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Administrative Procedure

PRC-PRO-SH-40481

Storing, Using and Handling Compressed Gases

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TABLE OF CONTENTS

1.0 INTRODUCTION 4
 1.1 Purpose..... 4
 1.2 Scope 4
 1.3 Applicability 4
 1.4 Implementation 4
2.0 RESPONSIBILITIES 4
3.0 PROCESS..... 5
3.1 SAFE HANDLING REQUIREMENTS 5
 3.2 Storing Cylinders..... 6
 3.3 Welding, Cutting, and Brazing Gas Cylinders 8
 3.4 Training Requirements 9
4.0 FORMS 9
5.0 RECORD IDENTIFICATION 10
6.0 SOURCES 10
 6.1 Requirements..... 10
 6.2 References..... 10
7.0 APPENDIXES 10

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Published Date: 07/26/12

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1.0 INTRODUCTION**1.1 Purpose**

This procedure provides the basic safety requirements and practices for storing, handling, and using compressed gas cylinders related to CH2M HILL Plateau Remediation Company (CHPRC) work scope.

1.2 Scope

This procedure is applicable to the handling, use, and storage of compressed gas cylinders. This procedure does not cover compressed gas cylinders that are part of self-contained breathing apparatus (SCBA) units, general air receivers or pressure vessels, bulk gas systems; procuring, receiving, inspecting (except for visual inspection to determine safe condition, marking, or filling compressed gas cylinders.

Transportation of compressed gases is outside the scope of this procedure. All transportation shall be in accordance with 49 Code of Federal Regulations and the applicable CHPRC Transportation and Packaging procedures.

1.3 Applicability

This procedure is applicable to CHPRC Team employees and subcontractor personnel involved with the CHPRC work scope.

1.4 Implementation

This procedure is effective upon publication.

2.0 RESPONSIBILITIES

All responsibilities associated with this procedure are identified in the process steps.

Storing, Using and Handling Compressed Gases

Published Date: 07/26/12

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3.0 PROCESS

3.1 Safe Handling Requirements

3.1.1 Cylinder Movement

Actionee	Step	Action
All Personnel	1.	AVOID dragging, striking, dropping, or rolling cylinders in the horizontal position, or allowing them to violently strike each other or another surface.
	2.	USE a suitable hand truck, forklift truck, or similar handling device with the cylinder properly secured to the device when transporting cylinders.
	3.	AVOID lifting of cylinders using the protective cap or with a magnet.
	4.	ENSURE cylinder is maintained in an upright position.
	5.	<u>IF</u> cylinder has appropriate lifting attachments, <u>THEN</u> USE ropes, chains, or slings to suspend cylinders. <u>WHEN</u> appropriate lifting attachments have not been provided, <u>THEN</u> USE suitable cradles or platforms to hold the cylinder for lifting.
	6.	AVOID using cylinders as rollers, supports, or for any purpose other than to contain and use the original contents.

3.1.2 Pre-Use Inspection

Actionee	Step	Action
Line Management	1.	IDENTIFY physical and health hazards and precautions on compressed gas containers in accordance with CHPRC Hazard Communication standard.
All Personnel	2.	CONDUCT a visual inspection of cylinders prior to use. Inspection will include checking for dents, bulges, cracks, evidence of excess heat, etc. A cylinder shall not be used if damaged.
	3.	ENSURE that all connecting devices are free of oil, grease, or other contaminants prior to use.
	4.	<u>IF</u> damage or contamination is apparent, <u>THEN</u> PLACE the container out of service and contact supplier for instruction.

Storing, Using and Handling Compressed Gases

Published Date: 07/26/12

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3.1.3 Caps and Valves

Actionee	Step	Action
All Personnel	1.	ENSURE that all valve protection caps or valve outlet caps or plugs are provided by the manufacturer remain on the cylinder at all times except when the cylinder is secured and connected to dispensing equipment.
	2.	CLOSE the cylinder valve when the cylinder is not in use.
	3.	SECURE the valve protection cap in place when the cylinder is not in use.
	4.	ENSURE that regulators and pressure gauges used with a particular gas is designed for use with the cylinders and gas.

3.1.4 Cylinder Use

Actionee	Step	Action
All Personnel	1.	<u>IF</u> a foreign substance is known or suspected of entering the container or valve. <u>THEN IDENTIFY</u> <u>AND</u> clearly MARK the container <u>AND</u> NOTIFY the gas supplier of the details of the contamination.
	2.	ENSURE that the cylinder is properly secured during use.

