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## **I. Introduction**

### **A. Campus Policy Statement**

The University of California at Santa Cruz (UCSC) is committed to maintaining a campus environment which will not adversely affect the health, safety, and well-being of students, employees, visitors, and the community.

Respiratory hazards at UCSC are eliminated through the use of engineering controls where feasible. For situations where engineering controls are not feasible or during emergencies, respirators shall be used for protection from inhalation hazards.

Work related activities requiring respiratory protection equipment shall be conducted in accordance with the provisions of Title 8 California Code of Regulations (CCR) concerning Respiratory Protection Programs. This UCSC Respiratory Protection Manual constitutes written operating policies and procedures required by those regulations.

UCSC shall provide each employee required to use respiratory protection with the necessary medical certification, respiratory protection equipment, and training on the safe and proper way to use their respirator. Each employee participating in the UCSC respiratory protection program shall have full responsibility for using respirators as instructed and in strict accordance with all provisions of this manual.

### **B. Program Elements**

The UCSC Respiratory Protection Program is designed to protect the campus community from respiratory hazards originating from work related activities. Respiratory protection terms and definitions are included in Appendix I for reference. Elements of the program include:

1. Requirements to implement engineering and administrative controls (e.g. ventilation, isolation, work practices, product substitution) to minimize or eliminate the use of respirators.
2. Medical certification, training, and fit testing prior to assigning job tasks requiring the use of respirators.
3. Ensuring respirator selection is based on the hazards to which an employee may be exposed and that only NIOSH certified respirators are used.
4. An ongoing program for training, fitting, and inspecting respirators.
5. Periodic audits of the programs effectiveness.

## **II. Administrative Responsibilities**

Responsibilities for developing and maintaining the UCSC Respiratory Protection Program shall be as follows:

### **A. Environmental Health & Safety Office (EH&S)**

1. Shall recommend, review, and approve purchases of respiratory protection equipment.
2. Provide a mechanism for instruction to personnel on the need for respiratory protection, and the proper selection, use, maintenance, and limitations of respirators.
3. Perform or assist with fit testing persons required to wear respiratory protection equipment.
4. Assist with developing and implementing controls to reduce or eliminate the need for respiratory protection.
5. Conduct a compliance audit of the campus respiratory protection program at least annually.
6. Act as an information resource for problems and questions related to respiratory protection.
7. Retain copies of all records required by this document.

### **B. The UCSC Occupational Health Physician**

1. Shall establish health standards which must be met by all prospective respirator users.
2. Review medical questionnaires of prospective respirator users, and if necessary, conduct medical examinations on employees and students designated to wear respiratory protection equipment.
3. Provide certification that persons required to wear respirators are physically able to do so without adverse medical consequences.

### **C. Supervisors, Principle Investigators, and Directors**

1. Shall identify employees who may need respiratory protection equipment.
2. Ensure initial and subsequent annual medical review, fit testing, and training is provided to employees wearing respiratory protection as required by this document.
3. Ensure respiratory protection equipment is properly used.
4. Perform annual audits of departmental respiratory protection activities and submit findings to EH&S.

#### **D. Employees, Students, Volunteers:**

1. Shall use respiratory protection equipment issued by UCSC as instructed and in accordance with all provisions of this policy.
2. Inform his/her supervisor of any unusual or temporary health conditions which could be aggravated by the use of respiratory protection equipment.
3. Ensure his or her respirator is kept clean, in good working order, and stored in an appropriate manner.
4. Report any malfunction of respiratory protection equipment to their supervisor.
5. Use respirators for which he/she has been trained and fitted.
6. Use the correct type of respiratory protection for the hazard involved.
7. Inform supervisors of new situations which may require a change in the use of respiratory protection equipment.

### **III. Respirator Use Authorization**

#### **A. Prerequisites**

Only persons with written authorization from their supervisor and EH&S are certified to wear respiratory protection equipment. No person shall receive written authorization until they have been medically qualified, fitted, and trained as described in this policy.

