



**Carnegie Mellon University**

Environmental Health and Safety (EHS)  
Respiratory Protection Written Program

## Contents

1.0	Respiratory Protection Plan Overview .....	4
a.	Purpose .....	4
b.	Scope and Application.....	5
c.	Responsibilities .....	6
i.	University Administration.....	6
ii.	Program Administrator .....	7
iii.	Supervisory Personnel and Principal Investigators (PIs) .....	7
iv.	Respirator Users .....	7
2.0	Respirator Selection Procedure.....	8
a.	Policy.....	8
b.	Hazard Evaluation.....	8
c.	Respirator Selection .....	8
d.	Approved Respirators .....	9
3.0	Medical Evaluation Procedure.....	9
a.	Policy.....	9
b.	Approval Process .....	9
c.	Additional Evaluations.....	10
4.0	Fit Testing Procedures.....	10
a.	Policy.....	10
b.	Fit Testing Frequency .....	11
c.	Fit Testing Methodology.....	11
5.0	Respirator Use Procedures.....	11
a.	Use Conditions.....	11
b.	User Seal Check .....	12
c.	User Response to Respirator Malfunction or Other Emergency .....	12
6.0	Cleaning Maintenance, Change Schedule, Storage Procedures.....	13
a.	Cleaning.....	13
b.	Inspection.....	13

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c. Change Schedule .....	13
d. Storage .....	14
7.0 Respirator Training Procedures .....	14
8.0 Respirator Program Evaluation Procedures.....	15
9.0 Respirator Record Keeping Procedures.....	15
10.0 Revisions.....	15
Attachment 1.....	16
OSHA Respirator Medical Evaluation Questionnaire .....	16
Attachment 2.....	26
Survey Form for Annual Update for Approved Respirator Users .....	26
Attachment 3.....	28
Qualitative Fit Test Procedures.....	28
Attachment 4.....	40
Carnegie Mellon University Voluntary Respirator Use Acknowledgement.....	40

## 1.0 Respiratory Protection Plan Overview

General elements and structure of the Carnegie Mellon University Respiratory Protection Plan (RPP) are presented in this document. Copies of the RPP are available from the Department of Environmental Health and Safety (EHS). The RPP is also present on the [EHS web page](#).

The RPP is a requirement of OSHA, per 29 CFR 1910.134, and consists of the following procedures:

Procedure #	Title
1.0	Respiratory Protection Plan Overview
2.0	Respirator Selection Procedures
3.0	Respirator Medical Evaluation Procedures
4.0	Respirator Fit Testing Procedures
5.0	Respirator Use Procedures
6.0	Respirator Cleaning, Maintenance, Change Schedule, Storage Procedures
7.0	Respirator Training Procedures
8.0	Respirator Program Evaluation and Update Procedures
9.0	Respirator Recordkeeping Procedures

### a. Purpose

It has been determined that employees of Carnegie Mellon University may become exposed to respiratory hazards during their work. These hazards may include particulates, dusts, gases and vapors. The purpose of this Respiratory Protection Program (RPP) is to ensure that all Carnegie Mellon employees are protected from overexposures to these respiratory hazards. This is accomplished as far as feasible by implementing engineering control measures - (for example, general and local ventilation, enclosure or isolation, and substitution of less hazardous processes or materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators may be required.

Some employees have expressed a desire to wear respirators during certain operation that do not REQUIRE respiratory protection, per OSHA regulation or by Carnegie Mellon determination. These employees (or their supervisors) must notify the department of Environmental Health and Safety (EHS) of their desire to use respirators voluntarily, in

these cases. Respirator use may be permitted in these cases if the use will not jeopardize the health or safety of the employee as determined by the RPP Program Administrator. The portions of this RPP applicable to voluntary respirator use will be outlined in “**Scope and Application**”.

Student (non-employee) and visitor (non-contractor) participation in respirator use will be limited to voluntary use of disposable face-piece units, unless other use is approved in writing by the Program Administrator (PA).

Contractors (non-Carnegie Mellon employees) working on campus property shall be subject to their employer’s Respiratory Protection Program.

## **b. Scope and Application**

There are three categories of respirator users at Carnegie Mellon University:

- i. Voluntary users of disposable filtering face-piece units
- ii. Voluntary users of half-face or full-face air purifying respirators (APR)
- iii. Required users of disposable filtering face-piece units, half mask air purifying, full face air purifying, powered air purifying respirator (PAPR) and supplied air respirators.

The various elements of the RPP apply differently to each category of use.

- i. Voluntary users of disposable filtering face-piece units are addressed only by a portion of the Training Procedures element of the RPP, specifically, that which informs these users of the limitations of the face piece.
- ii. Voluntary users of half mask or full face air purifying respirators are addressed by all procedures 1.0 through 9.0.
- iii. Required uses of respiratory protection are addressed by all procedures.