3.2 Storing Cylinders

3.2.1 General Requirements

Actionee	Step	Action
All Personnel	1.	PROTECT compressed gas containers from temperature extremes. <ul style="list-style-type: none"> • <u>IF</u> ice or snow accumulates on a container, <u>THEN THAW</u> at room temperature, or with water at a temperature not exceeding 125 degrees Fahrenheit (50 degrees Celcius).
	2.	ENSURE that flame or heat don't directly contact any part of a compressed gas container.
	3.	SEPARATE cylinders from electrical components where they might become part of an electrical circuit.
	4.	SECURE all gas cylinders, whether in service or storage, to prevent them from falling.
	5.	PROTECT cylinders from any object that will produce a harmful cut or other abrasion in the surface of the metal.

Storing, Using and Handling Compressed Gases

Published Date: 07/26/12

Effective Date: 07/26/12

3.2.2 Gas Compatibility

Actionee	Step	Action
All Employees	1.	CONSULT the Material Safety Data Sheets (MSDS) for appropriate guidance on the storage and compatibility requirements of the materials in question <u>AND</u> CONSULT the gas supplier as necessary for requirements regarding specific gases such as acetylene, hydrogen, oxygen, or for toxic or corrosive gases.
	2.	STORE <u>AND</u> POST compressed gases according to their hazard class (flammable, asphyxiant, etc.) or name of gas to be stored.
	3.	STORE oxidizers separately from flammable gas containers or combustible materials (especially oil or grease). MAINTAIN a distance of 20 feet (6 meters) or a noncombustible barrier at least five feet high having a fire resistance rating of at least one-half hour is considered a minimum requirement.

3.2.3 Storage Area

Actionee	Step	Action
All Employees	1.	PROTECT stored cylinders against accumulations of ice or snow and direct rays of the sun.
	2.	PROTECT from vehicular traffic.
	3.	AVOID prolonged exposure of cylinders to the ground (earth) or to damp environment.
	4.	AVOID storing cylinders near elevators, walkways, unprotected platform edges, or in locations where heavy moving objects may strike or fall on them.
	5.	AVOID subsurface storage locations.
	6.	SEPARATE empty cylinders from full ones.
Line Management	7.	PLAN storage so cylinders are used in the order in which they are received from the supplier.

Storing, Using and Handling Compressed Gases

Published Date: 07/26/12

Effective Date: 07/26/12

Actionee	Step	Action
Line Management	8.	POST "NO SMOKING" signs at all flammable gas storage areas.

NOTE: *It is suggested that all empty cylinders be marked "empty", unused cylinders "full", and those in service "In Use." All empty cylinders should be treated as if full. For example, cylinders that held oxidizing gases and flammable gases should not be stored together.*

9. CLOSE
AND CAP valves on empty cylinders.

3.3 Welding, Cutting, and Brazing Gas Cylinders

3.3.1 General Requirements

Actionee	Step	Action
All Employees	1.	KEEP cylinders, cylinder valves, couplings, regulators, hose, and other apparatuses free from oily or greasy substances.
	2.	ENSURE that compressed gas cylinders are not used for grounding when used in conjunction with any welding or cutting that employs an electrical arc.
	3.	REMOVE regulators and SECURE valve-protection caps in place, when provided for, in advance of cylinder movement, unless cylinders are secured on a special truck.

3.3.2 Acetylene

Actionee	Step	Action
All Employees	1.	STORE <u>AND</u> USE acetylene cylinders in a vertical position with the valve end up.
	2.	AVOID using acetylene at a pressure exceeding 15 psig.
	3.	LIMIT acetylene cylinders stored inside a building to a total capacity of 2500 ft ³ (70.8m ³) of acetylene exclusive of cylinders in use or attached for use.
	4.	ENSURE that buildings and rooms housing acetylene operations, that ventilation is provided and no open flames for heating or lighting are permitted.
	5.	ENSURE that the fusible metal pressure relief devices in valves or cylinders of acetylene are maintained in good condition.
	6.	KEEP sparks and flames away from acetylene cylinders and under no circumstances allow a torch flame to come in contact with fusible metal pressure relief devices.