#### **B. Voluntary Use**

Where respirator use is not required, an employee may request or use their own respirator if such use will not create a hazard. Voluntary respirator use is encouraged to provide additional protection and comfort for workers even when exposures are below permissible limits. Voluntary users must take part in the UCSC respiratory protection program to ensure they are medically capable and understand how to clean, maintain, and store their respirator. All voluntary users will be provided with Appendix IX of this document which is a copy of Cal-OSHA Title 8, 5144 Appendix D, (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard. The voluntary use of a disposable filtering facepiece (dust mask) by an employee does not require participation in the UCSC written program.

#### **C. Medical Qualification**

Prior to being fitted and trained for respirator use, personnel must be certified as medically able to wear a respirator without adverse health consequences. Certification of medical capability shall be provided by the Campus Physician. Evaluations for first time respirator users shall at a minimum include completion of a medical history questionnaire. Further evaluations and the scope of medical examinations will be at the discretion of the Campus Physician.

Medical screening shall be conducted as follows:

1. Supervisors will provide a copy of the medical questionnaire to employees assigned jobs requiring the use of respirators. A copy of the medical questionnaire is included in Appendix II.
2. Deliver completed medical questionnaires to the campus physician for review. Medical evaluation protocols are further described in Appendix II.
3. Persons who indicate a significant respiratory condition on the medical questionnaire may require a more extensive medical evaluation including pulmonary function tests. Results from this evaluation shall determine the employees eligibility for respirator use.
4. Employees will be given a written pass/fail certification from the Campus Health Center stating parameters under which the individual is medically able to wear a respirator.
5. The Cowell Student Health Center shall maintain records of all medical history questionnaires, certifications of respirator use eligibility, and pulmonary function tests. A copy of the certification shall be provided to the employee, the employees supervisor and to EH&S.
6. Upon receiving a pass certification from the physician, supervisors shall schedule a date for training and fit testing with EH&S. Employees must bring a copy of their certification to EH&S as proof they have been medically qualified to use a respirator.
7. Medical qualification must be repeated if:
  - a. An employee reports signs or symptoms related to the ability to wear a respirator.
  - b. The Campus Physician, EH&S, or the supervisor determines it is necessary.
  - c. A change in workplace conditions significantly increases the physiological burden on an employee.

## **D. Training**

1. Employees required to wear respiratory protection equipment shall be thoroughly trained in the selection, care, use, and limitations of the equipment. Training will vary depending on the type of respirator issued and the nature of the airborne hazard. As a minimum, each employee shall receive training when first issued a respirator and annually thereafter. Training shall include:
  - a. An explanation of the contents of the UCSC respiratory protection policy and the prerequisites for respirator use.
  - b. A description of the different types of respirators, conditions of use, fitting, selection, and limitations.
  - c. Procedures for obtaining respirators, cleaning, storage, inspection, and maintenance.

2. Specialized training will be required for personnel assigned to use SCBA systems. More information about the use of SCBA's can be found in Appendix VIII.
3. Training attendance records will be maintained by the supervisor and EH&S.

## **E. Fit Testing**

Prior to issuing a reusable, face-fitting respirator to any employee, the employee must successfully pass an appropriate quantitative or qualitative fit test on that respirator. The complete UCSC fit testing protocol is described in Appendix V. Other aspects of the UCSC respirator fit policy are as follows:

1. An employee will not be fitted with a face-sealing respirator if there is any facial hair present which would come between the skin and face mask sealing surface. Moderate stubble at the sealing surface is considered excessive facial hair.
2. If an employee exhibits any difficulty breathing or a severe psychological reaction during any phase of fit testing, he or she shall be referred back to the Campus Health Center for reevaluation.
3. Annual or repeat fit testing is required as follows:
  - a. Fit testing shall be repeated at least annually.
  - b. Fit testing shall be repeated when any change occurs which may alter respirator fit. Such changes may include but are not limited to:
    - i. a weight change of 20 pounds or more.
    - ii. significant facial scarring in the area of the face seal.
    - iii. significant dental changes, i.e., multiple extractions without prosthesis, or dentures.
    - iv. reconstructive or cosmetic surgery.
    - v. any other condition which may interrupt the facepiece seal.
4. Supervisors shall maintain records of fit tests in the employees respiratory protection file.

