W&M | ENVIRONMENTAL HEALTH & SAFETY

Respiratory Protection Program

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Responsible Office: EH&S

I. Scope

William & Mary's Respiratory Protection Program represents the commitment of workers and supervisors to identify and control airborne contamination hazards such as dusts, fibers, fumes, mists, gasses, smokes, sprays, bio-aerosols, and vapors.

Student (non-employee) and visitor (non-contractor) participation in respirator use will be limited to voluntary use of disposable filtering facepiece respirator (N95 mask), unless other use is approved in writing by EH&S. Students and visitors will be subjected to the medical and fit testing requirements of this program as deemed by EH&S. Supervisors and PIs are required adhere to all responsibility requirements of the Respiratory Protection Program.

Contractors (non-William & Mary employees) working on campus property shall be subject to their employer's Respiratory Protection Program.

II. Purpose

The purpose of the William & Mary Respiratory Protection Program is to protect the health of employees in accordance with the Occupational Safety and Health Administration's (OSHA) Respiratory Protection Standard, 29 CFR 1910.134.

Some air contaminants that may present respiratory hazards at William & Mary and the processes that produce them include:

- Metal fumes, ozone, and nitrogen dioxide from metal grinding, cutting and welding
- Chemical vapors from experiments, maintenance work, or cleaning
- Acid mists or nitrogen dioxide from acid etching of metals
- Chemical vapors and particulates from mixing or pouring chemicals

- Chemical vapors from painting and epoxy handling and curing
- Carbon monoxide and carbon dioxide from combustion
- Chemical vapors from spraying potentially harmful products and aerosols.

Whenever feasible, the elimination of hazardous chemicals and work processes that reduce or eliminate hazards, are the preferred methods for the reduction of respiratory hazards. The best way to achieve this goal is by substitution with less hazardous chemicals and work methods.

Engineering controls are the next best method for dealing with airborne contaminants. Ventilation is an engineering control for preventing occupational exposures to potentially harmful air contaminants, heat, and microbiological hazards. Common types of ventilation utilized around campus include: dilution ventilation, local exhaust ventilation, and laboratory fume hoods. The selection and design of appropriate air handling and ventilation systems as an occupational exposure control should be based on the results of hazard analysis, hazard identification, and good engineering practice.

Personal protective equipment (PPE) in the form of a negative pressure respirator is required at William & Mary whenever substitution, effective engineering controls and other types of workplace controls cannot feasibly reduce respiratory hazards to industry-recognized acceptable levels. The use of respirators is the last line of defense to protect employees from inhalation hazards.

The program administrator for the Respiratory Protection Program at William & Mary is the Environmental Health & Safety Officer.

III. Hazard Avoidance

a. To avoid exposure to airborne contaminants:
   i. Be familiar with the potential hazards of materials, processes, and by-products in your work area. A good initial reference is the Safety Data Sheet (SDS) available on the web at https://www.wm.edu/offices/publicsafety/ehs/hazard/safetydatasheets/
   ii. Recognize the presence of local exhaust and ventilation controls in your work area.
   iii. Check to see that such controls are working before performing your work.
   iv. Restrict access to controlled areas where processes which may generate significant airborne contaminants.
   v. Request an air quality assessment from your supervisor or an Environmental Health and Safety (EH&S) staff member whenever work processes change which could introduce new air contaminants.

b. Avoid unnecessary use of respirators:
    i. The use of any respirator presents a physiological burden. If the work environment places other stressors on the body, such as high temperature and humidity, question the continued use of respirators.
    ii. Note that you, as a respirator user, may not be the only person in the work area. If others who are not wearing respirators risk exposure, then control must be achieved using substitution or ventilation.

