Respiratory Protection Program

1. Purpose

Tufts Industrial Hygiene Group (TIHG) has determined that certain employees and/or students may be exposed to respiratory hazards during routine operations or during research projects. These hazards include particulates, animal dander, and other allergens; splashes or droplets of potentially infected fluid (e.g., blood, saliva), viruses or bacteria including Mycobacterium Tuberculosis (TB) droplet nuclei, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), hexane, dichloromethane, arsine, etc.

The purpose of this program is to ensure that all Tufts University employees and students are protected from exposure to these respiratory hazards.

Engineering controls, such as ventilation and substitution of less toxic materials, are the first line of defense at Tufts University. However, engineering controls have not always been feasible for some of our operations or have not always completely controlled the identified hazards. In these situations, respirators and other protective equipment must be used. Respirators are also needed to protect employees' health in cases when a hazardous material accidentally spilled out of a hood. The work procedures requiring respirator use at Tufts University are outlined in **Appendix A, Table 1-** ***Voluntary and Required Respirator Use at Tufts University.***

Some employees have expressed a desire to wear respirators during certain operations that do not require respiratory protection. As a general policy, TIHG will review each of these requests on a case-by-case basis. If the use of respiratory protection in a specific case will not jeopardize the health or safety of the employee (s), his/her direct Supervisor will provide respirators for voluntary use. As outlined in the Scope and Application section of this program, voluntary respirator use is subject to certain requirements of this program.

Contact TIHG at (617) 636-3933 if you have questions regarding respiratory hazards in your workplace or if you have any questions regarding the Respiratory Protection Program.

The Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard 29 CFR 1910.134 can be found at https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134. Definitions of basic terms are included in **Appendix B.**

2. Scope and Application

This program applies to all employees and students who are required to wear respirators during normal work operations, and during some non-routine operations such as a spill of certain hazardous substances of the hood. All employees working in these areas and engaged in certain processes or tasks (as outlined in Table 1) must be enrolled in the Tufts University Respiratory Protection Program.

In addition, the employer must establish and implement those elements of a written respiratory protection program necessary to ensure that any employee using a respirator voluntarily is medically able to use that respirator, and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user.

Exception: Employers are not required to include in a written respiratory protection program those employee or students whose only use of respirators involves the voluntary use of filtering facepieces (dust masks). *See* 29 CFR 1910.134(c)(2)(ii). Those employees or students must be provided with the information specified in OSHA's1910.134 Respiratory Protection standard, such as Appendix D of the standard (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard.

3. Responsibilities

3.1 Program Administrator:

The Program Administrator is responsible for administering the respiratory protection program. TIHG Certified Industrial Hygienist (CIH) is the qualified Program Administrator for Tufts University. Duties of the Program Administrator include:

- Working with Supervisors or Tufts University's in house Physician or Other Licensed Health Care Professional (PLHCP) to identify work areas, processes, or tasks that require employees to wear respirators and to evaluate respiratory hazards.
- Working with contractors on ensuring adequate air quantity, quality, and flow of breathing air for atmosphere-supplying respirators. See c(1) of the standard. *Note: Tufts personnel is not trained nor expected to use atmosphere-supplying respirators.*
- Working with Supervisors or PLHCP on selection of respiratory protection options.
- Working with Supervisors on monitoring respirator uses to ensure that respirators are used in accord with their certifications.
- Arranging for and/or conducting training and assisting Departments in complying with the program requirements.
- Working with Supervisors or Department representatives on ensuring proper storage, cleaning, inspections, and maintenance of respiratory protection equipment.
- Conducting qualitative fit testing with Bitrex (bitter) or Saccharin (sweet) solution, or quantitative fit testing with a PortaCount, TSI instrument.
- Working with the Supervisor and a PLHCP to ensure the employee is medically cleared and monitored.
- Delegating and training Qualified TIHG Personnel, including campus managers or Qualified Personnel within specific Departments to perform fit testing or assist with program implementation.
- Maintaining records required by the program and working with the delegated personnel on record keeping.
- Evaluating the Respiratory Protection program.
- Updating the written program as needed.

3.2 Supervisor:

Supervisors are responsible for ensuring the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements, Supervisors must also ensure that the program is understood and followed by the employees under their charge. *Note: Employees participating in the Respiratory Protection Program do so at no cost to themselves.*

Duties of the Supervisor include:

- Ensure that employees under their supervision (including new hires) have received appropriate

training, fit testing, medical evaluations, and a medical examination if required.
- Ensuring the availability of appropriate respirators and accessories.
- Aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that the respirators are properly cleaned, maintained, inspected, and stored according to the respiratory protection plan and manufacturer specifications.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards and working with the Program Administrator or PLHCP on selection of adequate respiratory protection.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.
- Working with contractors in ensuring adequate air quantity, quality, and flow of breathing air for atmosphere-supplying respirators. See c(1) of the standard. *Note: Tufts personnel is not trained or expected to use atmosphere-supplying respirators.*

3.3 Qualified TIHG Personnel or Qualified Personnel within specific departments:

Qualified Personnel (those delegated by the Program Administrator) are responsible for ensuring that the respiratory protection program is implemented in their area. In addition to being knowledgeable about the program requirements they must also ensure that the program is understood and followed by employees and other Departments working in their areas.

Duties of the Qualified Personnel include:
- Before performing a fit test, ensure that employees have received appropriate training, medical evaluations, and a medical examination if required.
- Conducting qualitative fit testing with Bitrex (bitter) or Saccharin (sweet) solution, or quantitative fit testing with a PortaCount instrument and working with the Program Administrator on record keeping.
- Aware of tasks requiring the use of respiratory protection.
- Training the employees to ensure that the respirators are properly cleaned, maintained, inspected, and stored according to the respiratory protection plan and manufacturer specifications.
- Ensuring that respirators fit well and do not cause discomfort.
- Working with the Supervisors to ensure the availability of appropriate respirators and accessories.
- Working with the Program Administrator to identify areas where monitoring would be needed to identify respiratory hazards.
- Working with the Program Administrator to ensure proper recordkeeping and program implementation.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

3.4 Employees:

Each employee has the responsibility:
- To wear their respirator when and where required and in the manner in which they are trained.
- Care and maintenance of their respirators as instructed (including storage in a clean, sanitary location).

- Inform the Supervisor if the respirator no longer fits well and request a new one that fits properly.
- Inform the Supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and any concerns that they have regarding the program.
- Inform their supervisor of a medical reevaluation.

