

UCSF

# Respiratory Protection Manual

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Office of Environmental Health and Safety  
University of California, San Francisco  
50 Medical Center Way, San Francisco 94143-0942

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## **I. INTRODUCTION**

UCSF makes all reasonable efforts to protect the health and safety of UCSF University faculty, staff, and students. This commitment extends to controlling respiratory hazards.

The most effective way to control air contaminants that create respiratory hazards is to follow correct work practices and institute prescribed engineering controls. When effective engineering and administrative methods fail to control air contaminants, or additional protection is needed, respirators will be used to ensure that employees and students are not exposed to hazardous levels of air contaminants.

UCSF has developed this Respiratory Protection Program to establish uniform policies and procedures concerning the use of respirators by UCSF employees and students. This document is designed to meet the regulatory requirements (8CCR5144) mandating a written respiratory protection program to assist employees, students, and supervisors in understanding their responsibilities, how to obtain a respirator, and how to properly use and care for their respirators. This program does not apply to contractors. They are responsible for providing their own respiratory protection program and respiratory protective equipment.

## **II. RESPONSIBILITIES**

### *1. Office of Environmental Health and Safety*

The Office of Environmental Health and Safety (OEHS) is responsible for establishing and maintaining a respiratory protection program consistent with the goal of protecting employees. This Program is designed and organized to ensure respirators are properly selected, used, and maintained, according to California regulatory standards (8CCR5144) and generally accepted industry standards.

OEHS is also responsible for evaluating tasks for which respiratory protection is necessary, determining the degree of hazard posed by the potential exposure, determining whether engineering or administrative controls are feasible, determining the appropriate task-specific respiratory protection, training personnel in the selection and use of respiratory protective devices, and conducting qualitative and/or quantitative fit testing.

### *2. Occupational Health Services (OHS)*

OHS is responsible for establishing medical evaluation and surveillance procedures and reviewing the health status of all personnel who may be required to wear respiratory protective equipment in the completion of their assigned tasks.

Note: OHS will also perform qualitative fit testing for incoming medical center employees when required.

### *3. Supervisors*

Supervisors will ensure each employee under his or her supervision using a respirator has received appropriate respirator training and medical evaluation review. Supervisors will ensure the availability of appropriate respirators and accessories, provide adequate storage facilities, and oversee proper respirator equipment maintenance. Supervisors must be aware of tasks requiring the use of respiratory protection, and ensure all employees engaged in such work use the appropriate respirator at all times. It is the supervisor's responsibility to report to OEHS problems related to respirator use and

changes in equipment or procedures that may affect employee exposures or respirator suitability.

#### 4. *Respirator Users*

It is the responsibility of each respirator user to wear his/her respirator when and where required and in the manner in which they were trained. Respirator wearers must report any malfunctions of the respirator to his/her supervisor immediately, inspect respirator for damage prior to each use, clean the respirator as instructed, provide daily fit checks for air purifying respirators (excluding disposable respirators) and store the respirator in a clean, sanitary location.

#### 5. *Materiel Management (medical center employees only)*

It is the responsibility of Materiel Management to provide Medical Center departments with disposable particulate respirators (N-95) and Power Air Purifying Respirators (PAPR). Particulate respirators for medical center employees will be available on Respiratory Protection Carts. Only respirators approved by OEH&S will be stocked. Materiel Management will also perform routine maintenance and cleaning of medical center PAPRs.

#### 6. *Hospital Epidemiology and Infection Control (HEIC)*

HEIC will identify patient care areas where Airborne/AFB Precautions for Tuberculosis (TB) are required. OEH&S will be consulted on observed problems with respirator use or compliance, environmental controls and isolation practices as they pertain to the TB Exposure Control Program.

#### 7. *Contractors*

Contractors are required to develop and implement a respiratory protection program for their employees who must enter into or work in areas where exposure to hazardous materials cannot be controlled or avoided. This program must meet Cal/OSHA regulations.