IV. Respiratory Hazards:

a. Effects associated with overexposure to workplace-produced air contaminants can include:
    i. oxygen deficiency, loss of consciousness, death
    ii. respiratory tract irritation
    iii. sensitization, asthma-like allergic reaction
    iv. nervous system effects
    v. systemic poisoning
    vi. metal fume fever
    vii. irreversible lung scarring
    viii. cancer

The Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH) are two organizations which help to establish acceptable exposure limits for workplace air contaminants. However, exposure limits are not available for all chemicals. There exist today well over 7 million known chemicals, with over 100,000 chemicals in general use, yet there are less than 500 air contaminants for which exposure limits have been established.

An atmosphere which presents the potential for exposure above any recommended exposure limit constitutes an unacceptable hazard, and requires controls to lower exposures to below the recommended limit.

Air purifying respirators are not to be used for atmospheres with a potential IDLH (Immediately Dangerous to Life and Health) hazard. When these conditions exist, if they cannot be eliminated through the OSHA Hierarchy of Controls of elimination, substitution, engineering controls, or administrative controls, then an authorized contractor with the ability to utilize a SCBA will be utilized.

V. Responsibilities

a. Qualified Respirator Users

i. Maintain, store, and use your respirator(s) according to training
ii. Use assigned respirators only for the work for which they were selected
iii. Maintain current qualifications to include medical clearance, respirator training and fit testing.
iv. Employees (males) shall be clean-shaven prior to annual fit-testing and anytime they must use and don a respirator.
v. Report problems associated with respiratory protective equipment to their supervisors and notifying the external physician or other license health care professional of any changes in medical condition or work practice that could impact their medical clearance for respirator use.

b. Supervisors/ PIs
i. Consider air quality issues whenever evaluating and implementing new work procedures.
ii. Request periodic air quality monitoring from any EH&S staff member for processes which generate air contaminants.
iii. Provide standard ventilation controls wherever feasible, and monitor their performance; monitoring may be requested through any EH&S staff member
iv. Ensure that all respirator use follows a written work procedure detailing the task being completed.
v. Select and procure required respirators with the assistance of the EH&S office.
vi. Responsible for implementation and enforcement of all provisions of this program
vii. Ensure employees have received training, fit testing, and medical evaluation prior to assigning work that requires respiratory protection.

c. Respiratory Protection Officer
i. Administer William & Mary's Respiratory Protection Program in accordance with OSHA requirements:
ii. Coordinate the approval of respirator use with supervisors
iii. Issue respirators provided that there is reasonable data for concentration of the contaminant in air.
iv. Maintain an inventory of respirators, accessories, and maintenance items to be used and backfilled utilizing budgets associated with tasks being completed.
v. Coordinate training/fit testing for all respirator users.
vi. Ensure that recordkeeping requirements are followed.
vii. Adhere to medical recordkeeping requirements for Occupational Health & Safety.
viii. Conduct air monitoring for work procedures that may generate air contaminants.

ix. Evaluate employee exposure to air contaminants.
x. Survey work areas to identify new procedures/processes that may generate air contaminants.
xi. Maintain a record of air monitoring performed on campus.
xii. Maintain air monitoring equipment for usage.

d. External Physician or other Licensed Health Care Professional (PLHCP)
   i. Provide medical evaluation for respirator users. Evaluation must meet or exceed evaluation that the OSHA required questionnaire provides.
   ii. Investigate suspected workplace overexposures, based on results of medical evaluation, using the assistance of EH&S Staff.

VI. Qualifications

a. Medical Determination
   i. Employees who are required to wear respirators at William & Mary must have a medical evaluation performed to determine the employee's ability to use a respirator. Employees are not permitted to wear respirators until a physician or other licensed health care professional (PLHCP) designated by W&M has determined they are medically able to do so. Once the user is approved medically they must complete a fit test conducted by the EH&S office and the associated training to be qualified for respirator use. The medical questionnaire is administered confidentially during the employee's normal working hours or at a time convenient to the employee.
      1. The authorized PLHCP performs the medical evaluation using a medical questionnaire completed by the employee that is being evaluated. The respirator medical questionnaire and instructions for submitting the questionnaire to the PLHCP can be acquired by contacting the EH&S office at Safety@wm.edu. The medical evaluation is conducted at no cost to the employee.
      2. If the PLHCP deems a follow-up medical examination is necessary to make a final determination, the tests, consultations or diagnostic procedures will be performed at no cost to the employee.
   ii. Medical re-evaluation will be required if the following circumstances are met:
      1. An employee reports medical signs or symptoms that are related to ability to use a respirator;
      2. A PLHCP, supervisor or the respirator program administrator informs the employer that an employee needs to be reevaluated;
      3. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or

4. 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.
5. The employee is subject to additional medical evaluation requirements in additional standards (such as asbestos).