4. Program Elements

4.1 Selection Procedures – The Program Administrator:

- Will select respirators to be used on-site, based on the hazards to which employees are exposed and in accord with all applicable OSHA standards. At Tufts University a PLHCP from Tufts Occupational Health Services may recommend the use of certain type of respirators based on their direct interaction with employees or students.
- Will work with the Supervisor or PLHCP on conducting a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. Monitoring can be contracted out or performed by TIHG.
- The hazard evaluation will include:
    - Identification and development of a list of hazardous substances used in the workplace, by department or work process.
    - A review of the work process to determine where potential exposures to these hazardous substances may occur. The review is to be conducted by surveying the workplace, reviewing process records, and talking with employees and Supervisors.
    - Exposure monitoring to qualify potential hazardous exposures if necessary.
    - A review and use historical data, environmental or objective data in place of personal monitoring if such information is available.
    - If worker exposures cannot be evaluated, they must be considered Immediately Dangerous to Life or Health (IDLH).
- Respirators are selected based on the workplace hazards evaluated, and workplace and user factors affecting respirator performance and reliability. The Hazard Assessment Form is attached as **Appendix C.**
- Respirators are selected based on the Assigned Protection Factors (APFs) and calculated Maximum Use Concentrations (MUCs). Type of respirators are listed in **Appendix D**. Selection criteria for Powered Air Purifying Respirator (PAPR) are attached in **Appendix E**.
- A sufficient number of respirator sizes and models must be provided to the employee during fit testing to identify the acceptable respirator that correctly fits the users. During the SARS-COV-2 pandemic, employees that cannot get a good fit should be wearing loose fit respirators, such as PAPR or perform job tasks that would not require direct contact with patients or individuals that are positive for SARS-COV-2.
- For IDLH atmospheres (Triumvirate or other contractors only):
    - Full facepiece pressure-demand SARs with auxiliary SCBA unit or full facepiece pressure-demand SCBAs, with a minimum service life of 30 minutes, must be provided.
    - Respirators used for escape only are National Institute for Occupational Safety and Health (NIOSH)-certified for the atmosphere in which they will be used.
    - Oxygen deficient atmospheres are considered IDLH.
- For non-IDLH atmospheres, respirators are:

  - Selected as appropriate for the APFs and MUCs.
  - Selected as appropriate for the chemical nature and physical form of the contaminant.
  - Equipped with end-of-service-life indicators (ESLIs) if the air-purifying respirators (APRs) are used for protection against gases or vapors. If there is no ESLI, then a change in the schedule must be implemented based on manufacturer recommendation.
  - Equipped with the National Institute for Occupational Safety and Health (NIOSH)-certified High Efficiency Particulate Air (HEPA) filters (or other filters certified by NIOSH for particulates under 42 CFR part 84) if the respirators (APRs) are to be used for protection against particulates.
- When monitoring is contracted out, one of the Industrial Hygiene (IH) consulting companies (that have service agreements with Tufts) in place will provide the necessary monitoring services.

4.2 Updating the Hazard Assessment – The Program Administrator:

- Will revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure) based on the information received from the Supervisor. If an employee feels that respiratory protection is needed during a particular activity, he/she is to contact his or her supervisor or the Program Administrator. The Program Administrator then:
  - Will evaluate the potential hazard, arranging for outside assistance as necessary.
  - Will then communicate the results of that assessment back to the Supervisor of that employee. If it is determined that respiratory protection is required, all other elements of this program will be in effect for those tasks, and this program will be updated accordingly.
  - Will make recommendations to ensure that all respirators are certified by NIOSH and are used in accordance with the terms of that certification.
  - Will make recommendations to ensure that all filters, cartridges, canisters are labeled with the appropriate NIOSH certificate label. The label must not be removed or defaced while it is in use.
  - For Voluntary Respirator Use, Tufts University will provide respirators at no charge to employees for the work processes/areas mentioned in Table 1.

4.3 Medical Evaluation:

Employees or students who are either required to wear respirators or who choose to wear an APR voluntary, must be medically evaluated (see details in Section 2) before being permitted to wear a respirator on the job and before being fit tested. Employees/students are not permitted to wear respirators until a PLHCP has determined that they are medically able to do so. Any employee/student refusing the medical evaluation will not be allowed to work in an area requiring respirator use. Each campus has a recommended PLHCP that will provide the medical evaluations (**See Appendix F**).

The PLHCP will perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

A follow-up medical examination will be provided for an employee/student who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of the OSHA Questionnaire, or whose initial medical examination demonstrates the need for a follow-up medical examination.

Medical procedures are as follows:

- The medical evaluation will be conducted using the Tufts OHS OSHA based questionnaire (**Appendix G**)
- The Program Administrator, its delegated Qualified Personnel, Departmental Supervisor or PLHCP will provide a copy of this questionnaire to all employees requiring medical evaluations.
- To the extent feasible, the university will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee will be sent directly to the physician for medical evaluation.
- All affected employees will be given a copy of the medical questionnaire to fill out, along with the email addressed or a Fax number of the PLHCP.

Employees will:

- Be permitted to fill out the questionnaire on Tufts University's time.
- Be granted follow-up medical exams as required by the Respiratory Protection Standard, and/or as deemed necessary by the Tufts PLHCP.
- Be granted the opportunity to speak with the physician about their medical evaluation if they so request.

The Program Administrator, its delegated employees, or the Department Supervisor will provide the Tufts University PLHCP with:

- A copy of this program, and a copy of the Respiratory Protection standard.
- The list of hazardous substances or biological agents by work area as provided in this Respiratory Protection program, Table 1.
- The employee's title proposed respirator type, and weight, length of time required to wear the respirator, expected physical workload (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing required.

In case the Tufts PLHCP recommends respirator use for a specific employee or student, the PLHCP should provide the information mentioned above to the Program Administrator and Department supervisor.

The Program Administrator should receive from the PLHCP a written recommendation regarding the employee's ability to use the respirator. The recommendation should provide only the following information:

- The type of respirator that the employee or student was cleared for.
- Any limitations on respirator use related to the medical condition of the employee or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator.
- The need, if any, for follow-up medical evaluations; and
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

Any employee, required for medical reasons, to wear a positive pressure air-purifying respirator will be provided with a PAPR.

After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations will be provided if:

- The employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
- The PLHCP or Supervisor informs the Program Administrator that the employee needs to be reevaluated, an additional medical evaluation will be provided.
- Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation.
- There has been a change in workplace conditions that may result in an increased physiological burden on the employee.

Note: OSHA Respiratory Protection standard does not require the Medical Questionnaire to be filled out annually; however, to ensure that each respirator wearer is medically able to use a respirator before the annual fit test is performed an updated medical clearance or employee's written confirmation that no changes in his/hers health condition or changes in workplace conditions occurred since the last medical evaluation will have to be submitted to TIHG and PLHCP (See **Appendix H** *Need for Additional Medical Evaluations).*

All examinations and questionnaires are to remain confidential between the employee and the PLHCP.

4.4 Fit Testing:

Fit Testing is required for employees/students required to wear a respirator with a positive or negative pressure tight-fitting facepiece. Fit testing is not required for employees or students who voluntary use an APR (such as a dust mask); however, is recommended by TIHG.

Employees/students who are required to wear half facepiece APR will be fit tested:

- prior to being allowed to wear any respirator with a tight-fitting facepiece,
- annually,
- when there are changes in the employee's physical condition that could affect respirator fit (e.g. obvious changes in body weight, facial scarring, etc.).

Employees/students will be fit tested with the make, model, and size of respirator that they will wear and glasses or other personal protection equipment that they are going to wear in conjunction with the respirator.

- Employees/students will be provided with several models and size respirators so that they may find an optimal fit.
- Fit testing of tight-fitting PAPRs is to be conducted in the negative pressure mode. The Program Administrator or campus manager will conduct fit testing following the OSHA approved Bitrex Solution aerosol QLFT Protocol (See **Appendix I**). Quantitative fit testing (QNFT) is performed for employees in BL3 and LAMS wearing N95 filtering facepiece respirators annually. Employees hired between two QNFT sessions will be fit tested by QLFT for the remainder of the period, until the next QNFT is scheduled. Tufts Universities' Fit test form is attached in **Appendix I-1**.