### **III. MEDICAL EVALUATION**

The Occupational Physician/Clinician of Occupational Health Services (medical center employees) will initially and periodically thereafter determine whether or not an employee can wear a respirator. Based on the overall health of the individual and special medical tests (pulmonary function studies, EKG, etc.) as appropriate, the examining clinician must provide a medical clearance for all respiratory protective equipment. If an employee has a medical restriction, his/her supervisor and the Office of Health and Safety will be notified, and a respirator will be selected on the basis of that restriction.

### **IV. SELECTION AND USE OF RESPIRATORY PROTECTIVE DEVICES**

#### 1. *Respirator Use*

Respiratory protection is authorized and issued for the following personnel:

- a) Workers in areas known to have contaminant levels requiring the use of respiratory protection or in which contaminant levels requiring the use of respiratory protection may be created without warning (e.g., emergency purposes such as hazardous material spill responses).

- b) Workers performing operations for which OEH&S has approved the use of a respirator. This determination will be made on case-by- case basis.

## 2. *Respirator Selection*

Selection of the proper respirator(s) to be used in any work area or operation at a facility operated by UCSF is determined based on potential or actual exposure of employees to harmful concentrations of contaminants at the workplace. This evaluation will be performed prior to the start of any routine or non-routine tasks requiring respirators. Respiratory protective devices will be selected by the Office of Environmental Health and Safety, using ANSI Z88.2, the NIOSH Certified Equipment List, and/or the NIOSH Respirator Selection Decision Logic as a guide. The following items will be considered in the selection of respirators:

- a) Effectiveness of the device against the substance of concern;
- b) Estimated maximum concentration of the substance in the work area;
- c) General environment (open shop or confined space, etc.);
- d) Known limitations of the respiratory protective device;
- e) Comfort, fit, and worker acceptance; and
- f) Other contaminants in the environment or potential for oxygen deficiency.

Supervisors shall contact OEH&S (476-1300) prior to non-routine work which may expose workers to hazardous substances or oxygen deficient atmospheres. Examples of work, which may require the use of respirators includes, but is not, limited to:

- a) Asbestos abatement activities
- b) Painting, especially with epoxy or organic solvent coatings
- c) Using solvents, thinners, or degreasers
- d) Any work which generates large amounts of dust
- e) Working in a confined space
- f) Work involving potential Bio-aerosol exposure (e.g. pigeon feces)

A review of the real and/or potential exposures should be made at least annually by employee's supervisor in conjunction with OEH&S to determine if respiratory protection continues to be required, and if so, whether the previously chosen respirators still provide adequate protection.

## 3. *Types of Respirators*

### a. *Air-Purifying Respirator (APR)*

These respirators remove air contaminants by filtering, absorbing, adsorbing or chemically reacting with the contaminants as they pass through the respirator canister or cartridge. This respirator is used only where adequate oxygen (19.5 to 23.5 percent by volume) is available. Air-purifying respirators can be classified as follows:

Particulate removing respirators are those which filter out dusts, fibers, fumes and mists. These respirators may be single-use disposable respirators or respirators with replaceable filters. They may be half-face or full-face type respirators.

Anyone who is assigned an APR must be trained in donning, doffing and maintenance procedures. A negative/positive air pressure test must be performed each time the respirator is donned.

b. Donning Procedure

- a) The APR is donned and straps adjusted
- b) The employee then covers the inlets to the cartridges with their hands and inhales. If the mask fits correctly, the mask should collapse against the employees face. This is the negative pressure test.
- c) The employee then covers the exhalation valve with their hand and exhales. The mask should move away from the face of the employee. This is the positive pressure test.
- d) If either of these tests fail when donning, then the mask is readjusted and the procedures above are repeated.

**NOTE:** Surgical masks **do not** provide protection against chemical contaminants. They are never to be used in place of an air-purifying respirator. They are for medical use and/or patient protection only.

4. *Proper Selection of Respirator Cartridges*

Respirator cartridges and canisters are designed to protect against individual, or a combination of, potentially hazardous atmospheric contaminants, and are specifically labeled and color coded to indicate the type and nature of protection they provide.

In order to use an APR or PAPR, the chemical contaminant must be known and have adequate warning properties. Cartridge selection must be based upon the contaminants but will largely include organic vapors, acid gases, radionuclides and particulates. This cartridge is comprised of a combination carbon filter with a HEPA filter layer and is useful for most situations encountered at the UCSF campus and Medical Center.