All examinations and questionnaires will remain confidential between the employee and the physician. Once the user is approved medically, a medical clearance form will be generated by the PLHCP. EH&S will retain a copy of this form and will then conduct a fit test and the associated training.

b. Training

Annual respirator training will be provided as part of respirator qualification and will cover:

i. The William & Mary Respiratory Protection Program;
ii. Why respirators are necessary and how improper fit, usage, or maintenance can compromise the protective effect of a respirator;
iii. The limitations and capabilities of the respirator;
iv. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
v. How to inspect, put on and remove, use and check the seals of the respirator
vi. Procedures for maintenance and storage of the respirator;
vii. How to recognize medical signs and symptoms that may limit or prevent the effective us or respirators; and
viii. Applicable respiratory protection regulations.

c. Fit Testing

Before an employee will be required to use any tight-fitting respirator, the employee will be fit tested with the same make, model, style, and size of respirator that will be used. Qualitative and quantitative fit tests shall be administered using the William & Mary Respirator Fit Test Protocol.

Employees who are required to wear tight-fitting respirators will be fit tested:

i. Prior to being allowed to wear any respirator with a tight fitting facepiece;
ii. Annually
iii. When there are changes in the employee's physical condition that could affect the fit of a respirator (i.e., obvious change in body weight, or facial scarring);
iv. When a different respirator facepiece (size, style model, or make) is used; and
v. With the make, model, and size of respirator that they will actually wear.

d. Cartridge respirators are not to be used for atmospheres with a potential IDLH (Immediately Dangerous to Life and Health) hazard. Tasks requiring a higher level of protection will be accomplished through a contracted service provider.

e. The combination of the medical evaluation, annual fit test, and annual respirator training qualifies an employee to use a respirator.

VII. Program Summary

a. The decision to wear a respirator is never at the sole discretion of the employee. It is a decision made by the supervisor or PI and reviewed and approved by EH&S staff only after the consideration of substitution products, ventilation, or other engineering controls. Once the decision is made for the employee to wear a respirator, it must be worn according to the conditions of use described here.

b. Respirator Types
    i. Air-Purifying Respirators utilize an air-purifying filter, cartridge or canister that removes specific air contaminants by passing ambient air through the air-purifying element. Negative-pressure respirators use mechanical filters and/or chemical media and include filtering facepiece respirators, elastomeric half facepiece respirators and elastomeric full facepiece respirators. Negative pressure air purifying respirators are used at William & Mary. Positive pressure respirators are operated in a positive-pressure continuous flow mode utilizing filtered ambient air and include powered air-purifying respirators (PAPR). Air purifying respirators do not supply oxygen and shall not be used in oxygen-deficient atmospheres or in areas that are immediately dangerous to life or health (IDLH).
    ii. Atmosphere supplying respirators provide clean breathing air form a source independent of the work area. These respirators will protect wearers from many types of airborne contaminants (particles, gases, and vapors) and in certain cases, oxygen-deficient atmospheres. Three types of atmosphere-supplying respirators include supplied-air respirators (SARs), self-contained breathing apparatus (SCBAs), and combination SARs/SCBAs. Atmosphere supplying respirators are not utilized at William and Mary. Tasks requiring this level of protection will be accomplished through a contracted service provider.