4.5 Respirator Use: Employees/Students

Responsibilities for employees include that they:

- Will use their respirators under conditions specified by this program, and in accord with the training, they receive on the use of each particular model. In addition, the respirator must not be used in a manner for which is not certified by NIOSH or by its manufacturer.

- Must conduct user seal checks each time that they wear their respirator.

- Must use either the positive or negative pressure check (depending on which test works best for them) specified in **Appendix I-2**.

- Must leave the work area to go to the locker room to maintain their respirator for the following reasons:
  1. Clean or replace their respirator if the respirator is impeding their ability to work.
  2. Change filters or cartridges, or replacement parts; or
  3. Inspect the respirator if it stops functioning as intended.

- Should notify their supervisor before leaving the area.

- Not wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents from achieving a good seal.

- Not wear headphones, jewelry, or other articles that may interfere with the facepiece-to face seal. Employees wearing corrective glasses or goggles, or additional PPE should ensure the face to face seal of the respirator remains intact.

4.6 Emergency Procedures:

Air-purifying respirators may only be used for emergency response (e.g., TB spills outside the biological safety cabinet) in normal atmospheres and not under IDLH conditions. Entry into known levels of chemicals or biological contamination may only be performed by APR's when the following criteria are met:

- The atmosphere has enough oxygen (19.5% minimum)
- Cartridge/canister has enough capacity,
- Cartridge/canister has an end of service life indicator, and
- The contaminant has adequate warning properties.

Entry into unknown levels of chemical contamination may only be performed by qualified Fire Department personnel or Emergency Response teams. *Note: where IDLH or unknown chemical concentrations exist, Tufts University Police Department (TUPD) will isolate and deny entry into the area and request assistance.*

To report Emergency Situations, notify campus police at 617-636-6911 following any incidents.

4.7 Respirator Malfunction:

- APR respirator malfunction – for any malfunction of an APR (e.g., breakthrough, facepiece leakage, or improper working valve), the respirator wearer must inform his or her supervisor that the respirator no longer functions and go the designated safe area to maintain the

respirator. The Supervisor must ensure that the employee receives the needed parts to repair the respirator or is provided with a new respirator.

- Atmosphere-Supplying Respirator malfunction – Tufts University employees use no atmosphere supplying respirators.

4.8 Air Quality:

No supplied-air respirators are used at Tufts University by employees. Laboratory or Department Supervisors should contact TIHG to determine if there is a need to use supplied-air respirators for new processes or maintenance procedures.

4.9 Cleaning, Maintenance and Change Schedules and Storage

4.9.1 Cleaning and Disinfecting:

The employee is responsible for ensuring the respirator is clean, sanitary, and working prior to use. The Department Supervisor will ensure that the respirators are cleaned and disinfected using the mandatory procedures in OSHA's Respirator Cleaning Procedures and manufacturer requirements; and will keep the Program Administrator and its delegates informed (See **Appendix J**).

- The filtering facepiece respirators (N95) are disposable and should not be reused. During the SARS-CoV-2 Pandemic the Department Supervisor shall follow OSHA's and Commonwealth of Massachusetts Department of Public Health (MDPH) guidelines regarding extended use, reuse, or use of expired N95 respirators.
- Half face APRs or PAPR respirators are to be regularly cleaned and disinfected at the designated respirator cleaning station.
- Respirators designated for the exclusive use of an employee are to be cleaned as often as necessary, but at least after use.
- The following procedures should be used when cleaning and disinfecting respirators:
  1. Disassemble respirator, removing any filters, canisters, or cartridges.
  2. Wash the facepiece and associated parts in mild detergent with warm water. Do not use organic solvents.
  3. Rinse entirely in clean, warm water.
  4. Wipe the respirator components with disinfectant wipes (70% Isopropyl Alcohol) or other EPA-approved disinfectants efficient in killing specific germs.
  5. Rinse and air dry in a clean area.
  6. Reassemble the respirator and replace any defective parts.
  7. Store the respirators properly to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Never leave your respirator hanging on a machine, lying on your workbench, or tossed into your toolbox or a drawer.

Note: The Supervisor will ensure an adequate supply of appropriate cleaning and disinfection material at the cleaning station. If supplies are low, employees should contact their supervisor, who will order the necessary supplies.

4.9.2 Maintenance:

Respirators are to be properly maintained at all times to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects.

- Worn or deteriorated parts will be replaced prior to use. Discard any damaged or soiled N95.

- No components will be replaced, or repairs made beyond those recommended by the manufacturer.
- The following checklist will be used when inspecting respirators:
  1) Facepiece – look for cracks, tears, or holes; facemask distortion; cracked or loose lenses/face shield
  2) Valves - residue or dirt; crakes or tears in valve material
  3) Head straps - break or tears; broken buckles
  4) Filter/Cartridges - approval designation; gaskets; crack or dents in housing; proper cartridge for the hazard.
- Employees are permitted to leave their work area and go to a designated area that is free of respiratory hazards when:
  1) They need to wash their face and respirator facepiece to prevent any eye or skin irritation, or to replace the filter, cartridge, or canister, or
  2) When they detect vapor or gas breakthrough or leakage in the facepiece or
  3) detect any other damage to the respirator or its components.

4.9.3 Change Schedule:

- Employees wearing APRs or PAPRs with P100 or HE filters for protection against particulates need to change their cartridge on their respirator when they first begin to experience difficulty breathing (i.e., resistance) while wearing the respirators.
- Employees wearing APRs or PAPRs with organic vapor cartridges should change their cartridges in accordance with manufacturer recommendations. For cartridges not provided with an end-of-service-life indicator, the change should be made when a breakthrough is noticed or at the end of the shift. They will also have to write the date on the cartridge when first removed from the pack.
- If at any time the employee smells or tastes the contaminant or irritation is detected, they should leave the contaminated area immediately and try to adjust the respirators and/or change the cartridge.

4.9.4 Storage:

- Respirators must be stored in a clean, dry area and in accordance with the manufacturer's recommendations.
- Each employee will clean and inspect their own reusable APR in accordance with the provisions of this program and will store their respirator in a dry, well-ventilated area away from contaminants.
- Each employee will have his/her name on the respirator bag, and the bag will be used to store that employee’s respirator.

4.9.5 Defective Respirators:

- Respirators that are defective or have defective parts must be taken out of service immediately.
- If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his or her supervisor.
- The Supervisor will work with the Program Administrator in determining if the respirator is going to be taken out of service until repaired, perform a simple fix (i.e., replacing a strap), or dispose of the respirator due to an irreparable problem or defect.

- When a respirator is taken out of service, the respirator will be tagged out of service, and the employee will be given a replacement of the same make, model, and size.
- If the employee is not given a replacement of the same make, model, and size, then the employee must be fit tested.

