Respiratory Protection Program

March 2026 Updated

Tanner Finney

Senior Health and Safety Specialist

1. SCOPE AND APPLICATION

The purpose of the Respiratory Protection Program (RPP) at Clemson University is to establish and maintain a program that is in compliance with the OSHA Respiratory Protection Standard (OSHA 1910.134) concerning the selection, use, and maintenance of respirators. The intent is to provide protection for all employees who are required to wear a respirator while performing their job duties. The program includes medical surveillance, training, and fit-testing.

1.1. CLEMSON UNIVERSITY'S RPP WILL:

- Ensure that respiratory protective equipment is utilized only when effective administrative and/or engineering controls are not feasible; or while they are being implemented.
- Ensure that the correct type of respiratory protective equipment is selected for each application.
- Ensure that respiratory protective equipment is clean and in good working order.
- Ensure that respiratory protective equipment properly fits the user.
- Ensure that users of respiratory protective equipment are adequately trained in the care, limitations, and proper application of the device.
- Ensure that regulatory documentation is established and maintained in a logical and accessible manner.

1.2. RELEVANT REQUIREMENTS/REFERENCE

- Occupational Safety and Health Standards for General Industry (29 CFR 1910.94).
- Occupational Safety and Health Standards for General Industry (29 CFR 1910.120).
- Occupational Safety and Health Standards for General Industry (29 CFR 1910.134).
- Occupational Safety and Health Standards for General Industry (29 CFR 1910.156).
- Occupational Safety and Health Standards for General Industry (29 CFR 1910.1001).
- Mine Safety and Health Administration (30 CFR part 11).
- Public Health Service (42 CFR part 84).
- The United States Pharmacopoeia for medical or breathing oxygen.
- The Compressed Gas Association Specification G-7.1-1966.
- "American National Standard for Respiratory Protection" (ANSI Z88.2-1992), published by the American National Standards Institute, Inc.
- "Respiratory Protection-Respirator Use-Physical Qualifications for Personnel", ANSI Z88.6

1.3. APPLICATION

This document applies to Clemson University research and teaching personnel, and personnel at offsite locations who are required to wear respirators and those who choose voluntarily to use respirators. This Program applies to all employees of Clemson who OES has determined meets or exceeds an OSHA

2. DEFINITIONS

- Air-Purifying Respirator- means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.
- Assigned Protection Factor (APF)- means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide.
- Atmosphere-Supplying Respirator- means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

- Canister or Cartridge- means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
- Emergency Situation- means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.
- Employee Exposure- means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.
- Filter or Air Purifying Element- means a component used in respirators to remove solid or liquid aerosols from the inspired air.
- Filtering Facepiece (dust mask)- means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.
- Fit Factor- means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.
- Fit Test- means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.
- High Efficiency Particulate Air (HEPA) Filter- means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.
- Immediately Dangerous to Life or Health (IDLH)- means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
- Maximum Use Concentration (MUC)- means the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the required OSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no OSHA exposure limit is available for a hazardous substance, an employer must determine an MUC on the basis of relevant available information and informed professional judgment.
- Negative Pressure Respirator (Tight Fitting)- means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.
- Oxygen Deficient Atmosphere- means an atmosphere with an oxygen content below 19.5% by volume.
- Powered Air-Purifying Respirator (PAPR)- means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.
- Service Life- means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.
- Supplied-Air Respirator (SAR) or Airline Respirator- means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.
- Tight-Fitting Facepiece- means a respiratory inlet covering that forms a complete seal with the face.
- User Seal Check- means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

3. RESPONSIBILITIES

3.1. OCCUPATIONAL AND ENVIRONMENTAL SAFETY (OES)

OES is responsible for the development, implementation, and administration of the RPP. These responsibilities include:

- Reviewing and updating the respiratory protection written program.
- Conducting exposure and health hazard evaluations of the Clemson University work environment.
- Approving respiratory protection equipment for Clemson University employees.
- Providing training to personnel on the proper use, maintenance and storage of respirators.
- Providing a fit testing program for respirator wearers.
- Maintaining fit testing and training records.
- Evaluating the overall effectiveness of the respirator program.