The RPP augments the applicable portions of the Carnegie Mellon Emergency Operations Plan, Chemical Hygiene Plan, Hazard Communication Program and Radiation Safety Program dealing with the need for respiratory protection.

Employees participating in the RPP do so at no cost to them. The expense associated with their participation will be borne by their department.

A summary of the respirator use at Carnegie Mellon University is presented as **TABLE 1**.

**TABLE 1**

<b>VOLUNTARY AND REQUIRED RESPIRATOR USE AT CARNEGIE MELLON UNIVERSITY</b>		
<b><i>Respirator Type</i></b>	<b><i>Department/Process</i></b>	<b><i>Use</i></b>
N95 or other filter facepiece respirators	<b>Health Services</b> , for isolation areas <b>FMS</b> , for dust/mist/particulate exposure	<i>Required</i> <i>Voluntary</i>
Half Mask or Full Face APR with dust/mist, organic vapor, acid gas or combination cartridges, particulate filters	<b>EHS</b> , for emergency response in areas of chemical, biological or radiological contamination, asbestos bulk sampling <b>FMS, FINE ARTS MechE, MSE, NanoFab</b> , for dust/mist/chemical/particulate exposure during activities where these hazards may be present, such as maintenance work in or near fume hoods or their exhaust, and shop activities <b>University Police</b> , for exposures to riot control chemicals.	<i>Required</i> <i>Voluntary or required</i> <i>Required</i>
Powered Air Purifying Respirators (PAPR)	<b>Health Services</b> for pandemic protection as determined by EHS Other personnel not able to wear a tight-fitting respirator	<i>Required</i>
Supplied Air Respirator	<b>EHS and NanoFab</b> , emergency response in areas of chemical, biological, radiological, contamination	<i>Required</i>

**c. Responsibilities**

**i. University Administration**

The President, Provost, Vice Presidents, Deans and Department Heads are responsible for the safety and health of all Carnegie Mellon employees

ii. **Program Administrator**

The Program Administrator is responsible for administering the RPP. Duties of the Program Administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards
- Selection of respiratory protection options
- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Conducting respiratory protection training
- Conducting respiratory protection fit testing
- Administering the medical surveillance program
- Maintaining records required by the RPP
- Evaluating the program
- Updating the written program as needed
- The Program Administrator may assign the above duties to a suitable trained deputy within EHS

iii. **Supervisory Personnel and Principal Investigators (PIs)**

Supervisors and PIs are responsible for:

- Identifying to the Program Administrator the names of persons who may need to wear respiratory protection
- Ensuring that employees under their supervision (who participate in the RPP) have received appropriate training, fit testing and medical evaluation before commencing activities that may require respiratory protection
- Ensuring the availability of appropriate respirators and accessories and replacement parts as needed
- Being aware of the tasks requiring the use of respiratory protection
- Enforcing the proper use of respiratory protection
- Ensuring that respirators are properly cleaned, maintained and stored according to the RPP
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding respiratory protection

iv. **Respirator Users**

The respirator user is responsible for:

- Using their respirator in accordance with instructions and training
- Receiving medical approval to wear a respirator, as needed. Notify supervisor if medical status changes and re-submit medical evaluation.
- Properly cleaning, maintaining, and storing their respirator
- Reporting any malfunction of the respirator or emergencies to their supervisor and EHS

- Attending annual respirator fit testing and training
- Informing their supervisor of any respiratory hazards that they feel are not adequately addressed in the workplace and of any question they have regarding the RPP.
- Where tight-fitting respirators are worn, no facial hair (including stubble), that will interfere with the respirator's face seal is permitted.

## **2.0 Respirator Selection Procedure**

### **a. Policy**

The Respiratory Protection Program (RPP) Program Administrator (PA) will select all respirators to be used at Carnegie Mellon, based on the hazards to which employees are exposed, the anticipated exposure levels, and in accordance with all OSHA and other applicable regulations.

All respirators will be selected with the assistance of EHS. The purchase of the respirator and any corresponding parts is the responsibility of the wearer's department.

### **b. Hazard Evaluation**

The PA shall perform a hazard evaluation for all operations or processes where overexposures to airborne contaminants may be present. This evaluation will include:

- Identification of the hazardous substance(s) applicable to the situation
- A determination of the potential exposure levels to these substances, through evaluation of the process, discussions with employees and supervisors, and/or air monitoring
- Whether less hazardous materials or processes may be used that would eliminate the need for respiratory protection
- Whether engineering controls may correct an overexposure situation, eliminating the need for respiratory protection
- The details of the hazard evaluation shall be documented in written form and maintained in EHS files.