## **IV. Respirator Use at UCSC**

### **A. Types of Respirators**

Respirators available for protection from specific inhalation hazards are classified as either (1) Air-purifying respirators or (2) Atmosphere supplying respirators. Air-purifying respirators remove contaminants from ambient air before it is inhaled. Atmosphere supplying respirators provide clean air from an exterior source such as tanks or an air compressor. The following list describes the various types of respirators covered by this program and available to UCSC employees.

1. Filtering Facepiece Respirators (Disposable Dust Mask)
2. Air Purifying Half Mask Respirators
3. Air Purifying Full Face Respirators
4. Powered Air Purifying Respirators
5. Air Line Respirators
6. Self-Contained Breathing Apparatus (SCBA)

Detailed descriptions of these respirators including limitations, advantages and disadvantages are described in Appendix IV.

### **B. Selection**

Suitable respirator selection shall be based on the following considerations:

1. All respirators required by campus personnel under this policy shall be NIOSH approved.
2. Selection of respiratory protection equipment shall be based on (a) the nature of the respiratory hazard, (b) extent of the hazard, (c) work requirements and conditions, and (d) characteristics and limitations of respirators.
3. Air-purifying respirators shall not be used in atmospheres deficient in oxygen or other "Immediately Dangerous to Life and Health" (IDLH) atmospheres, or in emergencies where the concentration and type of air contaminant is unknown.
4. No respirator (including positive pressure respirators) shall be used when facial hair interferes with the face seal nor shall any negative pressure respirators be used when facial scars or deformities interfere with the face seal.

Appendix VI contains charts which can be used to help with respirator selection.

### **C. Issuing Respirators**

Respirators will only be issued to persons who have been medically certified, trained, and fitted as described in Respirator Use Authorization (Section III) of this document. A Respirator Qualification Record (Appendix III) shall be completed for each user and maintained by supervisors and EH&S.

1. Respirators should be obtained at the Campus Facilities Shop Store or on a limited basis from the Thimann Stockroom. Users must present a copy of their qualification record before a respirator will be issued. Certified individuals may purchase respirators from supply catalogs, but they must be the same brand, model, and size of respiratory protection equipment they were trained and fit tested to wear.



2. Individuals will only be issued the type(s) of respiratory protection equipment indicated on their qualification record.
3. The Stockroom and Shop Store shall maintain a log of all respiratory protection equipment checked out and supply a copy of that log to EH&S upon request.

#### **D. Use of Respirators in the Field**

Once the proper respirator has been selected and issued, care must be exercised in its use, cleaning, storage and maintenance. The following procedures shall be followed to help ensure respirators will function as designed.

1. Initial Inspection: Upon receipt of a new respirator and before each use, employees shall inspect the respirator to determine whether:
  - a. The respirator is the correct type for the job. (Read the cartridge on air purifying respirators to verify it is approved for the intended use).
  - b. The respirator is the correct brand and size, as specified on the respirator qualification record.
  - c. The respirator is intact, complete and functioning. Visually inspect all parts of the respirator for defective or worn parts. This inspection should include straps, hoses, valves, gaskets, rubber mask, filters and cartridges, as required. Only after a satisfactory inspection should the mask be donned. Personnel are required to run through both positive and negative user seal checks before entering a potentially hazardous atmosphere.

**The respirator should not be used if any problems are discovered during the check-out procedure.** If problems are discovered during the inspection process, the supervisor or EH&S should be notified for advice on how to proceed. Where appropriate, defective or worn parts will be replaced with new parts. However, respirator parts shall never be interchanged between different brands of respirators, as this would void the NIOSH approval.

2. Use Responsibilities: Employees assigned to a job requiring the use of respiratory protection equipment shall use the equipment in accordance with this document and training.
3. Cleaning and Sanitizing: Every respirator shall be cleaned and sanitized after each use or at the end of each day's use by at least one of the following techniques:
  - a. Light cleaning should be done by wiping down all rubber surfaces of the respirator with sani-wipes (available at the Facilities Shop Store). Light cleaning should be done several times throughout the day when working in particularly dirty environments.
  - b. Thorough cleaning is performed by removing cartridges and immersing the respirator into a cleaning/sanitizing solution. The respirator should be cleaned with brushes or scrubbers, rinsed twice to remove all soap/sanitizer residue, and air dried at temperatures of less than 125 degrees Fahrenheit.