3.2. OCCUPATIONAL HEALTH NURSE

The Occupational Health Nurse is responsible for:

- Developing and implementing an OSHA compliant medical surveillance program for all personnel utilizing respiratory protection.
- Performing initial evaluations and physical examinations of the individuals using respiratory protection to determine if the individual is medically able to wear respiratory protective equipment.
- Conducting periodic evaluations (and physicals as necessary) of respirator users.
- Maintaining up to date medical clearance records for respirator wearers in SciShield.

3.3. DEPARTMENT HEAD/SUPERVISOR/PI

Departments whose employees may be exposed to respiratory hazards are responsible for providing appropriate resources including personnel, equipment, and financial support. Departments are primarily responsible for ensuring implementation of the RPP in their areas and are responsible for:

- Identifying and notifying OES of tasks/procedures which may require exposure/health assessments to determine if individuals need to utilize respiratory protection.
- Supervising staff to ensure that the respirator protection program is followed.
- Provide resources for respirators, cartridges, and other necessary equipment.
- Ensure all individuals wearing a respirator are correctly marked as such in SciShield.

3.4. RESPIRATOR WEARERS

Respirator wearers are responsible for:

- Obtaining medical approval, respirator fit testing, training, and OES approval prior to wearing a respirator.
- Using respirators in accordance with instructions and guidelines received during training courses.
- Storing, cleaning, maintaining, and protecting respirators from damage.
- Reporting any problems or malfunction with respiratory protective equipment to the supervisor/principal investigator.
- Informing the Occupational Health Nurse or contracted medical personnel of health changes that would affect the safe use of respirators.

4. EXPOSURE/HEALTH HAZARD ASSESSMENT

Exposure monitoring will be performed when Clemson University employees or students perform work that may result in overexposure to a respiratory hazard. Employees who believe respiratory protection is needed for activities relating to their job should contact their PI/responsible supervisor. The employee or their supervisor should contact OES by submitting a Respiratory Protection Assessment Request Form to have a hazard assessment performed.

4.1. EXPOSURE ASSESSMENT TRIGGERS

Exposure assessments will be conduced by OES when:

- OSHA has a substance specific standard.
- Employees report respiratory health effects.
- The workplace contains visible emissions.
- Other circumstances when it is reasonable to suspect an exposure

4.2. EXPOSURE ASSESSMENT CRITERIA

Exposure assessments will:

- Identify the hazardous substance.
- Review work processes to determine where potential exposures may occur. The review may include a survey of the work area, review process records, and talking with employees or supervisors.
- Perform exposure monitoring where determined that a potential for overexposure exists.
    - Sampling is the primary method for determining exposure assessment. Sampling will utilize appropriate methods for contaminants, will present worst case exposures, and represent appropriate numbers of shifts and operations to determine range of exposure.
    - Other data including physical or chemical properties, air exchange rates, release rates, or objective information may also be used for estimating exposure.
- Allow OES to determine if the contaminant is a particulate, a chemical, or a biological contaminant as well as determine if there are any mandatory or recommended occupational exposure levels for the contaminant.
- Determine the need for respiratory protection and the type of respirator needed, if required.

4.3. HAZARD ASSESSMENT REEVALUATION

Hazard assessment will be reevaluated periodically. The PI/responsible supervisor must notify OES of any change in workplace conditions or operations that may affect employee exposure. Changes in materials or equipment used, changes in volume of work, or changes in the process or location may require reassessment.

5. MEDICAL EVALUATIONS

Once determined that an employee will use a respirator, either required or voluntarily, they must receive a medical evaluation and approval from the Occupational Health Nurse or from an approved/certified outside medical consultant. This assessment must be performed prior to fit testing and assigning a respirator to an employee.

5.1. MEDICAL EVALUATION FOR AIR-PURIFYING RESPIRATORS

Use of an air-purifying respirator may place a burden on a worker's health; breathing may become difficult because a filter or cartridge device may impede the flow of air. Certain medical conditions may place an employee at increased risk of illness, injury, or death:

- Cardiovascular and respiratory disease
- Cardiovascular damage
- Reduced lung function
- Neurological disorders
- Musculoskeletal disorders

- Psychological conditions

The Occupational Health Nurse (OHN) or an approved/certified outside medical consultant is required to make a determination if the employee is medically able to use a respiratory protective device.