### **c. Respirator Selection**

The PA shall select an appropriate respirator based on the results of the hazard evaluation. The selection will be made in consideration of the following:

- Ensuring that anticipated exposure levels will be maintained below any applicable PEL, corrected for the protection factor of the respirator
- Whether respirator use is mandatory or voluntary
- The results of an employee's medical evaluation
- Any other protective equipment the employee may need to wear and/or the actual tasks to be performed while using the respirator



- The availability of suitable protection for the agent(s) of concern

#### **d. Approved Respirators**

The PA shall consider only respirators, respiratory systems and cartridges approved by NIOSH or MSHA. Cartridges must be clearly identified as suitable for the hazards identified in the hazard evaluation. Respirators from varying manufacturers will be made available to employees, to ensure selection of a properly fitting and comfortable respirator for the wearer.

NOTE: Air purifying respirators are NEVER to be used in oxygen deficient atmospheres or Immediately Dangerous to Life or Health (IDLH) conditions.

Note that a respirator's approval is nullified when any of the following occur:

- Components are mixed between different types of makes of respirators
- Non-approved components are used
- The respirator is modified in any way
- A respirator is used in an atmospheric condition for which it is not approved
- The approval label is no longer legible

### **3.0 Medical Evaluation Procedure**

#### **a. Policy**

Employees who are either required to wear respirators, or who have been approved to wear a respirator voluntarily, must be approved to wear the respirator by a licensed physician. Employees who are not approved by a physician to wear a respirator shall not be permitted to use one while at work or to perform any tasks at work that would require a respirator.

#### **b. Approval Process**

Medical approval to wear a respirator is obtained by completing this process:

- i. Obtain a respirator user's medical questionnaire and cover letter from the EHS by contacting [safety@andrew.cmu.edu](mailto:safety@andrew.cmu.edu). If the respirator user is unable to read the questionnaire, EHS may assist in this activity.
- ii. The respirator user will complete and submit the forms identified in step i directly to the university's Physician, currently, Dr. Donald McGraw, UPMC Health System, via e-mail, [d.j.mcgraw@me.com](mailto:d.j.mcgraw@me.com) for approval.

Please note that there is a \$45 fee for Dr. McGraw's review of the forms which the respirator user's department is responsible for covering. An Oracle string is requested on the cover letter, which will be used for this charge.

To protect the respirator user's private, medical information, the questionnaire and cover letter should be e-mailed to Dr. McGraw directly—please do not send the forms to EHS or copy others on the e-mail.

- iii. The physician will typically supply written approval for respirator use for an individual based on the questionnaire responses. In some cases, the physician may follow up via phone to discuss the questionnaire before providing approval. In other cases, the physician will request a physical visit and examination of the potential respirator user. The potential user will schedule this visit directly with the physician—costs associated with the in-person follow-up evaluation will be the responsibility of the respirator user's department. After this visit is made, the physician will either issue an approval without qualification, an approval with qualification or qualifications, or the indication that the employee is not approved for the respirator use as planned.
- iv. All respirator users will be granted the opportunity to speak with the physician about their medical evaluation, if they so request.
- v. All medical examinations are to remain confidential between the employee and the physician.
- vi. All documentation of the physician's approval or disapproval will be maintained by EHS. However, no medical records or information will be contained in these documents.

**c. Additional Evaluations**

Additional medical evaluations are required if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

If any of the above occurs, participants of the RPP will be asked to complete and return to the PA the **“OSHA Respirator Medical Evaluation Questionnaire” (Attachment 1)**, and the medical approval process will begin again.

## **4.0 Fit Testing Procedures**

### **a. Policy**

Fit testing is required for all employees wearing any tight-fitting respirator, other than a dust mask or a filtering face piece worn voluntarily. This includes all users, including voluntary ones.

**b. Fit Testing Frequency**

Fit testing will occur:

- Prior to an employee's initial use of a respirator
- At least annually after initial fit testing
- When there have been changes in the employee's physical condition that could affect respirator fit, such as changes in body weight, facial scarring or dental work.

Respirator users will be fit tested with the make, model and size of respirator that they will actually wear. Employees will be provided with a choice of models and styles to help ensure a successful fit, adequate protection against the contaminant(s) of concern, and comfort. If prescription glasses or safety eyewear are to be worn with the respirator, they must be worn in a manner that does not interfere with the seal of the respirator's facepiece. Eyewear with temple bars or straps that pass between the sealing surface and the individual's face shall not be used. Corrective lenses can be mounted inside certain respirators and area available where needed. Similarly, no other personal protective equipment or personal effects are to be worn that will interfere with the respirator's face seal.

Respirator users who do not have a current fit test on record with the PA will not be permitted to wear their respirator or perform tasks at work that require the use of a respirator.

**c. Fit Testing Methodology**

The PA(s) will conduct the fit tests following one of the OSHA approved methods found in 29 CFR 134 and as outlined in Attachment 3.

## **5.0 Respirator Use Procedures**

**a. Use Conditions**

Employees will use their respirators under the conditions specified by the RPP and in accordance with the training they receive for the use of their particular unit. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or the manufacturer.

