Inspection, Maintenance and Control of Respiratory Protection Equipment

Nuclear Secured / Radiation Safety

NS-RS-PR-602, 0

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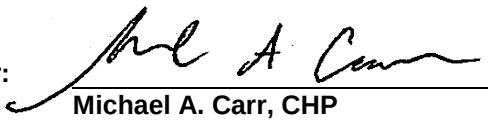
History and Approvals

History

Revision	Intent Y/N	Purpose description
0	Y	For Issue (Rebranded CS-RS-PR-014)

Approvals

Preparer: 

8/6/2019

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9/30/2019

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Chapter Pages

1. Purpose and Scope

Respiratory protection equipment must be maintained in proper operating condition in order to ensure adequate personnel protection when worn. Poorly maintained equipment can result in personnel contaminations, potential uptake and over-exposures and the potential transmission of communicable disease.

1.1. Purpose

The purpose of this procedure is to describe the process by which respiratory protection equipment is maintained and stored prior to use. This is to ensure the minimum requirements are met based on regulatory compliance including respirator inspection, cleaning and disinfecting, maintenance and repair, survey and storage.

1.2. Scope

This procedure is for the exclusive use of Nuclear Secured (NS) personnel and subcontractors who may be required to wear respiratory protection at the project site where the NS Radiation Protection Program (RPP) has been implemented and NS has the primary role in controlling exposures to on-site personnel.

2. References

2.1. ANSI/ASSE Z88.2, *Practices for Respiratory Protection*, 2015

2.2. 29CFR1910.134, *Labor – Respiratory Protection*

2.3. 10CFR20 Subpart H*, Energy – Standards for Protection against Radiation; Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas*

2.4. US NRC, NUREG-0041, *Manual of Respiratory Protection against Airborne Radioactive Materials*, 2001

2.5. US NRC, Regulatory Guide 8.15, *Acceptable Programs for Respiratory Protection*, 1999

2.6. AE-SH-PR-002, *Incident reporting and Notification*

2.7. NS-RS-PG-001, *Radiation Protection Program*

2.8. NS-RS-PG-002, *Respiratory Protection Program*

2.9. NS-RS-PR-102, *Project Records Management*

2.10. NS-RS-PR-300, *Performance of Radiological Surveys*

3. General

3.1. Definitions

3.1.1. *Air Purifying Respirator (APR)* – A respirator with an air purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air purifying element.

3.1.2. *Emergency Use Equipment* - Respiratory protection equipment that has been designated for emergency response issue only.

3.1.3. *Negative Pressure Respirator* - A respirator in which the air pressure inside the facepiece is negative with respect to the ambient air pressure outside the respirator during inhalation.

3.1.4. *Positive Pressure Respirator* - A respirator in which the pressure inside the respirator exceeds the ambient air pressure outside the respirator.

3.1.5. *Powered Air Purifying Respirator (PAPR)* - An air purifying respirator that uses a blower to force the ambient air through the air purifying element for which inhalation and exhalation resistance is negligible similar to a continuous flow air-line device.

3.1.6. *Self-Contained Breathing Apparatus (SCBA)* - An atmosphere supplying respirator for which the breathing air source is designed to be carried by the user.

3.1.7. *Supplied Air Respirator or Air-Line Respirator* – At atmosphere supplying respirator for which the source of breathing air is not designed to be carried by the user.

3.2. Responsibilities

Depending on personnel qualifications and the size of the project, project personnel may be assigned multiple roles and/or responsibilities.

3.2.1. NS Radiation Safety Officer

The NS Radiation Safety Officer (RSO) maintains and oversees the implementation of the NS RPP and Respiratory Protection Program. The RSO shall ensure that radiation safety, radioactive materials management, and radiological operations procedures and programs are kept up to date such that they comply with current regulations and incorporate current and relevant industry practices and regulatory guidance. The RSO is also responsible for the review of all personnel exposure records and to ensure exposures are maintained below regulatory and NS administrative limits as applicable.

The specific RSO responsibilities relative to the Respiratory Protection Program include:

- Review of any ALARA evaluations,
- Approval of the use for respiratory protection,
- Approval of the type of respiratory protection equipment, and
- Evaluation of the Respiratory Protection Program as implemented through records review and/or site inspection.

3.2.2. Project Manager

The Project Manager (PM) is responsible for ensuring that the proper procedures and programs are implemented on the project site as required by customer agreements and contracts. The PM is responsible for ensuring that these programs and procedures are properly incorporated into project specific plans and procedures. The PM is responsible for ensuring that the NS RPP and client programs and procedures, as applicable, are available for use by project personnel. The PM shall also ensure that anyone donning respiratory protection equipment meets the minimum requirements to wear a respirator in accordance with NS-RS-PG-002, *Respiratory Protection Program*.

3.2.3. Project Health Physicist

The Project Health Physicist (PHP) is responsible for assisting the RSO with the review of personnel exposure records and providing health physics support to the PM and Radiation Protection Supervisor (RPS). This includes technical support to ensure procedural and regulatory compliance. The PHP is also responsible for evaluating the need for respiratory protection and obtaining approval from the RSO for the type and use of respiratory protection equipment.