4.9.6 Training:

- The Program Administrator or a designated qualified TIHG or Qualified Personnel within specific departments will provide training to respirator users and their supervisors on the contents of the Tufts University Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection standard. At Tufts, the BSL3 supervisors are providing specific PAPR training to their employees.
- Employees or students will be trained before using a respirator in the workplace.
- The training will recur annually and more often if necessary.
- Supervisors must be trained before using a respirator in the workplace and be trained before supervising employees who wear respirators even if the Supervisors themselves do not wear a respirator.
- Supervisors will provide basic information on the respirators in accordance with OSHA's requirements for employees who voluntarily wear respirators when not required by the employer to do so (see **Appendix K** – Voluntary Use of Filtering Facepiece Respirators).
- Supervisor, the Program Administrator, or its delegates will ensure that each employee can demonstrate knowledge of at least the following:
  1) Why the respirator is necessary and how improper fit, usage or maintenance can compromise the protective effect of the respirator.
  2) What the limitations and capabilities of the respirator are.
  3) How to use the respirator effectively in emergencies, including situations in which the respirator malfunctions.
  4) How to inspect, put on and remove, use, and check the seals of the respirator.
  5) What the procedures are for maintenance and storage of the respirator.
  6) How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators, and
  7) The general requirements of the Respiratory Protection standard.
- The Supervisor will ensure that employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator).
- The training should be provided no later than 12 months from the date of the previous training.
- The new hires will be trained shortly after their first day of employment.
- Retraining should be administered annually, and when the following situations occur:
  1) Change in the workplace or the type of respirator render previous training obsolete.
  2) Inadequacy in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
  3) Any other situation arises in which retraining appears necessary to ensure safe respirator use.

5. Program Evaluation

- The Program Administrator or its delegates will work with the Supervisor on conducting periodic evaluations of the workplace to determine whether the provisions of this program are effectively

implemented, and it continues to be effective.

- During the SARS-CoV-2 pandemic voluntary use of N95 respirators was requested by employees/student's physician or Tufts PLHCP. The recommendation for use of N95 respirators for SARS-CoV-2 prevention may change as the pandemic evolves.
- The evaluations will include regular consultations with employees who use respirators, their supervisors, or the designated Qualified Personnel for specific departments, site inspections, air monitoring, and review of records.
- Factors to be assessed include, but are not limited to:
  1) Respirator fit (including the ability to use the respirator without interfering with effective workplace performance).
  2) Appropriate respirator selection for the hazards to which the employee is exposed.
  3) Proper respirator use under the workplace conditions the employee encounters; and
  4) Proper respirator maintenance.
- Problems identified will be noted in an inspection log and will be addressed with the Supervisor.
- These findings will be reported to the TIHG director, and the report will list plans to correct deficiencies in the respiratory program and target dates for implementing those corrections. The program is annually reviewed by the Program administrator and the TIHG team and updated as needed (See **Appendix L** -*Tufts University Program Compliance Steps).*

6. Documentation and Recordkeeping

- A written copy of this program and the OSHA standard is kept in a TIHG Box File electronically and is made available to all employees who wish to review it. A copy of the Tufts Respiratory Protection Program is also available online at https://viceprovost.tufts.edu/ehs/ppe/respiratory-protection-program/. Also maintained on the e-Box file or Tufts eLearning center are copies of the training materials.
- Copies of the fit test records are kept in a database and updated as new fit tests are conducted.
- Copies of the records are given to the Supervisor and employees that were fit tested.
- These records will be updated as new employees are trained, and as existing employees receive refresher training. BSL3 Supervisors are responsible for PAPR training records recordkeeping.
- The Program Administrator will also maintain copies of the records for all employees covered under the respirator program (except medical records).
- The completed medical questionnaire and the PLHCPs documented findings are confidential and will remain at the PLHCP office. Tufts University will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

7. Supporting Documentation

1. OSHA Personal Protection – Respiratory Protection Standard 29 CFR 1910.134
2. OSHA Toxic and Hazardous Substances – Hazard Communication 29 CFR 1910.1200
3. OSHA Temporary Enforcement Guidance - Healthcare Respiratory Protection Annual Fit-Testing for N95 Filtering Facepieces During the COVID-19 Outbreak
4. OSHA Expanded Temporary Enforcement Guidance on Respiratory Protection Fit-Testing for N95 Filtering Facepieces in All Industries During the Coronavirus Disease 2019 (COVID-19) Pandemic
5. OSHA Enforcement Guidance for Use of Respiratory Protection Equipment Certified under Standards of Other Countries or Jurisdictions During the Coronavirus Disease 2019 (COVID-19)

Pandemic
6. CDC Summary for Healthcare Facilities - Strategies for Optimizing the Supply of N95 Respirators during the COVID-19 Response
7. Mass DPH Guidance for Prioritizing and Optimizing Use of Personal Protective Equipment (PPE) in Massachusetts during the COVID-19 response
8. NIOSH Guide to Selection and Use of Particulate Respirators Certified under 42 CFR 84
9. NIOSH Respirator Selection Logic
10. OSHA Directive CPL-02-00-158

APPENDIX A: Voluntary and Required Respirator Use at Tufts University

Table 1 - Voluntary and Required Respirator Use at Tufts University

Contact TIHG or your Supervisor if a full list of Departments that use Respirators is needed.

APPENDIX B: 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 to employees when the employer implements a continuing, effective respiratory protection program as specified by this section.

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.

Demand respirator means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

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.

End-of-service-life indicator (ESLI) means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only respirator means a respirator intended to be used only for emergency exit.

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. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

Helmet means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

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.

Hood means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

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.

Interior structural firefighting means the physical activity of fire suppression, rescue, or both, inside of buildings and enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155)

Loose-fitting facepiece means a respiratory inlet covering that is designed to form a partial seal with the face.

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.

Physician or other licensed health care professional (PLHCP) means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e) of this section.

Positive pressure respirator means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

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.

Pressure demand respirator means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

Qualified personnel mean an employee that is familiar with one of the two acceptable tit test methods as well as the limitations of the models of respirators being tested, was trained in OSHA Respiratory Protection Standard and is familiar with Tufts Universities' Respiratory Protection Program and hazard recognition.

Qualitative fit test (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory inlet covering means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

Self-contained breathing apparatus (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

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.

This section means this respiratory protection standard.

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.

APPENDIX C: Hazard Assessment Form

General information			
Department	Supervisor	Work site	
Brief description of job task:			
Job classification:			
Level of physical exertion required to perform the job:			
Light (less than 200 kcal per hour):	*Moderate* (200 to 350 kcal per hour)	*Heavy* (above 350 kcal per hour)	
Hazards			
Type of hazard	Biological	Chemical	Radiation
Enumerate and describe:			
Chemical hazards	Name		
Regulatory limits	OSHA PEL	ACGIH TLV	
Monitoring data			
Contaminant concentration	Is this above the OSHA PEL? Yes/No	Is this at IDLH concentration? Yes/No	
Is the work being done in an O_2 deficient atmosphere?	Yes	No	
Controls			
Are engineering controls used?	Yes	No	
Describe			
Is a respirator used for routine tasks	Yes	No	
Type of respirator selected	Air Purifying	Atmosphere supplying	
Style of respirator	Tight fitting	Loose fitting	
Additional comments:			
Name of the person that completed the Assessment and role: Date:			

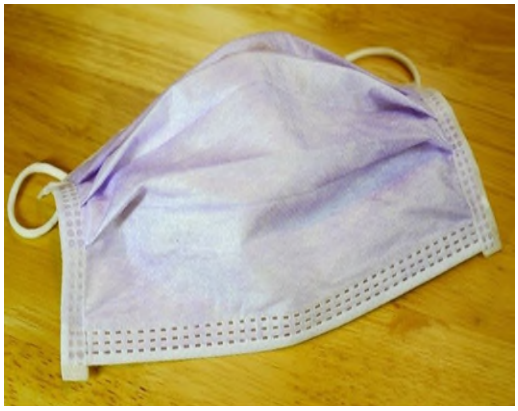
APPENDIX D: Types of Respirators

There are two main types of respirators air-purifying respirators (which use filters, cartridges, or canisters to remove contaminants from the air you breathe) and atmosphere-supplying respirators (which provide you with clean air from an uncontaminated source).