Employees are not permitted to use their respirators in any of these circumstances:

- They are not currently medically approved for respirator use
- They do not have a current fit test recorded by the Program Administrator (PA)

- They have facial hair or any other condition that may interfere with the respirator fit

**b. User Seal Check**

Wearers of tight-fitting respirators shall conduct user seal checks each time that they wear their respirator using the procedures as follows:

- Positive-Pressure Check:** Close off the exhalation valve by covering with the palm of the hand and exhale gently into the facepiece. The fit is considered satisfactory if a slight positive pressure (i.e. the facepiece expands away from the face) can be built up inside the facepiece without any evidence of leakage of air out of the respirator via the face seal.
- Negative-Pressure Check:** Close off the inlet of the respirator's cartridges or filters by covering them with the palms of the hands and inhale gently. The fit is considered satisfactory if a slight negative pressure (i.e. the facepiece collapses slightly) is achieved without evidence of leakage of air into the respirator via the face seal; and hold the breath for 10 seconds. The facepiece should remain slightly collapsed with no inward leakage from around the face seal.

Both of the pressure checks must pass before the respirator user is permitted to commence work. If one or both checks do not pass, readjust and re-tighten the respirator and perform the pressure checks again. If one or both pressure checks still do not pass, do not proceed with work as you may need a new or different respirator. Contact EHS for additional assistance.

**c. User Response to Respirator Malfunction or Other Emergency**

In the event of any noted malfunction of the respirator or other emergency, the wearer is required to leave the hazardous area immediately.

Examples of malfunction or other emergency may include:

- A component of the respirator or filters/cartridges become damaged
- Leakage of the facepiece
- Breakthrough of a chemical is detected (e.g. a chemical can be tasted or smelled)
- The wearer begins to experience nose, eye, throat or other respiratory irritation or it becomes difficult to breath
- The workplace environment changes in such a way that the contaminants of concern change or airborne concentration of contaminants is unknown
- The workplace environment changes in a such a way that a new safety hazard is identified, whether or not a respiratory concern
- Oxygen levels in the work area fall to below 19.6%

Notify your supervisor and EHS (24/7 Emergency Hotline 412-268-8182) as soon as possible after leaving the hazardous area and in a safe location. The respirator user

is not permitted to return to the work area until the problem has been evaluated and corrected.

## **6.0 Cleaning Maintenance, Change Schedule, Storage Procedures**

### **a. Cleaning**

Respirators must be cleaned after each use.<sup>1</sup> Always follow manufacturer's instructions for specific cleaning instructions for your unit, but the cleaning process will be generally as follows for elastomeric, negative-pressure air-purifying respirators<sup>2</sup>.

- Remove any filters or cartridges from the unit.
- Wash the face-piece with a mild soap/water solution. Do not use organic solvents for cleaning. Alcohol-containing PPE wipes are also not recommended as they may more quickly degrade the rubber of the respirator's face seal.
- Rinse completely in clean warm water.
- Air-dry the mask completely in a clean area by lying flat to dry.
- Inspect (outlined in section 6b) the respirator and its components before storage
- Reassemble the respirator and place in a clean, dry bag or similar container.

### **b. Inspection**

Prior to each use and during cleaning, the user should inspect their respirator as outlined in training. If any problems or malfunctions are identified, the respirator must be removed from service and addressed before the respirator is used. Users should contact their supervisors or EHS with any questions. This inspection may include the following checks:

- Valves and valve seats are not damaged, worn, dirty or "stuck" in place
- That there are no cracks or other damage in the respirator body
- That the strap elastic is in good condition, with appropriate pliability
- That the respirator is clean with no other defects or signs of deterioration
- That the proper filter or cartridge is being used, considering the contaminants in the work area

### **c. Change Schedule**

Respirator filters or cartridges should be changed if any of the following occur:

- Organic vapor or acid gas odors are detected by the respirator user while those cartridges are being worn (notify EHS if this occurs)
- Difficulty in breathing due air resistance due to clogged filters
- End-of-service life has been reached as specified by the manufacturer or EHS based on the hazard evaluation

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<sup>1</sup> N95 respirators do not have any cleaning requirements and should be properly disposed of after each use.

<sup>2</sup> Cleaning of PAPRs and supplied air respirators will differ from negative-pressure respirators.

**d. Storage**

Respirators shall be stored to protect from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals and in accordance with the manufacturer's instructions inside of a protective storage container.

Respirators must also be stored in a manner that will prevent deformation of the facepiece and exhalation valve, which may result in future fit issues.

Respirators issued to specific individuals should have the name of that individual marked on the outside of the respirator storage container.

Respirator filters or cartridges shall be stored in a closed plastic bag or other device when not in use and must never be stored in the open environment.

## **7.0 Respirator Training Procedures**

The OSHA Respiratory Protection Standard requires training for certain participants of the Respiratory Protection Program (RPP). The Program Administrator (PA) will provide training to respirator users and their supervisors on the contents of the RPP and their responsibilities under it, and on the OSHA Respiratory Protection standard. Workers must receive training **prior to** using a respirator in the workplace.