5.2. INITIAL DETERMINATION

The initial determination will consist of the completion of the Respiratory Protection- Medical Clearance form which addresses the information required in 29 CFR 1910.134 Appendix C and can be found in the SciShield Document Library for download. Completed forms will be submitted to the Clemson University Occupational Health nurse for review. Based on the evaluation of the form, the OHN may require an additional health exam or spirometry test prior to giving medical approval. Medical approval will be provided to OES via documentation through SciShield.

5.3. ADDITIONAL MEDICAL DETERMINATIONS

The medical evaluation and any necessary follow-up exams, as detailed in section 5.2 of this document, will be repeated periodically for all respirator wearers. Medical evaluations will be repeated at a minimum,

- When a change in job activity requires the use of respiratory protection the employee was not previously medical cleared to use.
- An employee reports medical signs or symptoms that are related to the ability to use a respirator.
- A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated.
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.
- Every 3 years

6. TRAINING

Respiratory protection training is mandatory for all Clemson University employees and researchers who wear a respirator for protection against hazardous air contaminants. Training is also mandatory for PI/responsible supervisors. Training will be provided by OES staff to Clemson University employees and researchers prior to wearing a respirator and then annually thereafter for the duration of the respirator use. It is the responsibility of the PI/Supervisor to ensure all employees receive training.

6.1. RESPIRATOR TRAINING WILL INCLUDE:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- The limitations and capabilities of the respirator.
- How to use the respirator effectively in emergency situation, including situations in which the respirator malfunctions.
- How to inspect, put on and remove, use, and check the seals of the respirator.
- The procedures are for maintenance and storage of the respirator.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- The general requirements of the OSHA Respiratory Protection Standard
- .

6.2. PI/SUPERVISOR TRAINING WILL INCLUDE:

PI/Supervisors of respirator wearers should receive training of at least the following:

- Fundamentals of respiratory protection
- Respiratory protection practices
- Nature and extent of hazards which employee may be exposed
- Selection and use of respirator used by employee
- Employees responsibilities and job duties that facilitates the Respiratory Protection Program

6.3. SUPPLEMENTAL TRAINING

6.3.1. TRAINING-SITE SPECIFIC

The PI/responsible supervisor should provide the following training:

- Where respirators are to be stored specific to your area.
- Who is responsible for ordering filters/cartridges.
- Ensuring unit specific training, including when a new procedure relating to respirators is introduced to your specific work area.

6.3.2. TRAINING- VOLUNTARY USE OF FILTERING FACEPIECE

Employees who voluntarily wear filtering facepiece respirators (dusts masks) are not required to complete formal training. However, they will be given a copy of Information for Employees Using Respirators When Not Required under Appendix D of the Respiratory Protection Standard. PI/responsible supervisors must keep a signed copy ensuring the employee has read and understand the information contained in the document.

6.3.3. TRAINING EXCEPTION FOR CLEMSON UNIVERSITY FIRE DEPARTMENT

The Clemson University Fire Department will perform additional internal training annually. This training will be performed and documented by a competent person familiar with the relevant respiratory hazards and training requirements. Training will be made up of a combination of classroom instruction and hands-on training and will address, at a minimum, the following as they pertain to the specific hazards encountered by the Clemson University Fire Department:

- Type of respiratory hazards encountered
- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- Capabilities and limitations of respirators
- How to use the respirator effectively in emergency situations, including situations where the respirator malfunctions.
- Instructions on recognizing medical signs and symptoms that may limit or prevent the effective use of the respirator.
- How to inspect, put on and remove, use, and check the seals of the respirator.
- What the procedures are for maintenance, and storage of the respirator.
- SCBA Air Management and cylinder alarm procedures
- SCBA cylinder filling

6.3.4. TRAINING EXCEPTION FOR STUDENT HEALTH SERVICES

Clemson University's Student Health Center has designated an employee, Kelly Slatton (kslatto), to perform internal hands-on training to ensure proficiency in the correct use of loose fitting PAPRs for response to infectious disease. The training will cover, at a minimum,

- The correct procedure for donning and doffing the respirator
- How to decontaminate and clean the PAPR after use
- Criteria for inspecting the PAPR for damage or wear to the blower, hose, hood, or belt
- How to evaluate the blower for correct function
- What to do in the event of PAPR failure during use
- Correct filter selection for the hazards present

Training documentation will be documented through SciShield.