Respirators can be classified as tight-fitting or loose-fitting.

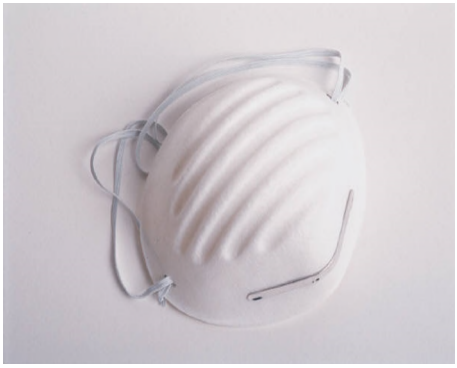
Tufts University is responsible for selecting the appropriate respirators to protect employees from airborne hazards. To ensure that the correct respirator is selected, Tufts University takes into consideration several factors, in accordance with NIOSH guidance documents.

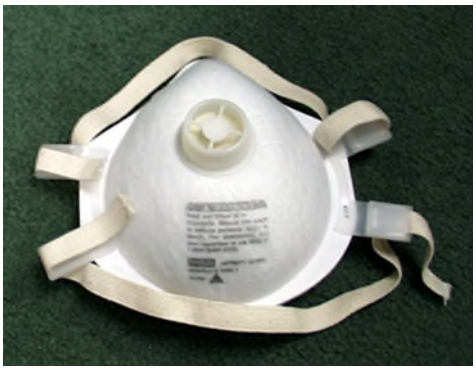
Surgical masks (these are not respirators)



A **surgical mask** is a loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. These are often referred to as face masks, although not all face masks are regulated as surgical masks. Note that the edges of the mask are not designed to form a seal around the nose and mouth. These need Food Drug Administration (FDA) approval.

Below is a description of the main types of respirators and their characteristics.

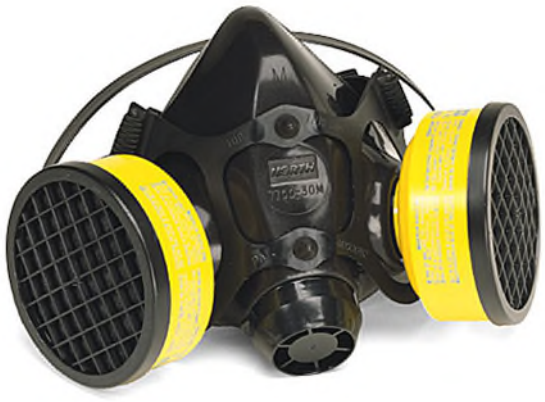




These are **filtering facepiece half-mask respirators,** sometimes referred to as **N95s**. A filtering facepiece respirator covers the nose and mouth and is a tight-fitting, air-purifying respirator in which

the whole facepiece functions as the filter. Filtering facepieces may or may not have an exhalation valve to help exhaled breath exit the facepiece. They need to be fit tested unless you are wearing them under voluntary use conditions. Filtering facepiece respirators filter out particles and do ***not*** protect against non-particulate hazards such as gases or vapors.

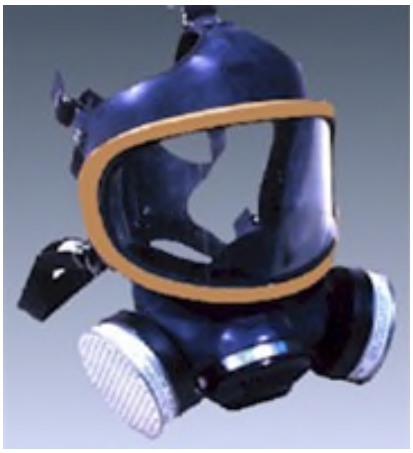
Some N95 respirators are intended for use in a health care setting. Specifically, single-use, disposable respiratory protective devices, without a valve are used and worn by health care personnel during procedures to protect both the patient and health care personnel from the transfer of microorganisms, body fluids, and particulate material. These surgical N95 respirators are class II devices regulated by the FDA, under 21 CFR 878.4040, and CDC NIOSH under 42 CFR Part 84.



This is a **half-facepiece elastomeric respirator**. It is a tight-fitting, air-purifying respirator with replaceable filters (for particulates) or cartridges or canisters (for gases and vapors). In either case, these are attached to a rubber or silicone facepiece that covers the nose and mouth. This type of respirator needs to be fit tested and can be used instead of a filtering facepiece respirator.

An elastomeric half-facepiece respirator can be cleaned, decontaminated, and reused. This is not the case for a filtering facepiece respirator, which is discarded after use.

Like filtering facepieces, half-facepiece elastomeric respirators can be used for particulates, but they can also be used for many gases and vapors if equipped with the proper cartridges. The change-out schedule for gases and vapors cartridges is based on the chemical concentration, physical work effort, temperature, and humidity. Many respirator manufacturers have cartridge change schedule calculators available on the Internet.



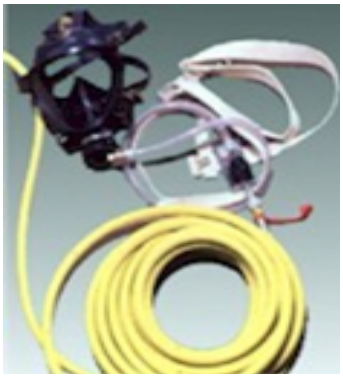
This is a **full facepiece elastomeric respirator**. This type of respirator provides a higher level of protection than a half-facepiece respirator because it has better sealing characteristics. Since it covers the user's eyes and face, it can also be used to protect against liquid splashes and irritating vapors.

Like the half-mask elastomeric respirator, this respirator is a tight-fitting, air-purifying respirator with replaceable filters or cartridges attached to a rubber or silicone facepiece. It needs to be fit tested.

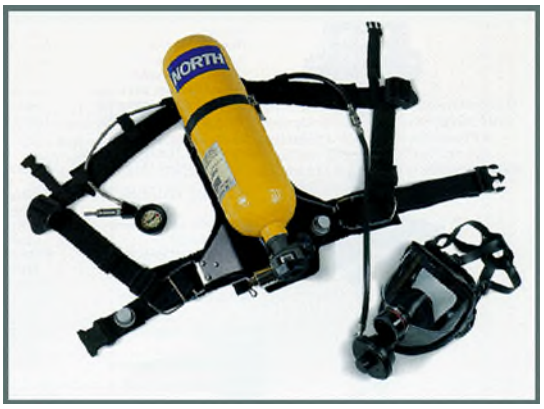
This is a **loose-fitting facepiece powered air-purifying respirator** or **PAPR**. A PAPR has a blower that pulls air through attached filters. The blower then pushes the filtered air into the facepiece, which covers all of the user's face. Since it is loose-fitting, it does not need to be fit tested and can be used by workers with facial hair.

Another type of PAPR is the tight-fitting full facepiece PAPR. This PAPR has an elastomeric facepiece made of rubber or silicone. It has filters and a blower that operate as they do on a loose-fitting facepiece PAPR. Because this PAPR has a tight-fitting facepiece, it must be fit tested.

There are also half-mask PAPRs as well as PAPRs that have a helmet or hood.