c. Conditions of Use
    i. Respirator Use for Routine Work

1. The supervisor/worker ensures that requirements for procurement, selection, training, qualifications, maintenance, and inspection are followed.
2. Respirators are utilized in accordance with the training they receive on the use of each model. In addition, the respirator will not be used in a manner for which it is not certified by NIOSH or by its manufacturer.
3. All employees will conduct a positive pressure or negative pressure user seal check each time they don a respirator before entering a hazardous atmosphere and periodically while wearing the respirator to ensure an effective seal has been obtained.
4. If an effective seal is not maintained, breakthrough, leakage, improperly working valve and/or the respirator is damaged while working in a contaminated area, the worker must immediately exit the contaminated area. The respirator must be repaired or replaced in a safe area.
5. Employees are not permitted to wear tight-fitting respirators if they have conditions such as deep facial scars, facial deformities, facial hair (including stubble), or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, head/face coverings, or other articles that may interfere with the facepiece-to-face seal. Eyewear with temples cannot be worn with a full face respirator as interferes with the facepiece-to-face seal and a spectacle kit must be provided at no cost to the employee.

ii. Inspection

Prior to use, the respirator must be inspected to ensure it is in proper operating condition. Any damaged or defective parts must be replaced before use. The following procedure is recommended:

1. Check the facepiece for cracks, tears, holes, distortion, other damage and dirt.
2. Examine the inhalation and exhalation valves for signs of distortion, cracking, tearing or missing parts.
3. Check that the head straps are intact and have good elasticity.
4. Examine all plastic parts and gasket areas for signs of cracking or fatiguing and replace if necessary. Secure the valve cover and all pieces removed during inspection prior to use.

iii. Cleaning and Storage

During breaks and between a more thorough cleaning, a single use respirator cleaning pad may be used to clean the portion of the mask that comes in contact with your face. Cleaning with solvents may degrade some respirator components and reduce respirator effectiveness. It is important to utilize wipes designated for respirator use.

Respirators issued for the exclusive use of an employee will be cleaned as often as necessary to be maintained in a sanitary condition. Respirators issued to more than one employee will be cleaned and disinfected before and after being worn by different individuals.

For a thorough cleaning:

1. Disassemble the respirator, remove cartridges and/or filters, valve assemblies and any additional components recommended by the manufacturer. Discard or repair any defective parts.
2. Clean face piece and associated parts in warm water (less than 120 degrees Fahrenheit) and scrub with a soft brush until clean. Add neutral detergent if necessary. Do not use organic solvents or cleaners containing lanolin or other oils.
3. Disinfect the face piece by wiping the respirator with 70% isopropyl alcohol solution disinfecting wipes, soaking in solution of quaternary ammonia disinfectant or 3 oz. household bleach in 2 gallons of water.
4. Rinse facepiece in fresh, clean warm water.
5. Air dry in a non-contaminated atmosphere.
6. Reassemble the respirator and test the respirator to ensure all parts work properly.

When the respirator is not in use, it must be stored in its resealable storage bag, away from contaminated areas.

iv. Respirator Selection

1. Only NIOSH-approved respirators will be used.
2. All procurements of required respirators and replacement parts shall be done with the approval of the EH&S Staff.
3. All respirator selections shall be based on an assessment of the respiratory hazards in the work environment.
4. All air purifying chemical cartridge respirators that do not have an end of service life indicator shall have their cartridges discarded after 8 hours of use.

v. Cartridge Changeout

1. Cartridges should be dated when opened and replaced based on the manufacturer's recommendations. If the manufacturer has made no recommendations, changeout schedule should occur based on OSHA's

methods of estimating service: Rule-of-thumb, mathematical models, or by experimental testing.