7. TYPES OF RESPIRATORS AND LIMITATIONS

Respirators are used to prevent the inhalation of harmful airborne substances or to assist in oxygen deficient atmospheres. If used properly, respirators provide protection either by removing contaminants from the air before it is inhaled, or by supplying an independent source of respirable (clean, oxygen sufficient) air. They are designed to be tight fitting or loose fitting.

7.1. AIR PURIFYING RESPIRATORS

Air purifying respirators (APR's) use filters, canisters, or cartridges to remove contaminants from the air. Elements that remove particles are called filters, while vapor and gas removing elements are called either chemical cartridge or canisters. Each cartridge or canister is designed for use to a specific gas, vapor or particulate hazard, with some offering protection against a combination of hazards. Filters or canisters are the functional part of the respirator, and can generally be removed and replaced once their effective service life has expired. The exception is filtering facepiece respirators, which cannot be cleaned, disinfected, or re-supplied with filter elements.

7.1.1. ADVANTAGES OF AIR PURIFYING RESPIRATORS

- Light weight
- Less Restrictive
- Easier to use than atmosphere supplying respirators
- Less expensive to purchase, use, maintain, replace

7.1.2. DISADVANTAGES OF AIR PURIFYING RESPIRATORS

- Cannot be used in in Oxygen deficient atmospheres (i.e. less than 19.5% oxygen)
- Cannot be used in IDLH atmospheres
- Cannot be used when a substance specific standard mandates use of a different type of respirator
- Cannot be used when the contaminant, or concentration of the contaminant is unknown

7.2. POWERED AIR PURIFYING RESPIRATORS (PAPR)

Powered air purifying respirators function like other air purifying respirators in that they use filters, canisters or cartridges to remove contaminants from the air. Their difference lies in the belt-mounted, battery-operated blower that delivers a supply of purified air to the facepiece.

7.2.1. ADVANTAGES OF PAPRS

- The user does not have to draw air directly through the filters and are typically more tolerated by users than APR's.
- Constant flow of fresh air may make the user more comfortable in hot environments or when worn with protective clothing.
- Loose Fitting PAPR do not rely on a good face seal and can be used with beards or other conditions that might interfere with a good face seal.
- Users who may not be medically qualified to use negative pressure respirators in some instances may use PAPR when approved by the Occupational Health Nurse.

7.2.2. DISADVANTAGES OF PAPRS

- Batteries must be fully charged before using the blower.
- Tight fitting PAPR rely on a good face seal and cannot be used with beards or other conditions that might interfere with this seal.
- Significantly more expensive to purchase and maintain.
- General use limitations for APR's apply to PAPR as well.

7.3. ATMOSPHERE SUPPLYING RESPIRATORS

Atmosphere supplying respirators provide breathing air from a source independent of the surrounding atmosphere. Use of Atmosphere Supplying Respirators must be approved by OES.

7.3.1. TYPES OF ATMOSPHERE SUPPLYING RESPIRATORS

- Air-Line Respirators: Also called supplied air respirator (SAR): The respirator is connected to a stationary source of compressed breathing air by a hose. The air is delivered in a sufficient volume and pressure to meet the user's breathing requirements.
- Self-Contained Breathing Apparatus (SCBA): The air is supplied from a compressed gas cylinder, usually through a full-face mask, which is worn on the wear's back.
- Combination Respirators: Consist of a small auxiliary self-contained breathing air supply (SCBA) that is normally used in atmospheres that are or may be IDLH. The auxiliary unit can be used if the primary air supply fails.