3.2.4. Radiation Protection Supervisor

The Radiation Protection Supervisor (RPS) manages and oversees the project personnel in regards to radiation and respiratory protection and reports directly to both the PM and the RSO. The RPS is responsible for implementing the NS RPP at the project location. The RPS manages and oversees the project personnel in regards to radiation and respiratory protection and reports directly to both the PM and the RSO. The RPS shall in conjunction with the PM, shall ensure that all personnel donning respiratory protection equipment are qualified. The RPS is also responsible for ensuring that the proper respiratory protection equipment is available and provided as needed.

3.2.5. Project Personnel

Project personnel that wear respiratory protection are responsible for complying with the requirements of NS-RS-PG-002, *Respiratory Protection Program* and the associated implementing procedures. They are responsible to ensure their training, medical evaluation and fit test are current and that they properly don and wear

respiratory protection equipment as required. In the event of any personal medical condition that may arise, the wearer is responsible to notify the PM and the RPS such that the proper evaluations may be performed to ensure they are still fit to wear respiratory protection equipment.

3.3. Precautions and Limitations

3.3.1. Do not use detergents that contain lanolin for respirator cleaning.

3.3.2. Ensure the respirators are properly rinsed to remove any detergent and disinfectant residue. Any residue that dries on the respirator may cause dermatitis or may cause deterioration of the rubber or corrode metal parts if not completely removed.

3.3.3. Alcohol wipes may be used to disinfect respirator surfaces at the wearer's discretion.

4. Pre-Requisites / Requirements

4.1. Only respirators and associated equipment that has been tested, certified and approved by the National Institute for Occupational Safety and Health (NIOSH) and as approved by the RSO shall be used for respiratory protection.

4.2. Respiratory protection equipment shall be inspected and used in accordance with the manufacturer's instructions, NS-RS-PG-002, *Respiratory Protection Program* and associated implementing procedures.

4.3. Any maintenance and repairs shall not violate the equipment's NIOSH certification and shall only be performed by personnel familiar with the equipment and in accordance with the manufacturer's guidelines.

5. Procedure

5.1. Respirator Inspection

5.1.1. All respiratory protection equipment shall be inspected prior to donning.

5.1.2. Respirator equipment shall be inspected after decontamination, sanitation and following any maintenance and repair.

5.1.3. For inventoried respirators, perform an inspection on 10% of the respirators on a monthly basis. Document all inspections on a Respirator Inspection Log, Attachment 7.1, or equivalent.

5.1.4. Equipment Inspection shall include the following:

- Facepiece seal and straps for any signs of dry-rot, cracking or distortion,
- Facepiece for clarity (scratches), cracking and distortion,

- Clasps on the straps to make sure they are present and not damaged,
- Inhalation and exhalation valves to make sure they are operational,
- Gaskets to ensure they are present and not damaged to ensure an adequate seal with the respirator cartridge,
- Nose cups and vocal diaphragms if used,
- Cartridge and filter media as applicable to ensure it is not damaged,
- Seams and material for helmet/hoods,
- Batteries and power packs for PAPRs to ensure an adequate charge,
- Regulators and pressure gauges for SCBAs,
- Bottles for SCBAs and escape respirators.
- Any straps, belts and harness for any damage that may affect equipment use and safety.

5.1.5. Emergency use respirators and SCBAs shall be inspected on a monthly basis as a minimum.

5.1.5.1. Verify that the SCBA cylinder contains a minimum of 90% of their rated capacity.

5.1.5.2. Ensure that aluminum and steel cylinders have been hydrostatically tested within the last 5 years.

5.1.5.3. Ensure that composite cylinders are less than 15 years old and have been hydrostatically tested within the last 3 years.

5.2. Decontamination and Disinfecting

5.2.1. Laundered respirators are exempt from decontamination and disinfection as these are one time use and a contracted vendor provides these services.

5.2.2. Respirator decontamination and disinfecting may be performed using a dishwasher with approved detergents and disinfecting agents.

5.2.3. For hand washing, prepare an appropriate amount of respirator detergent and disinfectant solution for two stage cleaning, e.g. two 5 gallon pails or wash tubs.

5.2.3.1. Mix the detergent / disinfectant with an appropriate amount of warm water per the manufacturer directions. Cleaners include Airkem A-33 DRY, MSA cleaner and sanitizer, or other respirator detergent and disinfectant.

5.2.3.2. Do not use detergent with lanolin.

5.2.3.3. Mix thoroughly.

5.2.4. Prepare a rinse pail or tub with an adequate amount of warm water.

5.2.5. Remove any cartridges from the respirator and dispose or bag the filters as appropriate.

5.2.6. Remove any items as recommended by the manufacturer, typically speaking diaphragms, pressure demand valves and assemblies and hoses.

5.2.7. Place the respirator in the first bucket of detergent and disinfectant and allow it to soak for at least 10 minutes.