Airline Respirator



Tank-type respirator (SCBA)

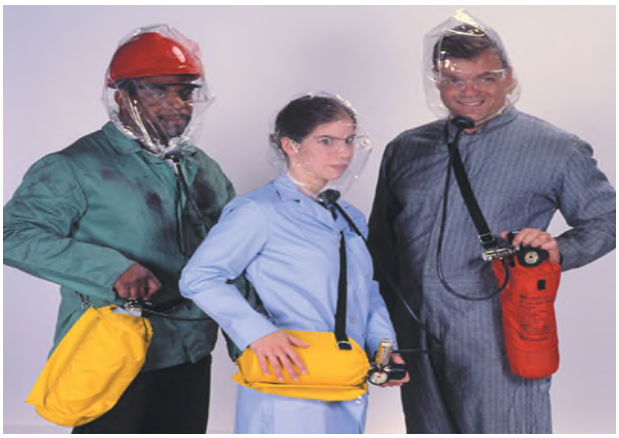
The **airline respirator** supplies clean breathing air to either a hood or a facepiece through a long hose, from a source of clean air such as a cylinder or compressor. If the facepiece is tight-fitting, it must be fit tested.

The **self-contained breathing apparatus (SCBA)** is a type of atmosphere-supplying respirator. SCBAs have a tight-fitting, elastomeric facepiece that covers the user's face. The air is supplied from a cylinder of compressed breathing air that is designed to be carried by the respirator user. The facepiece is tight-fitting and must be fit tested. As its name implies, this respirator is truly self-contained. These respirators provide the highest level of respiratory protection.

Supplied air respirators are required when a respiratory hazard is considered "immediately dangerous to life or health" (also called "IDLH"). Respiratory hazards are classified as IDLH as follows:

- There is a lack of oxygen (less than 19.5% oxygen)
- There is too much oxygen (more than 23.5% - a fire hazard)
- You know there are toxic chemicals in the air, but you don't know how much
- The amount of chemical(s) in the air is known or expected to be above the IDLH level for that chemical. See the NIOSH Pocket Guide to Chemical Hazards for chemical IDLH levels.

Levels of chemicals above IDLH can occur in confined spaces or enclosed spaces where there is little or no ventilation.



These are **emergency escape respirators**, that can only be used for one thing – to escape or exit from a room or building in an emergency, usually a significant chemical release, leak, or spill, or when a supplied-air respirator fails or runs out of air. An escape respirator is typically a small bottle or tank of air connected to a facepiece that provide 5-10 minutes of air. Some supplied-air respirators will have an auxiliary bottle of air for escape that connects to the existing facepiece.

APPENDIX E: Tufts PAPR Selection Criteria

PAPRs are battery-powered devices that use a blower to pull air through attached filters (for particles) or cartridges (for gases and vapors) to clean it before delivering it to the breathing zone of the wearer.

Factors to consider before purchasing a PAPR:

1. Assigned protection factor (APF): concentration of air contaminant in the air divided by the concentration inhaled. The APF is assigned by OSHA based on test data from NIOSH.

Assigned Protection Factors for PAPRs:

- Half mask PAPR (tight-fitting) = 50[1]
- Full facepiece PAPR (tight fitting) = 1000
- Loose-fitting facepiece = 25
- Helmet PAPR (loose-fitting) = 25 or 1000 depending on test data
- Hood PAPR (loose-fitting) = 25 or 1000 depending on test data.

The employer must provide evidence provided by the manufacturer that testing of the respirator demonstrates a level of protection of 1000 or higher to receive APF of 1000. Otherwise the helmet, hood or loose-fitting facepiece get protection factor of 25. A protection factor of 1000 reduces the inhaled concentration x 40 compared to a protection factor of 25.

2. NIOSH assessment of the airflow: a minimum constant airflow of 115 liters per minute (lpm) for tight-fitting, or 170 lpm for loose-fitting. The recommended airflow is 220 lpm and higher.
3. Noise inside headgear: less than 80 dBA preferably less than 70 dBA
4. Comfort of wearing: the weight of headgear and blower/battery pack
5. Ability to use all chemical cartridges for aerosols, gases and vapors including multi with HEPA/acid Gas and Organic Vapor without affecting airflow
6. Ease of finding supplies and maintenance
7. Cost to purchase/cost of supplies
8. Reputation of manufacturer; likelihood of being in business in 5 years

The likely useful life of PAPR is 5 years, depending on the use factor: hourly (less than 4 hrs.), daily (4-8 hrs. per day), weekly, monthly.

List of Manufacturers of Powered-Air Purifying Respirators

- ILC Dover
- MSA Safety
- Sentech International aka Maxair
- 3M
- ED Bullard
- Honeywell/North
- Sundstrom – Sweden
- Draeger – Germany

Recommended PAPRs:

- ILC Dover Sentinel XL with Clear head, 75 dBA noise level
- 3M Versaflo TR 617N cleanable with high capacity battery
- Bullard EVA
- Draeger X-plore 8000, 64dbA noise level

[1] *A Half Face PAPR can only be used with air contaminants that do not affect the eyes through irritation, corrosion or toxicity e.g. lead, silica, asbestos*

Recommended Vendors:

- Fisher Scientific: 3M Versaflo TR 617N, Bullard EVA
- Grainger: 3M Versaflo TR 617N, Bullard EVA, ILC Dover Sentinel XL, Draeger X-plore 8000
- Safety Inc.: 3M Versaflo TR 617N, ILC Dover Sentinel XL, Bullard EVA

APPENDIX F: Tufts University Recommended PLHCP

Table 2 - Tufts University Recommended PLHCP

Tufts University Recommended PLHCP				
Campus location	**Persons served**	**Provider's name**	**Address**	**Phone number**
Medford/Sommerville	Employees and students	Tufts OHS	161 College Ave., Suite 130, Medford, MA	508-251-7263
Medford/Sommerville	Animal care personnel	TMC Employee Health Clinic	185 Harrison Ave., 3rd Floor Boston, MA	617-636-5480
Boston	Employees, students	Tufts OHS	161 College Ave., Suite 130, Medford, MA	508-251-7263
Boston	Animal care personnel	TMC Employee Health Clinic	185 Harrison Ave., 3rd Floor Boston, MA	617-636-5480
Grafton	Employees and students	Occupational Environmental Health Network	200 Westborough Rd., Rm. 013, Grafton, MA	508-887-4447

APPENDIX G: Medical Questionnaire

Occupational Health Department

Please complete this form and send to Tufts Occupational Health Department at occupationalhealth@tufts.edu.
Do not send to your supervisor. In the Subject line, please write "Respirator Questionnaire" and your campus. The nurse will review the questionnaire and reach out to you with questions. You will be notified when you are cleared to be fit tested to wear a respirator.

OSHA Respirator Medical Evaluation Questionnaire

Please fill in the information as completely as possible and sign at the bottom. Thank You.

Full Name	
Date of Birth	
ID#	
Email address	
Phone #	
Department	
Supervisor Name	
	❒ Male ❒ Female ❒ non-binary

OSHA Respirator Questionnaire & Medical Clearance Release & Waiver

I understand the sole purpose of this evaluation is to evaluate my physical ability to wear a respirator (pursuant to the Fit and Medical Evaluation defined in OSHA regulation 29CFR1910.134). I understand that I will be asked to complete the Mandatory OSHA questionnaire and that I may be required to have further testing or examination by Tufts Occupational Health Services staff and/or to supply additional documentation from my healthcare provider. I understand I may be contacted to provide additional information.