The training course will address these topics:

- The Carnegie Mellon RPP
- The OSHA Respiratory Protection standard
- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- The respiratory hazards they may be exposed to and their health effects
- Proper selection and use of respirators
- Limitations and capabilities of their respirators
- Respirator inspection, donning/doffing, and user seal/fit checks
- Fit testing
- Emergency use procedures, including during respirator malfunction
- Maintenance and storage of the respirator
- Medical issues that may affect one's ability to wear a respirator

Employees will be trained at least annually, provided they continue to wear their respirator or be involved in tasks that require the use of a respirator. More frequent training will be performed as necessary. Voluntary users receive information on the limitations of the

filtering face-piece upon initial use and must complete the Voluntary Use Acknowledgment Form (see attachment 4).

## 8.0 Respirator Program Evaluation Procedures

The Program Administrator will conduct periodic evaluations of the university's workplaces to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators, their comments at the time of their annual training update and air monitoring results.

This evaluation will occur at least annually and more often as conditions change or as opportunities to update the program are identified.

## 9.0 Respirator Record Keeping Procedures

The Respiratory Protection Plan (RPP) will be maintained in the EHS offices and will be available on the Carnegie Mellon EHS web page. A copy will also be provided to any participant in the program who requests one.

Also maintained in the EHS offices are copies of the physician approvals or disapprovals of users, fit test records, training records, and any other related aspect of the RPP.

## 10.0 Revisions

Date	Documented Changes	Initials
10/07/2009	Updated	
10/1/2010	Reviewed	
10/19/2011	Reviewed & Updated	
4/3/2013	Reviewed & Updated	
09/30/2014	Reviewed & Updated	
01/13/2016	Reviewed & Updated	
1/5/2018	Reviewed and updated	
2/6/2020	Reviewed	
6/18/2021	Updated Format and Accessibility Update	MAS
05/03/2022	Reviewed and updated	CG

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## Attachment 1

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### OSHA Respirator Medical Evaluation Questionnaire

You have been identified by your supervisor as someone who may wear a respirator either on a voluntary basis or as a requirement of your position. Either way, it is necessary to determine whether you are physically able to wear a respirator before one is given to you. A respiratory physician will make this determination based on your answers to this questionnaire. The physician **may** request an office visit and certain tests before a final determination is made.

1. It is **required** that you complete **Part A, Section 1** of this questionnaire.
2. It is **required** that you complete **Part A, Section 2** from **question 1 through question 9** of this questionnaire. You are **not required** to complete **questions 10 through 15** of the questionnaire, but you are welcome to do so.
3. Please complete **Part B** of the questionnaire as best as you can. We understand that you may not know all of the information these questions ask.
4. Please sign below at **EMPLOYEE SIGNATURE** and submit this form in the envelope provided to the University's Respiratory Physician.

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*EMPLOYEE SIGNATURE*

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*PRINT NAME **CLEARLY***

*For use by the Physician or Other Licensed Health Care Professional, only*

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#### To the PLHCP:

Check the **ONE** that applies

I have reviewed Part A Section 2 of this questionnaire with the employee and I do not recommend that a physical examination be performed at this time.



I have reviewed Part A Section 2 of this questionnaire with the employee and I am recommending that a physical examination be performed at this time.

I have reviewed Part A Section 2 of this questionnaire without the employee and I do not recommend that a physical examination be performed at this time.

I have reviewed Part A Section 2 of this questionnaire without the employee and I am recommending that a physical examination be performed at this time.

\_\_\_\_\_  
PLHCP Signature

\_\_\_\_\_  
Date

### OSHA Respirator Medical Evaluation Questionnaire

Carnegie Mellon University wants 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 supervisor will not look at or review your answers, and your employer will tell you how to deliver or send this questionnaire to the Physician or other Licensed Health Care Professional (PLHCP) who will review it. OSHA mandates that you have the right to contact the PLHCP who will review this questionnaire, in the event of any questions regarding either this form or the results. Here is the contact information for the PLHCP:

**Dr. Donald McGraw      412-363-1060 or 412-292-4149**

Can you read? (circle one)    **YES**                    **NO**

## 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 all information **CLEARLY**).

1. Today's Date \_\_\_\_\_

2. Your name \_\_\_\_\_
3. Your age, to nearest year \_\_\_\_\_
4. Sex (circle one)    **MALE**            **FEMALE**
5. Your height \_\_\_\_\_ feet \_\_\_\_\_ inches
6. Your weight \_\_\_\_\_ pounds
7. Your job title \_\_\_\_\_
8. Your phone number <sup>3</sup> \_\_\_\_\_
9. Best time to reach you at the above number \_\_\_\_\_
10. Have you worn a respirator in the past? (Circle one)            **YES**            **NO**

If **"YES"**, what type?

\_\_\_\_\_

11. Check the type of respirator that you will be using (you can check more than one category).  
Contact your supervisor if you are unsure of the type of respirator you will be using.