Storing, Using and Handling Compressed Gases

Published Date: 07/26/12

Effective Date: 07/26/12

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
All Employees	7.	USE only wrenches or other tools provided by the valve or cylinder manufacturer to open or close the cylinder valves.
	8.	OPEN the acetylene cylinder valve slowly. The minimum amount required to deliver acceptable flow should be used so that the valve can be closed as quickly as possible in an emergency situation. One and one-half turns is usually sufficient to provide adequate flow.

3.3.3 Oxygen

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
All Employees	1.	STORE oxygen cylinders away from highly combustible material such as oil, grease, or fuel-gas cylinders.
	2.	ENSURE that hands and gloves are free from grease before handling oxygen cylinders or apparatus.
	3.	ENSURE that the oxygen flow is not allowed to strike oily surfaces, greasy clothes; or the entrance into a fuel oil or other storage tank.

3.4 Training Requirements

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
Line Management	1.	ENSURE that only properly trained employees handle and use compressed gases.

- NOTE:**
- *CGA P-1 defines "handling" as "Moving, connecting or disconnecting a compressed or liquefied gas container under normal conditions of use."*
 - *Training course #020049, Compressed Gas Cylinder Safety, or equivalent, meets this requirement.*
 - *For forklift operators exclusively performing propane bottle change-out, training course #044674, Propane Bottle Change-Out, meets this requirement.*

4.0 FORMS

None

Storing, Using and Handling Compressed Gases

Published Date: 07/26/12

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5.0 RECORD IDENTIFICATION

All records are required to be managed in accordance with PRC-PRO-IRM-10588, *Records Management Processes*. OCRWM records are also managed in accordance with PRC-PRO-QA-19579, *OCRWM Records Management*.

Records Capture Table

Name of Record	Submittal Responsibility	Retention Responsibility	OCRWM Retention Schedule (If OCRWM Related)
N/A	N/A	N/A	N/A

6.0 SOURCES

6.1 Requirements

29 CFR 1910 Subpart H - *Hazardous Materials*. Sections:

- 1910.101 - Compressed Gases (general requirements)
- 1910.102 - Acetylene
- 1910.104 - Oxygen

Compressed Gas Association Pamphlet P-1 (1965)

- Incorporated by reference in 29 CFR 1910.101(a)

1910.253 *Oxygen-Fuel Gas Welding and Cutting*

6.2 References

PRC-PRO-QA-19579, *OCRWM Records Management*
 PRC-PRO-IRM-10588, *Records Management Processes*
 PRC-PRO-SH-40410, *Hazard Communication*
 29 CFR 1910.1200

7.0 APPENDIXES

APPENDIX A - GLOSSARY

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Published Date: 07/26/12

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Appendix A - Glossary

Term	Definition
Compressed Gas	Any gas or mixture of gases exerting in a container, a pressure exceeding 40.6 psia (280 kPa. Abs) at 68 °F (20 °C). Also, any flammable liquid having an absolute vapor pressure exceeding 40.6 psia (280 kPa. abs) at 100 °F (37.8 °C) as determined by ANSI/ASTM D 323. <i>American National Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)</i> [30]. Unless specifically stated otherwise in [the Compressed Gas Association P-1 Document], the term “compressed gas” also refers to liquefied and dissolved gases meeting these criteria.
Corrosive Gas	A gas that in contact with living tissue causes destruction of the tissue by chemical action. This term shall not refer to action on inanimate surfaces.
Flammable Gas	A gas is considered flammable when either a mixture of 13% or less (by volume) with air is ignitable at 17.7 psia (101.3 kPa) or has a flammable range with air of at least 12% regardless of the lower limit. These limits shall be determined at 14.7 psia (101.3 kPa) of pressure and a temperature of 68 °F (20 °C).
Handling	Moving, connecting, or disconnecting a compressed or liquefied gas container under normal conditions of use.
Material Safety Data Sheet (MSDS)	Written or printed information concerning a hazardous material prepared in accordance with the provisions of 29 CFR 1910.1200.
Oxidizing Gas	A gas that, in the presence of an ignition source and a fuel, supports and may vigorously accelerate combustion.
Toxic Gas	A compressed gas that has a medial lethal concentration (LC50) in air of less than or equal to 5000 parts per million (ppm) by volume of gas or vapor when administered by continuous inhalation for an hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.
Use	The act of withdrawing and using the product gas in a nonrecoverable manner for applications other than manufacturing/repackaging of compressed gases.
Valve Protection Cap	A rigid removable cover provided for container valve protection during handling, transportation, and storage.