The NIOSH approval label on the respirator also specifies the maximum concentration of contaminant(s) for which the cartridge or canister is approved. For example, a label may read:

"DO NOT WEAR IN ATMOSPHERES IMMEDIATELY DANGEROUS TO LIFE. MUST BE USED IN AREAS CONTAINING AT LEAST 19.5% PERCENT OXYGEN. DO NOT WEAR IN ATMOSPHERES CONTAINING MORE THAN ONE-TENTH PERCENT ORGANIC VAPORS BY VOLUME. REFER TO COMPLETE LABEL ON RESPIRATOR OR CARTRIDGE CONTAINER FOR ASSEMBLY, MAINTENANCE, AND USE."

5. *Warning Signs of Respirator Failure*

a. Particulate Air-Purifying

When breathing difficulty is encountered with a filter respirator (due to partial clogging with increased resistance), the filter(s) must be replaced. Disposable filter respirators must be discarded.

When a cartridge end of service life indicator is not available, the only method available for replacing cartridges before break-through is by a pre-established cartridge change out schedule. This schedule should be supported by adsorption or other related studies.

b. Gas or Vapor Air-Purifying

If, when using a gas or vapor respirator (chemical cartridge or canister), any of the warning properties (e.g., odor, taste, eye irritation, or respiratory irritation) occur, promptly leave the area and check the following:

- 1) Proper face seal
- 2) Damaged or missing respirator parts
- 3) Saturated or inappropriate cartridge or canister

If no discrepancies are observed, replace the cartridge or canister. If any of the warning properties appear again, the concentration of the contaminants may have exceeded the cartridge or canister design specification. When this occurs, an airline respirator or SCBA is required.

c. Self-Contained Breathing Apparatus (SCBA)

This type of respirator allows the user complete independence from a fixed source of air and offers the greatest degree of protection but is also the most complex. Training and practice in its use and maintenance is essential. **SCBA use is limited to emergency situations** only and requires specialized training.

SCBAs are inspected monthly by assigned users (namely the OEHS Emergency Response Team). Additionally, each staff member that has been trained in the use of an SCBA, or is an active member of an emergency response team, must perform and SCBA checkout every month. The procedure follows and must also be performed prior to response:

**Visual Inspection Procedure:**

- a). The high pressure hose connection is tight on cylinder fitting
- b). The bypass valve is closed
- c). The mainline valve is closed
- d). There is no cover or obstruction on the regulator outlet
- e). The cylinder is fully charged
- f). Visually inspect to ensure all straps are present
- g). Ensure that straps are not frayed or damaged
- h). Visually inspect that mating ends match
- i). Check the locking function
- j). Inspect the backplate for cracks or missing screws or rivets.
- k). Visually inspect cylinder hold-down strap and check that the strap tightener locks and is functional.
- l). Check that the cylinder is tightly fastened to the backplate
- m). Check the hydrostatic test date to ensure that it's current and compliant
- n). Inspect cylinder for damage, dents or gouges
- o). Inspect cylinder valve lock mechanism
- p). Inspect cylinder gauge for readability and functionality

- q). Open cylinder valve and listen or feel for leakage around packing gland (if leakage is noted, do not use cylinder until repaired). Note function of valve lock
- r). Regulator and high pressure hose: Listen or fell for leakage in hose or at hose-to-cylinder connection
- s). Ensure that o-ring is in place and in good condition.

### **Regulator and Alarm Check Out Procedure:**

- a). Cover outlet of regulator with palm of hand. Open mainline valve and read regulator gauge.<sup>1</sup> Close cylinder valve and slowly move hand from regulator outlet to allow slow flow of air. Gauge should begin to show immediate loss of pressure as air flows. The alarm should sound/vibrate at approximately 1125 psi for a high pressure cylinder. This is approximately equal to 25% of remaining air in the cylinder. Remove hand completely from outlet and close mainline valve.