7.3.2. ADVANTAGES OF ATMOSPHERE SUPPLYING RESPIRATORS

- Atmosphere supplying respirators are the only respirators that can be used in IDLH or oxygen deficient atmospheres.
- Atmosphere supplying respirators offer a higher protection factor and maximum use concentration then air purifying respirators.

7.3.3. DISADVANTAGES OF ATMOSPHERE SUPPLYING RESPIRATORS

- Air-line respirators supply breathing air to the user by a hose connected to an air compressor or cylinders. The user is limited by the length of the hose and the dangers of damage to the hose.
- If breathing air from a fuel-generated compressor is used, the supply air must be continuously monitored with audible alarm for carbon monoxide. Airline respirators may not be used in an IDLH atmosphere unless the worker also wears an emergency escape SCBA.

- A SCBA is limited due to the cylinders of compressed air that must be carried by the wearer. This makes SCBA's heavy and bulky, and the duration of air supply is limited, typically 30 minutes. These respirators are expensive to purchase and maintain. All employees who use or may need to use an airline or SCBA must receive specialized training, conducted by a person credentialed and knowledgeable in the subject matter.

7.4. TYPES OF FACE PIECES

The degree of protection offered by a respirator and its acceptability by workers varies according to facepiece style. Respirator facepieces may be tight fitting, half mask or full facepiece, or loose fitting hood or helmet.

7.4.1. TIGHT FITTING RESPIRATORS

Tight fitting respirators include full facepiece, half mask, and filtering facepiece models that rely on the face-to-facepiece seal for adequate protection. They cannot be used when facial hair or other conditions interfere with this seal. Fit testing is required before an employee is assigned a respirator with tight fitting facepiece. Tight fitting respirators may be either negative pressure APR's or PAPR's.

7.4.2. LOOSE FITTING RESPIRATORS

Loose fitting respirators are PAPR units that deliver purified air to a hood, helmet or other loose-fitting face covering. They may be used by employees with facial hair or other conditions that might prohibit a good face-to-facepiece seal. Fit testing is not required for loose fitting respirators.

8. FIT TESTING

A "fit test" tests the seal between the respirator's facepiece and your face. Respirator wearers must be fit tested by OES before using a respirator in the workplace and must be retested at least every 12 months to make sure that the respirator still fits. The respirator wearer must be fit tested with the specific make, model, style, and size of respirator that they will be using. Not everyone can get a good fit with one specific respirator. If the respirator fails the fit test, then another make, model, style, or size must be tried until one is found that fits properly.

8.1. FIT TESTING PROCEDURE

The Fit Test will cover the proper donning and doffing of the respirator, how to perform a user seal check, and a quantitative or qualitative respirator fit test.

During fit testing, the employee shall be trained on how to don, doff, and adjust the respirator correctly.

8.1.1. USER SEAL CHECK

To perform a positive pressure check using a full facepiece, half mask, or filtering facepiece respirator with an exhalation valve, the employee shall seal the exhalation valve with the hand and exhale lightly into the mask. To perform a positive pressure check using a filtering facepiece respirator without an exhalation valve, the employee should cover the filter media of the respirator with their hands and exhale lightly into the mask. This should cause the mask to expand without leaking around the seal. If there is a leak, the mask must be reset to the face to obtain a good seal. To perform a negative pressure check using a full facepiece or half mask respirator, the employee shall seal the inhalation ports or filters and draw air into the lungs to cause the mask to collapse on the face. To perform a negative pressure check using a filtering facepiece respirator, the employee shall cover the filter media of the respirator with their hands and draw air into the lungs to

cause the mask to collapse on the face. If the mask holds this position until the employee exhales, the fit is good.

8.1.2. FIT TESTING METHODS

OES will perform fit tests using OSHA approved qualitative or quantitative methods. The respirator wearer will be fitted on each make and model of respirator they will be cleared to use. Respirators that a user has not been fitted on may not be worn.

8.1.2.1. QUANTITATIVE FIT TESTING

Quantitative fit test methods are the preferred fit testing method at Clemson University and will be prioritized over qualitative fit testing methods when feasible. Clemson University uses a TSI Portacount 8038 and Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol.