4. Storage: When not in use, respirators shall be stored in sealed plastic bags or other sealed containers and shall be protected from dust, sunlight, extremes of temperature, excessive moisture, and damaging chemicals.
5. Replacement of Cartridges/Filters: Cartridges and filters shall be replaced based on the following criteria:
  - a. Particulate cartridges shall be changed when they become damaged, clogged with contaminants, or breathing through them becomes difficult.
  - b. Organic vapor/acid gas cartridges shall be changed when their End-Of-Service-Life Indicator (ESLI) warns the user the cartridge is near its end of adequate protection. If no ESLI is available for a cartridge, users shall consult with EH&S to determine a change schedule. Most manufacturers provide software to calculate cartridge service life based on the concentration of contaminant, temperature, and humidity of the working environment. Contaminant warning properties such as odor, taste, and irritation are no longer the primary criteria to determine when a cartridge is saturated and needs to be replaced. Replacement cartridges or filters can be obtained from the Facilities Shop Store or ordered through a supply catalog.

#### **E. Respirator Turn-In**

1. A respirator must be returned to the supervisor when any of the following conditions occur:
  - a. The respirator is no longer needed.
  - b. The respirator malfunctions or is damaged.
  - c. The respirator becomes uncleanable or difficult to wipe down.
2. Supervisors shall notify EH&S about changes in respirator use activities.

### **V. Program Maintenance**

#### **A. New Job Consultation**

EH&S will assist departments with the evaluation of new or unusual jobs to determine if there is a hazard from airborne contaminants. EH&S shall also recommend engineering controls or the use of respiratory protective devices as appropriate to protect personnel from potential airborne hazards.

#### **B. Auditing**

1. An annual audit of compliance with this respiratory protection program shall be conducted by EH&S. This audit shall include as a minimum:
  - a. Inspection of all records, files, and logs kept by EH&S, supervisors, and the Cowell Student Health Center for completeness.
  - b. Spot inspections of storage and use of respiratory protection equipment in the field.

- c. Spot questioning of persons required to wear respirators concerning their qualification and training.
  - d. Review of compliance with required annual fit testing, medical qualification, and training.
  - e. Review of this policy and procedures manual for necessary changes.
2. EH&S shall take action as necessary to correct identified deficiencies. Appendix VII contains guidelines for program audits.

## APPENDIX I

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### DEFINITIONS LIST

**Air-Purifying Respirator:** A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

**Assigned Protection Factor (APF):** The minimum anticipated protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users.

**Atmosphere-Supplying Respirator:** A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

**Breakthrough:** The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing is often referred to as the percentage of the input concentration.

**Canister or Cartridge:** A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

**Demand Respirator:** An atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

**Disposable Respirators:** A respirator that is discarded after the end of its recommended period of use, after excessive resistance or physical damage, or when odor breakthrough or other warning indicators render the respirator unsuitable for further use.

**Dust:** A solid, mechanically produced particle with a size ranging from submicroscopic to macroscopic.

**Employee Exposure:** Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

**End-Of-Service-Life Indicator (ESLI):** A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective.

**Escape-Only Respirator:** A respirator intended to be used only for emergency exit.

**Filter or Air-Purifying Element:** A component used in respirators to remove solid or liquid aerosols from the inspired air.

**Filtering Facepiece (Dust Mask):** A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

**Fit Factor:** A quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

**Fit Test:** Means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

**Fume:** A solid condensation particulate, usually of a vaporized metal.

**Gas:** An aeriform fluid that is in a gaseous state at standard temperature and pressure.

**Helmet:** A rigid respiratory inlet covering that also provides head protection against impact and penetration.

**High-Efficiency Particulate Air (Hepa) Filter:** A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

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

**Immediately Dangerous to Life or Health (IDLH):** An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

**Mist:** A liquid condensation particulate.

**Negative Pressure Respirator (Tight Fitting):** A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

**Oxygen Deficient Atmosphere:** An atmosphere with an oxygen content below 19.5% by volume.

**Particulate Filter Series N-R-P:** New criteria eliminates classification of particulate filters according to hazard such as "dust, mist, fume" and provides for three levels of filter efficiency (95%, 99%, 99.97%). Each efficiency is available in a series of filter types known as N, R, P. The N, R, P designation corresponds to how resistant a filter is to oil. A single use, double strapped "dust mask" is now called an N95 single use filtering facepiece. Any HEPA cartridge is referred to as a P100 filter.