### **Facepiece and Corrugated Breathing Tube Checkout Procedure:**

- a). Inspect head harness for damage or deteriorated rubber. Inspect rubber facepiece body for signs of deterioration or extreme distortion.
- b). Inspect lens for proper seal in rubber facepiece
- c). Inspect exhalation valve for visible deterioration or foreign materials build-up.
- d). Place fingers inside of both ends of breathing tube. Stretch the tube. The breathing tube should collapse due to vacuum. If not, then a leak may be present in the tube.
- e). Don the mask and perform a negative pressure test by covering the end of the breathing tube. The mask should pull tightly toward the face.

## **V. Respirator Cleaning and Disinfecting**

Non-disposable respirators shall be regularly cleaned and disinfected. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use with an appropriate disinfectant (no acetone or solvents). Do not clean face shields with alcohol wipes as they will react with the shield and create poor visibility.

### *1. Cleaning your respirator*

Take off all the cartridges, filters, headbands, and filter holders. Completely disassemble respirator. Wash the facepiece in soapy water or in a manufacturer recommended solution. Follow with a disinfecting rinse. Rinse in warm water and let the facepiece air dry on shelf or countertop. Do not hang the respirator; this could cause distortion of the facepiece. Respirator wipe pads can be used for removing perspiration and body oils as a supplement to regular cleaning process.

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<sup>1</sup> A high pressure/one hour cylinder is full at 4500 psi. At a minimum, the reading should not be less than 4100 psi prior to site entry. A low pressure/30 minute cylinder is full at 2200 psi. At a minimum, the reading should not be below 1800 psi prior to site entry.

## **VI. Inspection and Maintenance**

Individual respirators must be inspected before and after each use to make sure they are in good condition. When inspecting a respirator the following steps should be followed:

- Take the respirator apart to check for valves and seats for dirt or grit.
- Check all parts for wear or damage. Pay special attention to rubber or plastic parts which can easily deteriorate. Replace any worn or damaged parts right away.
- SCBA's must be inspected on a monthly basis whether or not they are in use.
- Respirators used for emergency response should be inspected on a monthly basis.

### *1. Maintenance*

If a routine inspection or a wearer notices that something is wrong with a respirator, repairs must be made or a replacement respirator provided immediately. Repairs must be made only by trained personnel using parts specifically designed for the particular brand or respirator.

## **VII Storage**

Respirators must be stored in a clean and sanitary location in a way that protects it from dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals. APRs should be stored in an appropriate plastic bag and SCBAs must be stored appropriately in their cases.

## **VIII. Fit Testing**

Every employee who wears a respirator is required to have either a qualitative or quantitative fit test prior to wearing a respirator.

### *1. Qualitative fit test*

In this test a respirator wearer is exposed to a harmless challenge agent while performing various exercises similar to functions that could cause facepiece leakage. If the respirator wearer cannot detect the challenge agent then there is a good respirator fit.

### *2. Quantitative fit tests*

A quantitative fit test measures the contamination inside the test atmosphere and inside the respirator itself. During this test the user performs various exercises as described above. The fit tester utilizes a tool for this process called a Portacount.

Respirator fit testing is currently conducted via appointment with OEH&S. Contact OEH&S at 476-1300 to schedule a respirator fit test.

### *3. Training*

Employees will receive training on the use of respirators during initial fit testing and annually thereafter. A handout will be given to the employee describing the procedures and important points regarding the respirators uses and limitations.

At the Medical Center, annual re-test tracking is the responsibility of the department supervisors. Individuals schedule fit testing appointments with EH&S after having documented through OHS that their medical histories have remained the same. All medical center employees training records are tracked on the personnel data base (pdb).

This tracking program is currently undergoing changes to improve tracking efficiency.