5.2.8. Remove the respirator and place it in the second container of detergent and disinfectant solution and clean using a soft scrub brush.

5.2.9. Re-immerse the respirator in the second pail or tub to remove any residue from cleaning.

5.2.10. Rinse the respirator in the third pail or tub.

5.2.11. Periodically replace the detergent and disinfectant solutions and rinse water as it become soiled or cold.

5.2.12. Remove excess water from the respirator and facepiece by either using a wet vacuum, lint free adsorbent towel or by shaking.

5.2.13. Place or hang the respirator to dry.

5.2.14. Anti-fogging agents may be added to the lens after drying and/or the rubber seal and straps may be conditioned.

5.3. Respirator Survey

5.3.1. Perform surveys in accordance with NS-RS-PR-300, *Performance of Radiological Surveys*.

5.3.2. Health physics shall perform a confirmatory survey on 5% of any incoming ready use respirators from a vendor for quality assurance. New respirators do not require survey.

5.3.3. Survey each respirator after decontamination and disinfecting to ensure the respirator meets the following survey requirements.

- No removable alpha or beta/gamma contamination anywhere on the respirator.
- No detectable alpha activity on the respirator.
- No detectable beta/gamma activity in excess of 100 cpm on interior surfaces or on the facepiece seal.

- No detectable beta/gamma activity in excess of 500 cpm on the exterior surfaces of the respirator.

5.3.4. If the respirator is contaminated, rewash and resurvey. For respirators laundered by a vendor, submit a first notification in accordance with AE-SH-PR-002, *Incident reporting and Notification*, notify the RPS, PM and RSO for further direction regarding the balance of respirators received from the vendor and notify the vendor.

5.3.5. If the respirator is still contaminated, identify the area of contamination and see if it can be repaired by removing and replacing any contaminated parts.

5.3.6. If the respirator cannot be decontaminated, render the respirator unusable by cutting the straps and dispose as radioactive waste. Vendor owned respirators shall not be destroyed and should be returned to the vendor.

5.4. Repair and Maintenance

5.4.1. Laundered equipment shall be repaired by the vendor.

5.4.2. Field repairs are limited to respiratory equipment issued for multiple use and shall be performed in accordance with the manufacturer's instructions by personnel familiar with the equipment.

5.4.3. Field repairs are limited to the following:

- Lens replacement,
- Replacement of inhalations and exhalation valves,
- Installation and removal of speaking diaphragms,
- Replacement of filter cartridges,
- Head strap replacement,
- Replacement of batteries, and
- Replacement of breathing tubes.

5.4.4. All replacement parts shall be obtained from the manufacturer to maintain NIOSH certification. Parts from different types and models of respirators shall not be intermixed.

5.4.5. All repairs on SCBA equipment including valves, bottles and regulators shall be performed by the manufacturer or by an individual trained by the manufacturer.

5.4.6. Inspect the respirator and verify a proper seal check following repairs to make sure the respirator is operational.

5.4.7. Disinfect the respirator using alcohol wipes or re-wash.

5.4.8. Document all respiratory maintenance and repair on a Maintenance Log, Attachment 7.2 or equivalent. Documentation shall include at least the following:

- Date of repair
- Respirator serial number,
- Description of the repair,
- Performance of seal check,
- Initial of person performing the repair and maintenance.

5.5. Storage

5.5.1. All inventoried respirators will be individually identified using a serialized tagging system and tracked using a Respirator Inventory, Attachment 7.3 or equivalent with the exception of single use and laundered respirators (i.e., any one time use respirator). Laundered respirators are typically owned and controlled by the vendor.

5.5.2. Respirators shall not be stored in a manner that may damage, distort or distend the respirator from its normal shape.

5.5.3. All straps shall be fully extended and the respiratory cartridges stored separately.

5.5.4. Respirators shall be stored with the facepiece facing down so the respirator does not rest on the facepiece seal.

5.5.5. Respirators and cartridges shall not be stored in direct sunlight, excessive heat or cold, excessive moisture or near chemicals.

5.5.6. Respirators shall be individually bagged to keep them dry, free of dust and free of potential contamination.

6. Records

6.1. Respirator Inventory

6.2. Respirator Inspection Log

6.3. Respirator Survey(s)

6.4. Respirator Maintenance Log

7. Appendices and Forms

7.1. Respirator Inspection Log

7.2. Respirator Repair and Maintenance Log

7.3. Respirator Inventory

Attachment 7.1 **Respirator Inspection Log**

Respirator ID	Model	Size	Status		Date	Technician
			SAT	UNSAT		

Reviewed by: _____ Date: _____

Attachment 7.2 **Respirator Repair and Maintenance Log**

Date	Respirator ID	Repair Description	Leak Test		Comments	Initial
			SAT	NA [a]		

a Hood style PAPRs do not require leak tests.

Reviewed by: _____ Date: _____

Attachment 7.3 **Respirator Inventory**

Respirator ID	Model	Size	Date Added	Date Removed