Efficiency	NaCl aerosol test (N= <u>N</u> ot oil resistant)	DOP aerosol test (R= <u>R</u> esistant to oil)	DOP aerosol test (P= <u>P</u> roof)
95%	N95	R95	P95
99%	N99	R99	P99
100 (99.97%)	N100	R100	P100

**Positive Pressure Respirator:** A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

**Powered Air-Purifying Respirator (PAPR):** An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

**Pressure Demand Respirator:** A positive pressure atmosphere- supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

**Qualitative Fit Test (QLFT):** A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

**Quantitative Fit Test (QNFT):** Means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

**Self-Contained Breathing Apparatus (SCBA):** An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

**Service Life:** The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

**Single-Use Dust or Dust and Mist Respirators:** Respirators approved for use against dusts or mists that may cause pneumoconiosis and fibrosis.

**Supplied-Air Respirator (SAR) or Airline Respirator:** An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

**Tight-Fitting Facepiece:** A respiratory inlet covering that forms a complete seal with the face.

**User Seal Check:** An action conducted by the respirator user to determine if the respirator is properly seated to the face.

**Vapor:** The gaseous state of a substance that is solid or liquid at temperatures and pressures normally encountered.

## APPENDIX II

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### A. MEDICAL PROTOCOL FOR RESPIRATOR EXAMINATIONS

The Occupational Health Service (OHS) at Cowell Health Center will conduct a medical surveillance program for respirator users. Medical clearance is required before an individual will be approved for respirator use. The program will include a medical questionnaire, and if necessary, a medical examination. All aspects of the medical surveillance program will be conducted under the supervision of the Chief Campus Physician including all medical questionnaires, exam reports, and laboratory results.

Information from medical evaluations will be confidential except where disclosure is necessary to protect the health of the employee or co-workers. Medical records will be kept on file at Cowell Health Center or according to regulations governing occupational health records.

1. All employees, faculty, students, and visiting scholars seeking approval to use a respirator will fill out a medical questionnaire.
2. Any employee using a Self-Contained Breathing Apparatus (SCBA) shall be required to complete a medical questionnaire. At the discretion of the physician, a medical examination and an exercise electrocardiogram test may need to be performed.
3. Final decisions on medical clearance for respirator use will be made by the Chief Campus Physician. Any information supplied by an individual's personal physician will be considered in this decision.

## B. MEDICAL QUESTIONNAIRE

### UCSC Respirator User Medical Evaluation Questionnaire

#### **To the employer:**

Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

#### **To the employee:**

Can you read (circle one): \_\_\_\_\_ Yes / No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

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

1. Today's date: \_\_\_\_\_

2. Your name: \_\_\_\_\_

3. Your age (to nearest year): \_\_\_\_\_

4. Sex (circle one): Male/Female

5. Your height: \_\_\_\_\_ ft. \_\_\_\_\_ in.

6. Your weight: \_\_\_\_\_ lbs.

7. Your job title: \_\_\_\_\_

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

9. The best time to phone you at this number: \_\_\_\_\_

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): \_\_\_\_\_ Yes / No

**(YOU MAY CONTACT DR. LES ELKIND OF THE CAMPUS HEALTH CENTER AT 459-2689)**

11. Check the type of respirator you will use (you can check more than one category):

a. \_\_\_\_\_ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

b. \_\_\_\_\_ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): \_\_\_\_\_ Yes / No

If "yes," what type(s): \_\_\_\_\_

\_\_\_\_\_



**Part A. Section 2. (Mandatory) Questions 1 through 17 below must be answered by every employee who has been selected 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
10. 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
11. Have you ever had an injury to your ears, including a broken ear drum:..... Yes/No
12. 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
13. Have you ever had a back injury:..... Yes/No
14. 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

