressed gases general requirements.”

5.1.2 29 CFR 1910, Subpart H, “Hazardous Materials,” Section 102, “Acetylene.”

5.1.3 29 CFR 1910, Subpart H, “Hazardous Materials,” Section 103, “Hydrogen.”

5.1.4 29 CFR 1910, Subpart H, “Hazardous Materials,” Section 104, “Oxygen.”

5.1.5 29 CFR 1910, Subpart H, “Hazardous Materials,” Section 110, “Storage and Handling of Liquefied Petroleum Gases.”

5.1.6 29 CFR 1910, Subpart H, “Hazardous Materials,” Section 111, “Storage and Handling of Anhydrous Ammonia.”

5.1.7 29 CFR 1910, Subpart I, Section 134, “Respiratory Protection.”

5.1.8 29 CFR 1910, Subpart L, Section 157, “Portable Fire Extinguishers.”

5.1.9 29 CFR 1926.350, “Gas Welding and Cutting.”

5.1.10 49 CFR 173.6, “Materials of trade exceptions,” Part 173, “Shippers-General Requirements for Shipments and Packagings.”

5.1.11 49 CFR 173.301, “General Requirements for Shipment of Compressed Gases and Other Hazardous Materials in Cylinders, UN Pressure Receptacles and Spherical Pressure Vessels.”

5.1.12 International Building Code.

5.1.13 NFPA 1, "Fire Code."

5.1.14 TFC-ESHQ-FP-STD-02, "Fire Protection Design Criteria."

5.2 References

5.2.1 Compressed Gas Association, CGA C-7, "Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Cylinders," 2004.

5.2.2 Compressed Gas Association Pamphlet, CGA P-1, "Safe Handling of Compressed Gases in Containers," 2006.

5.2.3 DOE-0352, "Hanford Site Respiratory Protection Program."

5.2.4 DOE/RL-2001-36, "Hanford Sitewide Transportation Safety Document."

5.2.5 DOT-SP-10915, Rev. 21, "Department of Transportation Special Permit DOE-SP-10915," May 9, 2016.

5.2.6 E-mail: ^WRPS General Delivery "Change to bulk transports of SCBA bottles," February 16, 2016

5.2.7 MGT-ENG-IP-05, Rev. 3, "Fire Protection Program."

5.2.8 NFPA 55, "Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks."

5.2.9 NFPA 58, "Liquefied Petroleum Gas Code."

5.2.10 NFPA 400, "Hazardous Materials Code."

5.2.11 TFC-ESHQ-FP-STD-01, "Fire Marshal Permits, Combustible Controls, and Construction/Occupancy Requirements."

5.2.12 TFC-ESHQ-IH-C-02, "Hazard Communication."

5.2.13 TFC-ESHQ-IH-STD-07, "Respiratory Protection."

5.2.14 TFC-OPS-WM-C-35, "Chemical Management Process."

5.2.15 TFC-PLN-41, "Integrated Safety Management System Description."