I hereby authorize the examining medical professional to provide the results of my evaluation, medical/occupational questionnaire, and my other relevant screening information to Tufts University and/or other entities authorized by law to receive the information. I understand my medical information

will be kept confidential and only my ability to safely wear a respirator will be released.

I further understand that the examiner is not my doctor and that this medical professional is evaluating me solely regarding my ability to perform the functions of a specific job. I understand that the examiner has no obligation to me as a patient.

Name: **Today's Date:**

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)
To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.
To the employee:
Can you read (check one): ❒Yes ❒No
If you cannot read, the questionnaire will be read to you by an Occupational Health Professional. If you need a translator, one will be provided for you.
Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. **(Mandatory)** The following information must be provided by every employee who has been selected to use any type of respirator **(please print).**

Today's date:

Your name:

Your age:

Sex (check one): ❒Male ❒Female ❒non-binary

Your height: feet inches

Your weight: lbs.

Your job title:

A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code):

The best time to phone you at this number:

Has your employer/school told you how to contact the health care professional who will review this questionnaire? (Check one): ❒Yes ❒No

Have you worn a respirator? (Check one): ❒Yes ❒No

If "yes," what type(s)?

Part A. Section 2. (Mandatory) Questions 1 through 8 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").	**Yes**	**No**
Do you **currently** smoke tobacco, or have you smoked tobacco in the last month?		
Have you **ever had** any of the following conditions?		
Seizures (fits)?		
Diabetes (sugar disease)?		
Allergic reactions that interfere with your breathing?		
Claustrophobia (fear of closed-in places)?		
Trouble smelling odors?		
Have you **ever had** any of the following pulmonary or lung problems?		
Asbestosis?		
Asthma?		
Emphysema?		
Pneumonia?		
Tuberculosis?		
Silicosis?		
Pneumothorax (collapsed lung)?		
Lung cancer?		
Broken ribs?		
Any other lung problem that you've been told about?		

Do you **currently** have any of the following symptoms of pulmonary or lung illness?		
Shortness of breath?		
Shortness of breath when walking fast on level ground or walking up a slight hill or incline?		
Shortness of breath when walking with other people at an ordinary pace on level ground?		
Have to stop for breath when walking at your own pace on level ground?		
Shortness of breath when washing or dressing yourself?		
Shortness of breath that interferes with your job.		
Coughing that produces phlegm (thick sputum)?		
Coughing that wakes you early in the morning?		
Coughing that occurs mostly when you are lying down?		
Coughing up blood in the last month?		
Wheezing?		
Wheezing that interferes with your job?		
Chest pain when you breathe deeply?		
Any other symptoms that you think may be related to lung problems?		
Have you **ever had** any of the following cardiovascular or heart problems?		
Heart attack?		
Stroke?		
Angina?		
Heart failure?		
Swelling in your legs or feet (not caused by walking)?		
Heart arrhythmia (heart beating irregularly)?		
High blood pressure?		

Any other heart problem that you've been told about?		
Have you **ever had** any of the following cardiovascular or heart symptoms?		
Frequent pain or tightness in your chest?		
Pain or tightness in your chest during physical activity?		
Pain or tightness in your chest that interferes with your job?		
In the past two years, have you noticed your heart skipping or missing a beat?		
Heartburn or indigestion that is not related to eating?		
Any other symptoms that you think may be related to heart or circulation problems?		
Do you **currently** take medication for any of the following problems?		
Breathing or lung problems?		
Heart trouble?		
Blood pressure?		
Seizures (fits)?		
If you've used a respirator, have you **ever had** any of the following problems? (If you've never used a respirator, check the following space, and go to question 9)		
Eye irritation?		
Skin allergies or rashes?		
Anxiety?		
General weakness or fatigue?		
Any other problem that interferes with your use of a respirator?		
Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire?		

If you checked "Yes" to any of the questions above, please explain here:

For Occupational Health only:

❒ Cleared ❒ Not Cleared, needs additional testing

Comments:

Name of Occupational Health professional reviewer:

Date of Review:

APPENDIX H: Need for Additional Medical Evaluations

Annual Medical History Update for Respirator Wearers at Tufts

In accordance with 29 CFR 1910.134(e)(1), the employer (Tufts) shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace.

In accordance with 29 CFR 1910.134(e)(7), the employer shall provide additional medical evaluations that comply with the requirements of this section if:

An employee reports medical signs or symptoms that are related to ability to use a respirator. Have your answers to the following questions changed since your initial medical evaluation?

1. Any current tobacco uses?
2. Any lung problem such as asthma or pneumonia?
3. Currently have any shortness of breath or persistent cough?
4. Any history of heart problems?
5. Current any unexplained tightness in your chest or pain in your chest

- A physician or other licensed health care professional, your supervisor, or the Respirator Program Administrator informs you that you need to be medically reevaluated.

- Information from the respiratory protection program, including observations made during fit testing and program evaluation by the Program Administrator, indicates a need for employee medical 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 hence a medical reevaluation is needed.

By signing you are confirming that none of the above circumstances currently apply to your use of a respirator.

Name (Print)	Signature	Date

Simona Holacsek, CIH
Program Administrator

APPENDIX I: Fit Testing Procedures

OSHA Fit Testing Procedures (Mandatory)

The entire document can be found at

https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppA

OSHA-Accepted Fit Test Protocols

Fit Testing Procedures -- General Requirements

Tufts University is conducting fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

(a) Position of the mask on the nose

(b) Room for eye protection

(c) Room to talk

(d) Position of the mask on face and cheeks

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

(a) Chin properly placed;

(b) Adequate strap tension is not overly tightened;

(c) Fit across nose bridge;

(d) Respirator is of the proper size to span distance from nose to chin;

(e) The tendency of the respirator to slip;

(f) Self-observation in a mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix F of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix F. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache, or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health-care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use, which could interfere with respirator fit.

14. Test Exercises.

(a) Employers must perform the following test exercises for all fit testing methods prescribed in this appendix, except for the CNP quantitative fit testing protocol and the CNP REDON quantitative fit testing protocol. For these two protocols, employers must ensure that the test subjects (***i.e.***, employees) perform the exercise procedure specified in Part I.C.4(b) of this appendix for the CNP quantitative fit testing protocol, or the exercise procedure described in Part I.C.5(b) of this appendix for the CNP REDON quantitative fit-testing protocol. For the remaining fit testing methods, employers must ensure that employees perform the test exercises in the appropriate test environment in the following manner:
(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act as a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).
(b) Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1-liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of

these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor, which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select, and put on another respirator, return to the test area, and again begin the fit test procedure described in (b)(1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly, and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly, and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory, and the test is failed. A different respirator shall be tried, and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex^{TM} (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly, and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly, and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type of particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory, and the test is failed. A different respirator shall be tried, and the entire test procedure is repeated (taste threshold screening and fit testing).

Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacat [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacat [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber

prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is

taken to be representative of average penetration into the respirator for that exercise.

(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where ff_1, ff_2, ff_3, etc. are the fit factors for exercises 1, 2, 3, etc.

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

3. Modified ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol for full-facepiece and half-mask elastomeric respirators.

(a) When administering this protocol to test subjects, employers shall comply with the requirements specified in Part I.C.3 of OSHA's Appendix A (ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol), except they shall use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in section I.C.3(a)(6) of OSHA's Appendix A.

(b) Employers shall ensure that each test subject being fit tested using this protocol follows the exercise and duration procedures, including the order of administration, described in Table A-1 of this appendix.