15. 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

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

- a. Light (less than 200 kcal per hour):..... Yes/No  
If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

*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.*

- b. Moderate (200 to 350 kcal per hour):..... Yes/No  
If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

*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.*

- c. Heavy (above 350 kcal per hour):..... Yes/No  
If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

*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.).*

17. 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: \_\_\_\_\_

---

Employee Name: \_\_\_\_\_

College / Department: \_\_\_\_\_

Supervisor: \_\_\_\_\_

Campus Phone Number: \_\_\_\_\_

**EMPLOYEE DO NOT WRITE BELOW THIS LINE**

---

*COWELL STUDENT HEALTH CENTER: PLEASE COMPLETE THE FOLLOWING INFORMATION, RETURN A COPY OF THIS PAGE TO EH&S TRAILER (attention Brent Cooley) AND RETAIN THE ORIGINAL FOR YOUR RECORDS*

PHYSICIAN'S NOTES:

- Approved to use air purifying respirator
- Approved to use SCBA respirator
- Medical follow up necessary

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### C. MEDICAL CERTIFICATION

---

Respirator Use Medical Certification  
University of California at Santa Cruz  
Cowell Student Health Center

Name: \_\_\_\_\_ Department: \_\_\_\_\_

Date of Examination: \_\_\_\_\_ Supervisor: \_\_\_\_\_

I performed a medical evaluation of the above named person and believe this individual:

\_\_\_\_\_ IS MEDICALLY QUALIFIED to use respirators as listed below WITHOUT restrictions.

\_\_\_\_\_ IS MEDICALLY QUALIFIED to use respirators as listed below WITH RESTRICTIONS (see comments).

\_\_\_\_\_ IS NOT MEDICALLY QUALIFIED to use respirators.

#### Respirator Types

\_\_\_\_\_ Negative Pressure Respirators      \_\_\_\_\_ Half Face      \_\_\_\_\_ Full Face

\_\_\_\_\_ Air Line Respirators      \_\_\_\_\_ Powered Air Purifying Respirator

\_\_\_\_\_ Self Contained Breathing Apparatus

#### Other Considerations

Corrective Lenses:      \_\_\_\_\_ Required      \_\_\_\_\_ Not Required

Physical limitations which may affect fit factor:      \_\_\_\_\_ Yes      \_\_\_\_\_ No

Comments: \_\_\_\_\_

\_\_\_\_\_

Type of Exam: Initial: \_\_\_\_\_ Re-examine: \_\_\_\_\_ 1 year      \_\_\_\_\_ Other

Signature of Physician: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX III

<b>UCSC RESPIRATOR QUALIFICATION RECORD</b>
---

Name: _____	Department: _____
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**I. TRAINING RECORD**

The employee named has been trained in the selection, use, storage and other usage requirements for the respirator(s) specified in Section II below.  Yes  No

Date: \_\_\_\_\_ Trained by: \_\_\_\_\_

Initial Qualification? \_\_\_\_\_ Annual Recertification? \_\_\_\_\_

**II. FIT TESTING**

**A. Qualitative Fit Testing**

The employee has been successfully qualitatively fit tested on the listed respirator(s).

	Respirator		Negative	Positive	
	Type	Manufacturer	Size	Pressure	Pressure
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____

**B. Quantitative Fit Testing**

The employee has been quantitatively fit tested on the listed respirator(s).

	Respirator		Assigned	Pass	Measured
	Type	Manufacturer	Size	Prot. Factor	(APF <sub>x10</sub> )
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____

Overall Quantitative Fit Test Performance  Pass  Fail

Reason for Failure:

**III. MEDICAL QUALIFICATIONS**

A. Medical questionnaire completed:  Yes  No Date: \_\_\_\_\_

**IV. SIGNATURE**

I have received and understand training provided on the selection, use, and care of respirators. I know to contact my supervisor or EH&S if I have questions on the proper use of respirators.

\_\_\_\_\_  
Employee Signature

\_\_\_\_\_  
Date

## APPENDIX IV

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### Types of Respirators

This appendix describes the various types of respirators available for use at UCSC. Included in the discussion is an overview of the advantages, disadvantages, limitations, applications and assigned protection factors for each class of respirator.