2. If no data exists for the timely replacement of chemical cartridge respirators and the chemical cartridge does not have an end of service life indicator, cartridges shall be discarded after 8-hours of use, or for filtering cartridges when there are changes in breathing resistance. EH&S can provide further assistance in making cartridge changeout determinations.

vi. Inspection and Assessment
   1. Ventilation Controls Used for Airborne Contaminant Control
      a. All ventilation controls must be monitored at least annually.
      b. All ventilation controls must have written maintenance procedures.
      c. The selection of new ventilation controls shall be made with assistance from EH&S staff.

d. Workplace Air Monitoring
   i. Employees, with assistance from the EH&S staff, shall monitor the workplace for respiratory hazards periodically and when developing new work procedures or when introducing new chemicals.

e. Air Contaminant Exposure Limits
   i. OSHA and the ACGIH establish exposure limits for workplace air contaminants. William & Mary observe these limits. OSHA limits are called Permissible Exposure Limits (PELs) and are legally enforceable. ACGIH limits are called Threshold Limit Values (TLVs) and serve as guidelines. In many cases, ACGIH limits are more conservative than are OSHA's. The exposure limits are expressed as time-weighted averages. Common reporting units are parts-per-million per eight-hour shift for gases and vapors, and milligrams-per-cubic-meter per eight-hour shift for particulate air contaminants. For highly toxic or fast-acting contaminants, the units are averaged over a 15-minute interval and are called Short Term Exposure Limits (STELs). Exposures at or below the exposure limits are considered to represent minimal risk to health. OSHA PELs are found in the OSHA Z-Tables of 29 CFR 1910.1000. ACGIH TLVs are found in the "Threshold Limit Values (TLVS) and Biological Exposure Indices (BEIS) Book" by the American Conference of Governmental Industrial Hygienists. For assistance in interpreting these levels, all faculty/staff/students should consult with EH&S staff.

f. Voluntary Respirator Use:
    i. At the request of an employee, the supervisor can authorize the voluntary use of respirators when the following conditions have been met:
        1. If the employee chooses to use a respirator other than a disposable filtering facepiece respirator (N95 mask), the user must be trained by EH&S and medically authorized by the PLHCP prior to using a voluntary respirator.
        2. The employee must review and sign Attachment 2 of this document, which is Appendix D of 1910.134. The supervisor must submit the signed copy of Attachment 2 to Safety@wm.edu.
        3. Voluntary use respirators must not be worn in an environment that exceeds any safety guidelines or regulatory requirements, to include ACGIH TLVs, PELs, and IDLHs.
        4. Evidence that these conditions have been met will be documented by the EH&S office and maintained on file.

g. Program evaluation:
    Periodic evaluation of the respiratory protection program at William & Mary will be conducted by the Environmental Health & Safety Officer.

Attachments

Attachment 1 – OSHA appendix D pertaining to voluntary use respirators
Attachment 2 – Respirator Use Tracking Log

Attachment 1

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Voluntary N95 Respirator Use

Appendix D to Sec. 1910.134 (Mandatory) 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.
[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

By signing this document, the supervisor acknowledges they will authorize situational, voluntary use of an N95 respirator and will not authorize use where no respiratory hazard exists.

_____	_____	_____	_____
Supervisor Name (Print)	Supervisor Name (Signature)	Employee Id #	Date

By signing this document, I am acknowledging that I have read Appendix D to Sec. 1910.134 and that I will adhere to the requirements of Appendix D.

_____	_____	_____	_____
Employee Name (Print)	Employee Signature	Employee Id #	Date

A signed copy of this form shall be submitted to Safety@wm.edu

Attachment 2

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Respirator Cartridge Change-out Schedule/Log

Use the following log form to determine when respirator cartridges have reached their end of service and should be replaced with a new cartridge.

Cartridge Change-Out Tracking						
Cartridge Type:						
	Date	Start Time of Respirator Use	End time of Respirator use	Total Time Used during Job	Total Accumulated Time on Cartridge	Product/Chemical Used
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

Date New Cartridges Utilized				
1.	2.	3.	4.	5.
6.	7.	8.	9.	10.

All chemical cartridges that do not have an end of service life indicator shall have their cartridges discarded after 8 hours of use. Particle filtering cartridges shall be discarded when there are changes in breathing resistance.

For specific information regarding respirator use and cartridge selection contact the Environmental Health and Safety Office: 221-1643 or Safety@wm.edu