<input type="checkbox"/>	N, R or P disposable respirator (i.e., a filter-mask or other non-cartridge type unit)
<input type="checkbox"/>	Half-face cartridge respirator
<input type="checkbox"/>	Full-face cartridge respirator
<input type="checkbox"/>	Powered air-supplying respirator
<input type="checkbox"/>	Supplied air/self-contained breathing apparatus

## Section 2 (Mandatory)

### Questions 1 through 9

These questions must be answered by every employee who has been selected **or volunteers** to use any type of respirator (please circle "yes" or "no").

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month:  
**Yes      No**
  
2. Have you ever had any of the following conditions?
  - a. Seizures (fits): **Yes      No**
  - b. Diabetes (sugar disease): **Yes      No**
  - c. Allergic reactions that interfere with your breathing: **Yes      No**
  - d. Claustrophobia (fear of closed-in places): **Yes      No**
  - e. Trouble smelling odors: **Yes      No**
  
3. Have you ever had any of the following pulmonary or lung problems?
  - a. Asbestosis: **Yes      No**
  - b. Asthma: **Yes      No**
  - c. Chronic bronchitis: **Yes      No**
  - d. Emphysema: **Yes      No**
  - e. Pneumonia: **Yes      No**
  - f. Tuberculosis: **Yes      No**
  - g. Silicosis: **Yes      No**
  - h. Pneumothorax (collapsed lung): **Yes      No**
  - i. Lung cancer: **Yes      No**
  - j. Broken ribs: **Yes      No**
  - k. Any chest injuries or surgeries: **Yes      No**
  - l. Any other lung problem that you've been told about: **Yes      No**
  
4. Do you currently have any of the following symptoms of pulmonary or lung illness?
  - a. Shortness of breath: **Yes      No**
  - b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: **Yes      No**
  - c. Shortness of breath when walking with other people at an ordinary pace on level ground: **Yes      No**
  - d. Have to stop for breath when walking at your own pace on level ground: **Yes      No**
  - e. Shortness of breath when washing or dressing yourself: **Yes      No**
  - f. Shortness of breath that interferes with your job: **Yes      No**
  - g. Coughing that produces phlegm (thick sputum): **Yes      No**
  - h. Coughing that wakes you early in the morning: **Yes      No**
  - i. Coughing that occurs mostly when you are lying down: **Yes      No**
  - j. Coughing up blood in the last month: **Yes      No**
  - k. Wheezing: **Yes      No**
  - l. Wheezing that interferes with your job: **Yes      No**

- m. Chest pain when you breathe deeply: **Yes No**
  - n. Any other symptoms that you think may be related to lung problems: **Yes No**
5. Have you ever had any of the following cardiovascular or heart problems?
- a. Heart attack: **Yes No**
  - b. Stroke: **Yes No**
  - c. Angina: **Yes No**
  - d. Heart failure: **Yes No**
  - e. Swelling in your legs or feet (not caused by walking): **Yes No**
  - f. Heart arrhythmia (heart beating irregularly): **Yes No**
  - g. High blood pressure: **Yes No**
  - h. Any other heart problem that you've been told about: **Yes No**
6. Have you ever had any of the following cardiovascular or heart symptoms?
- a. Frequent pain or tightness in your chest: **Yes No**
  - b. Pain or tightness in your chest during physical activity: **Yes No**
  - c. Pain or tightness in your chest that interferes with your job: **Yes No**
  - d. In the past two years, have you noticed your heart skipping or missing a beat:  
**Yes No**
  - e. Heartburn or indigestion that is not related to eating: **Yes No**
  - f. Any other symptoms that you think may be related to heart or circulation problems: **Yes No**
7. Do you currently take medication for any of the following problems?
- a. Breathing or lung problems: **Yes No**
  - b. Heart trouble: **Yes No**
  - c. Blood pressure: **Yes No**
  - d. Seizures (fits): **Yes No**
8. If you've used a respirator, have you ever had any of the following problems? (If you've never used a respirator, go to question 9:)
- a. Eye irritation: **Yes No**
  - b. Skin allergies or rashes: **Yes No**
  - c. Anxiety: **Yes No**
  - d. General weakness or fatigue: **Yes No**
  - e. Any other problem that interferes with your use of a respirator: **Yes No**
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire?: **Yes No**

### Questions 10 to 15

These questions must be answered by every employee **who has been selected to use either a full facepiece respirator**. For employees who have been selected to use other types of respirators, answering these questions is **voluntary**.