#### A. N95 Filtering Facepiece (Disposable Dust/Particulate Respirators)

1. Description: Single use disposable particle masks are designed for respiratory protection against certain pneumoconiosis and fibrosis-producing dusts and mists (double strapped types) as well as non-toxic nuisance particulates (single strapped type). These types of respirators are frequently misused therefore Supervisors or EH&S authorization is required prior to use.
2. Advantages: Respirators are lightweight, disposable, relatively comfortable, and inexpensive.
3. Limitations: Disposable N95 respirators offer minimal protection due to poor sealing characteristics. They cannot be used by personnel with facial hair which comes between the respirator and the skin. N95 particulate respirators cannot be used in an oily environment (oil mist or aerosol).
4. Applications: Low concentrations of nuisance dusts, mists, pollen, and animal dust as well as some pneumoconiosis and fibrosis-producing dusts and mist.
5. Assigned Protection Factor = 3 - 5.

#### B. Air Purifying Half Mask Respirators

1. Description: Air purifying, half mask respirators have a rubber face seal which fits over the nose and under the chin. The respirator is fitted with cartridges which purify the air as the wearer breathes. Different types of cartridges are available for different types of air contaminants.
2. Advantages: This type of respirator is relatively lightweight and can offer good protection from many different air contaminants.
3. Limitations: Air purifying respirators cannot be used for all types of air contaminants and are limited by the type and capacity of the filters and cartridges used. Protection factors offered by these masks are not as good as that provided by a full facepiece air purifying respirator nor do they provide eye protection. Proper fit is essential and many factors may effect the face to facepiece seal. They cannot be used in oxygen-deficient atmospheres, or in atmospheres which have high concentrations of contaminants. Breathing may become difficult because of the additional effort required to draw air through the purifying media.

4. Applications: Air purifying respirators can be used for protection from a wide variety of respiratory hazards. Cartridges and filters are designed to provide protection against a specific type of hazard. The most common types of cartridges are:
  - a. HEPA Cartridge – High Efficiency Particulate Air or P100 particulate cartridges for low level concentrations of certain toxic dusts including asbestos, radionuclides, and silica. Can be used safely in an oily environment.
  - b. Organic Vapor Cartridge - approved for concentrations not to exceed 1000 ppm for many organic solvents, petroleum distillates, and alcohols.
  - c. Acid Gas/Mist Cartridge - for atmospheres containing low levels of mineral acid gas or mist.
  - e. Combination Cartridge - for environments with more than one contaminant present (organic vapors, acid gasses, and particulates). For example, a typical combination cartridge a painter may use would include an N95 particulate pre-filter and an organic vapor cartridge.
  - f. Mercury Cartridge - for protection against low levels of metallic mercury vapors.
5. Assigned Protection Factor = 10

### **C. Air Purifying Full Facepiece Respirators**

1. Description: Air-purifying full facepiece respirators work on the same principal as the half-mask respirators described above. The facepiece extends around the entire face, covering the eyes, nose, chin and mouth.
2. Advantages: Full facepiece respirators provide a better seal and therefore, more protection than half-mask air-purifying respirators. They also protect the eyes and face from irritating vapors, mists, and splashed chemicals.
3. Limitations: Full face respirators are heavier than half-masks and often less comfortable for the wearer. Full face air purifying respirators cannot be used for all types of air contaminants and are limited by the type and capacity of the filters and cartridges used. Eyeglass wearers must assure that temple bars do not interrupt the face to facepiece seal. They cannot be used in oxygen-deficient atmospheres, or in atmospheres which have high concentrations of contaminants. Breathing may become difficult because of the additional effort required to draw air through the purifying media.
4. Applications: Full face respirators are used where a greater degree of respiratory protection is needed or where eye and face protection is desirable.
5. Assigned Protection Factor = 50.

### **D. Powered Air Purifying Respirators (PAPR)**

1. Description: This class of respirator features a battery powered, portable fan which draws air through a particulate or chemical filter and blows it to the facepiece. The fan and filter unit is usually mounted on the wearer's back or belt. Full and half-mask facepieces are available as well as a variety of helmets and hoods.
2. Advantages: Major advantages are derived from positive pressure provided by the fan forcing air into the facepiece, hood, or helmet. This eliminates difficulty in breathing provided by negative pressure respirators and reduces the importance of a good facial fit.