#### **IX. Recordkeeping**

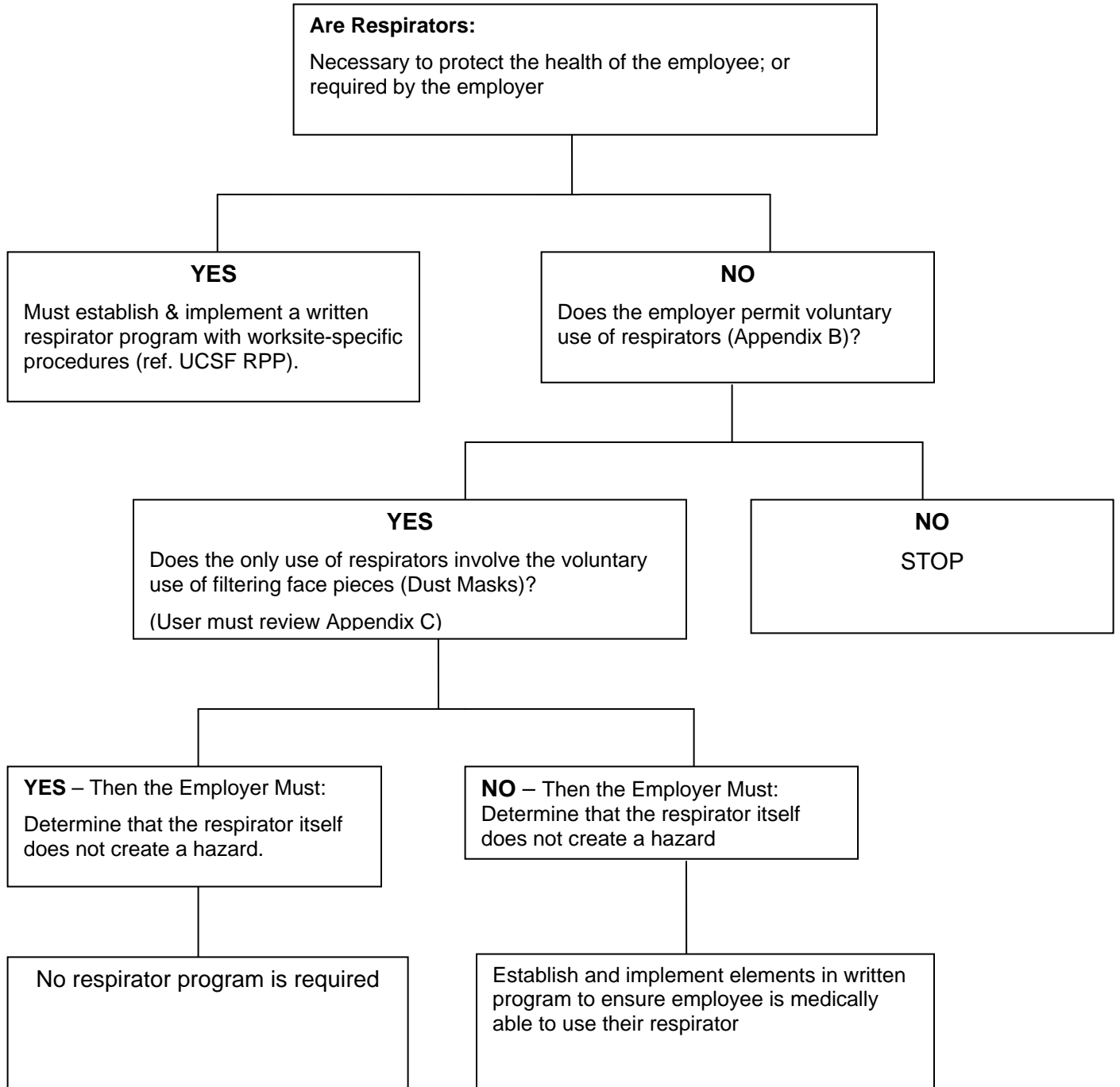
OEH&S will maintain a database of all employees that have had either a quantitative or qualitative fit test performed by OEH&S.

#### **X. Program evaluation**

This program will be evaluated and updated on a biannual basis. Program improvements will be implemented as soon as possible to ensure that employees are provided continued protection and safety.

# Appendix A

## Voluntary Use of Respirators





## Appendix C

### Subchapter 7. General Industry Safety Orders Group 16. Control of Hazardous Substances Article 107. Dusts, Fumes, Mists, Vapors and Gases §5144. Respiratory Protection.

#### Appendix D to Section 5144: (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 designated 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.

#### NOTE

Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

#### HISTORY

1. New appendix D to section 5144 filed 8-25-98; operative 11-23-98 (Register 98, No. 35).