Table A-1-- Modified Ambient Aerosol CNC Quantitative Fit Testing Protocol for Full Facepiece and Half-Mask Elastomeric Respirators

Exercises[1]	Exercise procedure	Measurement procedure
Bending Over	The test subject shall bend at the waist, as if going to touch his/her toes for 50 seconds and inhale 2 times at the bottom[2].	A 20 second ambient sample, followed by a 30 second mask sample.

Jogging-in-Place	The test subject shall jog in place comfortably for 30 seconds	A 30 second mask sample.
Head Side-to-Side	The test subject shall stand in place, slowly turning his/her head from side to side for 30 seconds and inhale 2 times at each	A 30 second mask sample.
Head Up-and-Down	The test subject shall stand in place, slowly moving his/her head up and down for 39 seconds and inhale 2 times at each	A 30 second mask sample followed by a 9 second ambient sample.

[1]Exercises are listed in the order in which they are to be administered.
[2]It is optional for test subjects to take additional breaths at other times during this exercise.

4. **Modified ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol for filtering facepiece respirators.**

(a) When administering this protocol to test subjects, employers shall comply with the requirements specified in Part I.C.3 of OSHA's Appendix A (ambient aerosol CNC quantitative fit testing protocol), except they shall use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in section I.C.3(a)(6) of OSHA's Appendix A.

(b) Employers shall ensure that each test subject being fit tested using this protocol follows the exercise and duration procedures, including the order of administration, described in Table A–2 of this appendix.

Table A–2— Modified Ambient Aerosol CNC Quantitative Fit Testing Protocol for Filtering Facepiece Respirators

Exercises[1]	Exercise procedure	Measurement procedure
Bending Over	The test subject shall bend at the waist, as if going to touch his/her toes for 50 seconds and inhale 2 times at the bottom[2].	A 20 second ambient sample, followed by a 30 second mask sample.
Talking	The test subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor for 30 seconds. He/she will either read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.	A 30 second mask sample.
Head Side-to-Side	The test subject shall stand in place, slowly turning his/her head from side to side for 30 seconds and inhale 2 times at each extreme[2].	A 30 second mask sample.
Head Up-and-Down	The test subject shall stand in place, slowly moving his/her head up and down for 39 seconds and inhale 2 times at each extreme[2].	A 30 second mask sample followed by a 9 second ambient sample.

[1]Exercises are listed in the order in which they are to be administered.
[2]It is optional for test subjects to take additional breaths at other times during this exercise.

APPENDIX I-1: Tufts University Fit Testing Form

Respirator Fit Testing Form

☐ Employee ☐ Student ☐ Other: _____ **Campus**: **B F G M**

Name:	**ID Number:**	**Title:**	**Issued Date:**	**EXPIRE Date:**

RESPIRATOR:

Brand/Model No.: Size: Type NIOSH Approval No.:	**PASS**	**FAIL**
☐ _____	☐	☐
☐ _____	☐	☐
☐ _____	☐	☐
☐ _____	☐	☐

APPLICATION ☐ **Particulate filtering facepiece respirator(s) for biological laboratory operations**

☐ **Particulate filtering facepiece respirator(s) for:** _____

_____

OTHER PPE USED: ☐ Eye**glasses** ☐ Safety Glasses ☐ Hearing Protection ☐ Hard Hat ☐ Other: _____

NOTES:

FITTING		
	☐ Satisfactory Qualitative: ☐ Saccharin ☐ BITREX® Fit Test ☐ Satisfactory Quantitative TSI PortaCount Respirator Fit Tester ☐ Satisfactory Positive Pressure Fit Check Test ☐ Satisfactory Negative Pressure Fit Check Test ☐ Other:_____	**Instructions for Use – Reviewed:** ☐ Training - Completed PPE Cert. Form or ☐ WEB Based Training (Learn Center) ☐ Donning, Removal, and Cleaning ☐ Storage & Replacement Indicators

Respirator User's Signature	**Print**	**Date**
Approval Signature	**Print**	**Date**

For additional record-keeping purposes, feel free to duplicate these forms.

APPENDIX I-2: Seal Check

Source: Appendix B-1 to § 1910.134: User Seal Check Procedures (Mandatory)
https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppB1

Appendix B-1 to § 1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. *Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

APPENDIX J: Respirator Cleaning

Source: Appendix B-2 to Sec. 1910.134 (Mandatory) Respirator Cleaning Procedures
https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppB2
These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed herein Appendix B- 2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand, and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.

APPENDIX K: Voluntary Respirator Use at Tufts University

Source: Appendix D to Sec. 1910.134 (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppD

Some Tufts University employees and students may choose to wear filtering facepiece respirators such as N95 or P100 disposables on a voluntary basis during activities that involve exposure to safe concentrations of dust, fumes, mists or other particulates or exposure to nuisance dusts that cause discomfort. In order to comply with OSHA 1910.134 Respiratory Protection regulations, Tufts is required to provide you with the following information and to document that it has done so. Please read the following information and complete the section at the bottom of this form. Appendix D to Section 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 (PEL). 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 substances 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 US 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 fume or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

The filtering facepiece respirator you have elected to use is approved, when fitted properly, for use against nuisance, non-hazardous particulates (e.g. fiberglass, sheet rock dust, sawdust, dirt, pollen, animal dander). It will not provide protection from any chemical vapors such as those associated with spray paints or solvents. It is not intended for use during work that may involve exposure to airborne asbestos fibers, silica dust or lead dust.

Please complete the next section. A copy will be given to you.
I have read and understand the information in this document

*Name (print)*_____*Job title*_____

Date _____ *Supervisor* _____

Department _____*Location where used:*_____

APPENDIX L: Tufts University Respirator Program Compliance Steps

1. Respirator Consultation - Contact TIHG Respiratory Program directly (6-3615) to discuss potential respirator use.

2. TIHG Evaluation - TIHG personnel will determine if the use of a respirator is necessary by evaluating the work process. This may be evaluated by one or a combination of the following methods:
   - Consulting with the Supervisor or Tufts PLHCP.
   - Interviewing the employee.
   - Observing the work operation.
   - Collecting air samples during the work process to assess airborne exposure to any toxic material. Respirators will be required for all operations where the concentration is in excess of the limits specified by the State or Federal OSHA, American Conference of Governmental Industrial Hygienists, or as deemed necessary by TIHG.
   - Evaluating existing or alternative engineering controls.

3. Medical History Questionnaire and Medical Examination, if necessary. Each employee or student needs to be medically cleared before the fit test if wearing a respirator is required in their work area.

4. Respiratory Protection Training - The purpose of this training is to inform the user of the limitations, use, and care of the respirator. Anyone requiring a respirator, including all disposable respirators will be informed of the limitations of the respirators, storage, maintenance, and all the other training requirements as specified in the OSHA standard.

5. Respirator Fit Testing – Program Administrator, its delegates or an outside company chosen by the Department will perform a fit test when all the above elements are met. A respirator that provides the best comfort and protection will be issued by individual departments. Upon completion of the three requirements, a respirator, and cartridges if applicable, will be issued by the Supervisor, while fit testing records are kept by TIHG and in the employee's personal file.

6. Respirator User's Responsibilities
   - Update your respirator qualification status annually.
   - Reschedule for a future date if you cannot attend your scheduled appointments.
   - Return your respirator to your department when you end your employment at Tufts or when you no longer need it.