8.1.2.2. QUALITATIVE FIT TESTING

Qualitative fit testing will only be performed on filtering facepiece respirators. Clemson will use either BITREX™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol or Saccharin Solution Aerosol Protocol for qualitative fit testing.

8.2. FIT TESTING FREQUENCY

OES will perform fit tests annually for each Clemson University employee or student on each respirator they will be using. Fit tests will be performed according to approved OSHA methods for either qualitative or quantitative fit testing. Fit testing will be performed,

- Prior to initially performing work that requires respiratory protection
- Every 12 months following the initial fit test
- When a change in physical condition could affect the fit of the respirator including,
    - large weight gain or loss
    - major dental work (such as new dentures)
    - facial surgery that may have changed the shape of your face
    - significant scarring in the seal

Changes in physical condition could affect the ability of the respirator to properly seal to your face, which could allow contaminated air to leak into your respirator facepiece. If the respirator wearer finds that the fit of your respirator becomes unacceptable, you must be allowed to select a different type of respirator and be retested. The selection may include a new make, model, style, or size of respirator.

8.3. DYNAMICS TO CONSIDER DURING FIT TEST

- Facial Hair - Any facial hair along the sealing area of the respirator such as beards, sideburns, moustaches, or even a few days growth of stubble will not be permitted on employees who are required to wear a respirator. This facial hair will prevent a good face-to-face piece seal. OES will not approve or fit test employees for respirator use if interfering facial hair is present. The PI/responsible supervisor must not allow a worker to enter a contaminated work area when conditions prevent a good seal of the respirator.
- Eyeglasses - Ordinary eyeglasses should not be worn with a full-face respirator because the temple bars will prevent a good face-to-face piece seal of the mask. Special corrective lenses are available that can be mounted inside the mask.
- Contact Lenses - Wearing contact lenses is acceptable while using a respirator.

- Facial Abnormalities - Facial abnormalities such as scars, deep skin creases, prominent cheekbones, severe acne, or the lack of teeth or dentures can prevent a respirator from sealing properly.

9. RESPIRATOR USE AND APPROVAL

Only respirators approved by OES are allowed for use at Clemson University. Respirators will be issued on an individual basis and provided to employees by the university when deemed necessary for respiratory protection for assigned job duties. OES will provide information about the respirator manufacturer, model and size the employee is approved to wear. The respirator and appropriate cartridges will be selected to protect the employee from identified hazards in their work areas.

If an employee encounters any new or unusual hazards, OES should be contacted to review the hazard and provide assistance/advice concerning protection from those hazards. The employee should not assume the respirator provides protection. The selection of respiratory protection equipment will be based on the characteristics of the hazardous substance, concentrations present, and limitation of the respiratory protection equipment itself.

10. INSPECTION, CLEANING, MAINTENANCE, AND STORAGE

Regular care and maintenance procedures will help to ensure all respiratory protection equipment is clean, sanitary, and in good working order.

10.1. INSPECTION CRITERIA

Respirator inspections will include, at a minimum, an assessment of:

- Respirator function
- The tightness of connections
- Facepiece condition
- Head strap condition and elasticity
- Valve and gasket condition
- Connecting tube condition
- Cartridges, canisters, and/or filters expiration date and condition
- A check of elastomeric parts for pliability and signs of deterioration.

Special attention should be given to rubber, silicone, or plastic parts that can deteriorate. The face piece, especially the sealing surface, headband, valves, and filters, must be in good condition.

10.1.1. INSPECTION CRITERIA- LOOSE FITTING HOOD

All supplied air hoods, elastic, hoses and any other components must be inspected for defects prior to use. The hood covers the head, neck, and upper torso, and usually includes a neck cuff. Air is delivered by a compressor through a hose leading into the hood. Because the hood is not tight-fitting, it is important that sufficient air is provided to maintain a slight positive-pressure inside the hood relative to the environment immediately outside the hood.