10. Have you ever lost vision in either eye (temporarily or permanently): **Yes No**
11. Do you currently have any of the following vision problems?
- a. Wear contact lenses: **Yes No**
  - b. Wear glasses: **Yes No**
  - c. Color blind: **Yes No**
  - d. Any other eye or vision problem: **Yes No**
12. Have you ever had an injury to your ears, including a broken ear drum: **Yes No**
13. Do you currently have any of the following hearing problems?
- a. Difficulty hearing: **Yes No**
  - b. Wear a hearing aid: **Yes No**
  - c. Any other hearing or ear problem: **Yes No**
14. Have you ever had a back injury? **Yes No**
15. Do you currently have any of the following musculoskeletal problems?
- a. Weakness in any of your arms, hands, legs, or feet: **Yes No**
  - b. Back pain: **Yes No**
  - c. Difficulty fully moving your arms and legs: **Yes No**
  - d. Pain or stiffness when you lean forward or backward at the waist: **Yes No**
  - e. Difficulty fully moving your head up or down: **Yes No**
  - f. Difficulty fully moving your head side to side: **Yes No**
  - g. Difficulty bending at your knees: **Yes No**
  - h. Difficulty squatting to the ground: **Yes No**
  - i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: **Yes No**
  - j. Any other muscle or skeletal problem that interferes with using a respirator: **Yes No**

### Part B

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Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: **Yes No**

**If “yes,”** do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: **Yes No**

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: **Yes No**
3. **If “yes,”** name the chemicals if you know them:

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4. Have you ever worked with any of the materials, or under any of the conditions, listed below:
- a. Asbestos: **Yes No**
  - b. Silica (e.g., in sandblasting): **Yes No**
  - c. Tungsten/cobalt (e.g., grinding or welding this material): **Yes No**
  - d. Beryllium: **Yes No**
  - e. Aluminum: **Yes No**
  - f. Coal (for example, mining): **Yes No**
  - g. Iron: **Yes No**
  - h. Tin: **Yes No**
  - i. Dusty environments: **Yes No**
  - j. Any other hazardous exposures: **Yes No**

If “yes,” describe these exposures:

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5. List any second jobs or side businesses you have:

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6. List your previous occupations:

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7. List your current and previous hobbies:

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8. Have you been in the military services? **Yes** **No**

**If "yes,"** were you exposed to biological or chemical agents (either in training or combat): **Yes** **No**

9. Have you ever worked on a HAZMAT team? **Yes** **No**

10. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): **Yes** **No**

**If "yes,"** name the medications if you know them:

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11. Will you be using any of the following items with your respirator(s)?

- a. HEPA Filters: **Yes** **No**
- b. Canisters (for example, gas masks): **Yes** **No**
- c. Cartridges: **Yes** **No**

12. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

- a. Escape only (no rescue): **Yes** **No**
- b. Emergency rescue only: **Yes** **No**
- c. Less than 5 hours per week: **Yes** **No**
- d. Less than 2 hours per day: **Yes** **No**
- e. 2 to 4 hours per day: **Yes** **No**
- f. Over 4 hours per day: **Yes** **No**

13. During the period you are using the respirator(s), is your work effort:

- a. **Light** (less than 200 kcal per hour): **Yes** **No**

[Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.]

If "yes," how long does this period last during the average shift? \_\_\_\_\_ Hours  
\_\_\_\_\_ Minutes

- b. **Moderate** (200 to 350 kcal per hour): **Yes**      **No**

[Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.]

If "yes," how long does this period last during the average shift? \_\_\_\_\_ Hours  
\_\_\_\_\_ Minutes

- c. **Heavy** (above 350 kcal per hour): **Yes**      **No**

[Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).]

If "yes," how long does this period last during the average shift? \_\_\_\_\_ Hours  
\_\_\_\_\_ Minutes

14. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator?: **Yes**      **No**

If "yes," describe this protective clothing and/or equipment:

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15. Will you be working under hot conditions (temperature exceeding 77 deg. F)?: **Yes**      **No**

16. Will you be working under humid conditions?: **Yes**      **No**



17. Describe the work you'll be doing while you're using your respirator(s):

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18. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):

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19. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

a. Name of the first toxic substance: \_\_\_\_\_  
Estimated maximum exposure level per shift: \_\_\_\_\_  
Duration of exposure per shift: \_\_\_\_\_

b. Name of the second toxic substance: \_\_\_\_\_  
Estimated maximum exposure level per shift: \_\_\_\_\_  
Duration of exposure per shift: \_\_\_\_\_

c. Name of the third toxic substance: \_\_\_\_\_  
Estimated maximum exposure level per shift: \_\_\_\_\_  
Duration of exposure per shift: \_\_\_\_\_

d. Indicate the name(s) of any other toxic substances that you'll be exposed to while using your respirator:

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20. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

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## Attachment 2

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### Survey Form for Annual Update for Approved Respirator Users

This form is used to update our records regarding your use of respiratory protection and also to evaluate the effectiveness of the Carnegie Mellon University Respiratory Protection Program.

- 1. The most recent respirator medical questionnaire we have for you is dated: Since then, have there been any changes in your medical condition that may affect your ability to wear a respirator? (For example, have you developed any lung or breathing problems, heart conditions, difficulty in hearing or vision, problems with moving or bending, etc.?)**

- No, my medical status has remained the same as in my most recent questionnaire
- Yes, my medical status has changed. (Please complete a new medical questionnaire.)