10.1.2. INSPECTION CRITERIA- SCBA

All self-contained breathing apparatus (SCBA) must be inspected at least monthly. SCBA's are only approved for emergency situations including emergency escape and rescue for trained and approved wearers. Air cylinders must be fully charged at all times. Regulators and warning devices must be checked to ensure their

proper function. Records must be kept of inspection dates and findings. Cylinders may only be filled with air that meets the standards for grade D medical or breathing air. Gaskets, seals, fittings, and regulators shall be inspected on all powered air-purifying respirators (PAPR) and air-line respirators before and after each use.

SCBA tanks must be hydrostatically tested. During a hydrostatic test, an SCBA cylinder is examined to ensure it can safely hold its rated pressure. This regular testing is crucial because SCBA cylinders, or any compressed gas cylinder for that matter, can rupture if there is degradation in structural integrity. A hydrostatic test consists of filling the cylinder with a nearly incompressible liquid, in most cases water, pressurizing the cylinder and examining it for leaks or permanent changes in shape. Copies of the certification must be maintained by the PI. According to Luxfer Gas Cylinders, one of the largest manufacturers of SCBA cylinders, some common requalification and service life periods for non-steel and non-aluminum cylinders are:

- Hoop-wrapped cylinders should be tested every three years and have a 15-year service life.
- Fully-wrapped fiberglass cylinders should be tested every three years and have a 15-year service life.
- Fully-wrapped Kevlar® cylinders should be tested every three years and have a 15-year service life.
- Fully-wrapped carbon fiber cylinders should be tested every five years and have a 15-year service life.

10.2. INSPECTION SCHEDULE

All respirators must be inspected for wear and deterioration of their components before and after each use. SCBAs will additionally be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. Respirators maintained for emergency use will have their inspections documented. Documentation will include,

- the date the inspection was performed
- the name (or signature) of the person who made the inspection
- the findings
- required remedial action
- serial number or other means of identifying the inspected respirator

Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

10.3. CLEANING

Standard cleaning and sanitizing procedure involves,

- Remove all filters and cartridges.
- Disassemble the respirator.
- Wash the respirator in a mild soap solution using a sponge or soft brush.
- While the respirator is disassembled, inspect it and replace any worn parts.
- Rinse in clean, warm, running water.
- A thorough rinse will remove all soap solution that might irritate the face or damage the respirator.
- To disinfect the respirator, add one tablespoon of household bleach per gallon of water in a sink or container.
- Immerse the respirator parts in this solution and allow to stand for five minutes.
- Remove parts, thoroughly rinse under warm, running water.
- Allow to air-dry or blot dry with a clean, lint-free cloth.
- Reassemble the respirator.

- At least once a year, the inhalation and exhalation valves must be replaced during the cleaning procedure.

10.4. MAINTENANCE

Respirator repairs must be made only by experienced persons and using only parts from the same manufacturer specifically for that respirator model. Contact OES if you need assistance with selecting appropriate replacement parts.

10.5. STORAGE

Respirators must be stored in a manner to protect against dust, sunlight, extreme heat or cold, excessive moisture, or damaging chemicals. A heavy-duty resealable plastic bag is recommended for respirator storage. Store the respirator in a position to prevent mechanical damage from occurring. Respirators shall be stored so that face pieces and exhalation valves rest in a normal position to prevent the mask from becoming deformed. Respirators shall never be hung from their straps or stored in a contaminated environment.

11. VOLUNTARY USE

Clemson Employees wearing respiratory protection on a voluntary basis will, at a minimum, be provided with the information found in Appendix D to Sec. 1910.134 (Mandatory) “Information for Employees Using Respirators When Not Required Under the Standard.”

11.1. INFORMATION FOR EMPLOYEES USING RESPIRATORS WHEN NOT REQUIRED UNDER THE STANDARD

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

12. RECORDKEEPING

OSHA regulations require that records pertaining to fit testing and respiratory training be retained in a format that allows easy and logical access. OES will retain all data pertaining to fit testing and respirator training will be kept on file with duplicate computer records maintained for efficient report writing and organizing. Regulatory compliance data such as personal fit testing and respirator training will be retained indefinitely.

Medical records are kept confidentially by the OHN as part of the Medical Surveillance Program (MSP) of Clemson University's Occupational Health and Safety Program.