- 2. What are the specific activities you use your respirator for? What are the contaminants you need to be protected from?**

Activities	Contaminants

- Yes     No Are any of these activities or contaminants different than in previous years?

**3. Do you feel that the Carnegie Mellon Respiratory Protection Program is working well to protect your health from contaminants in the areas you work?**

Yes

No If no, please describe below:

**Please complete the following:**

**Name** \_\_\_\_\_

**Job Title** \_\_\_\_\_

**Supervisor** \_\_\_\_\_

**Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## **Attachment 3**

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### **Qualitative Fit Test Procedures**

#### **A. Fit Testing Procedures -- General Requirements**

The employer shall conduct 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 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, not overly tightened;
  - c. Fit across nose bridge;
  - d. Respirator of proper size to span distance from nose to chin;
  - e. Tendency of respirator to slip; and
  - f. Self-observation in 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 B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. 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:
  - i. Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.
  - ii. Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
  - iii. 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.
  - iv. 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).
  - v. 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 like 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.

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

## **B. 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.

- i. Three 1 liter glass jars with metal lids are required.
- ii. Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.
- iii. The isoamyl acetate (IAA) (also known as 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.
- iv. 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.
- v. 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.
  - vi. A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.
  - vii. 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.
  - viii. 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."
  - ix. 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.
  - x. 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.
  - xi. 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**

- i. 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.
- ii. Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.
- iii. 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.



- iv. 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.
- v. 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.
- vi. 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.
- vii. 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.
- viii. 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.
- ix. 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.
- x. 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.

- i. 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.
- ii. 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.
- iii. 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.
- iv. 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.
- v. 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.
- vi. To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.
- vii. 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.
- viii. 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.
- ix. 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.
- x. The test conductor will take note of the number of squeezes required to solicit a taste response.
- xi. 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 3a.:** If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

- xii. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.
  - xiii. Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.
  - xiv. 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**
- i. The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.
  - ii. The fit test uses the same enclosure described in 3a. above.
  - iii. 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).
  - iv. 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.
  - v. The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.
  - vi. 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.
  - vii. 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.
  - viii. After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.
  - ix. 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).
  - x. 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.
  - xi. 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).

- xii. 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™ (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.

- i. 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.
- ii. 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.
- iii. 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.
- iv. The subject is instructed to report when he/she detects a bitter taste.
- v. 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.
- vi. The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.
- vii. 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.
- viii. 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.

- ix. 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.
- x. 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.
- xi. The test conductor will take note of the number of squeezes required to solicit a taste response.
- xii. 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.
- xiii. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.
- xiv. Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.
- xv. 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**

- i. The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.
- ii. The fit test uses the same enclosure as that described in 4a. above.
- iii. 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 particulate filter(s).
- iv. 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.
- v. 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.
- vi. 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.
- vii. 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.

- viii. After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.
- ix. Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).
- x. 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.
- xi. 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).

### **5. Irritant Smoke (Stannic Chloride) Protocol**

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

#### **a. General Requirements and Precautions**

- i. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
- ii. Only stannic chloride smoke tubes shall be used for this protocol.
- iii. No form of test enclosure or hood for the test subject shall be used.
- iv. The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.
- v. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

#### **b. Sensitivity Screening Check**

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- i. The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

- ii. The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.
- iii. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

**c. Irritant Smoke Fit Test Procedure**

- i. The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
- ii. The test subject shall be instructed to keep his/her eyes closed.
- iii. The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.
- iv. If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.
- v. The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.
- vi. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.
- vii. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
- viii. If a response is produced during this second sensitivity check, then the fit test is passed.

## Attachment 4

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### **Carnegie Mellon University Voluntary Respirator Use Acknowledgement**

**Carnegie Mellon has determined that you are NOT REQUIRED to use respiratory protection as part of your work activities.**

However, you have been provided respiratory protective equipment for *voluntary use, for your comfort and added protection as you work.*

It is important that you understand and acknowledge the following information:

- 1. I understand that the respiratory unit provided to me is for voluntary use and not a requirement of my work at Carnegie Mellon.
- 2. I have received training from Environmental Health & Safety as to the use, care and maintenance of my unit, and on how to fit it properly for use.
- 3. I have read Appendix D of 29 CFR 1910.134, the OSHA Respiratory Protection Standard (attached)
- 4. I have had all of the questions related to my respiratory protection use answered by EHS
- 5. I understand that the respiratory protection provided has limitations which have been identified to me during my training, as follows:

*This section to be completed by EHS only:*

- The unit does not supply oxygen
- The unit is not for use in confined spaces
- The unit does not protect me from particulates
- The unit does not protect me from solvents or gases



The unit does not protect me from the following:

\_\_\_\_\_

Please check each of boxes 1 through 5 above and sign below:

Printed name \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

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

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

You should do the following:

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

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.