3. Limitations: Units are relatively expensive to purchase and maintain. Use is restricted to battery life and the fan and battery pack must be carried by the wearer at all times. They cannot be used in atmospheres deficient in oxygen or other IDLH atmospheres. Heavy exertion (breathing) may create negative pressure inside the facepiece reducing the respirator's effectiveness.
4. Assigned Protection Factor = 25 - 100.

## **E. Airline Respirators (Pressure Demand or Continuous Flow)**

1. Description: These respirators provide clean, fresh air to the wearer from a stationary source such as a compressor or compressed air cylinders. They may be equipped with a half or full facepiece, helmet, or hood. Breathing air must be of high quality as described in Appendix VIII. Air-line respirators have limited application on the UCSC Campus. Use of respirators shall be approved on a case by case basis by EH&S.
2. Advantages: Airline respirators may be used for long periods of time and provide a high degree of protection from a variety of air contaminants. They provide minimal breathing resistance and discomfort, are light weight, low bulk, moderate initial cost and low operating costs. These respirators can be used in oxygen deficient and other IDLH atmospheres when done in conjunction with a 5 minute self-contained air supply (escape respirator).
3. Limitations: Loss of the source of air eliminates all protection to the user. Air must be delivered to the mask or hood through a hose which can be awkward to maneuver and may easily tangle or crimp.
4. Applications: These respirators can be used for protection from most all air contaminants up to, but not exceeding the IDLH level.
5. Assigned Protection Factor = up to 10,000

## **F. Self-Contained Breathing Apparatus (SCBA)**

1. Description: SCBA's provide the user with clean air from a high pressure cylinder carried on the wearer's back. They are equipped with a full facepiece and are operated in the pressure demand mode. SCBA's provide the maximum degree of protection available from airborne contaminants.
2. Advantages: Users carry their air supply with them allowing comparatively free movement over an unlimited area.
3. Limitations: SCBA units are expensive to purchase and maintain; require the wearer to carry 20 to 30 pounds of equipment on their backs, and provide no more than 40 minutes of continuous use. Personnel with facial hair which comes between the respirator sealing surface and the wearer's face cannot utilize SCBA equipment.
4. Assigned Protection Factor = up to 10,000

## APPENDIX V

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There are several methods available for testing the face to facepiece seal of a respirator. All methods fall into the general categories of qualitative fit testing or quantitative fit testing. The qualitative fit test procedures described in this manual will only be used under special circumstances when quantitative fit testing cannot be performed (ie. instrument failure or repair, access to computer and software unavailable).

### A. Qualitative Fit Testing

UCSC qualitative fit testing procedures shall be conducted only on negative pressure air purifying respirators that must achieve a fit factor of 100 or less. The qualitative fit testing procedures shall be conducted as follows:

1. Negative User Seal Check: With the intake port(s) blocked, the wearer inhales gently and holds. The respirator should collapse slightly on the wearer's face. No leakage around the face seal should be noted while maintaining a negative pressure inside the respirator for several seconds.
2. Positive User Seal Check: With the exhaust port(s) covered, the wearer exhales gently to generate a slight positive pressure within the facepiece. No leakage outward around the seal should be noted.

(NOTE: Positive and negative user seal checks are not feasible with all brands of respirators).

3. If the wearer fails to obtain a good facial fit on either the negative or positive user seal checks, the headstraps should be adjusted and the procedure repeated. Extreme or uncomfortable tightening of the respirator straps to obtain an adequate face seal is prohibited.
4. If a respirator cannot be made to fit by adjusting the straps, a different model and/or size should be tried.
5. Irritant Smoke Test: Once a satisfactory fit is obtained on the negative and positive user seal checks, the quality of the facial seal is verified by the use of stannic oxychloride (an irritant smoke). Air purifying respirators must be equipped with P100 High Efficiency Particulate Air (HEPA) filters for this test.

Testing procedures should proceed as follows:

- a. Inform the employee of the purpose and procedure for irritant smoke testing.
- b. Instruct the employee to remove contact lenses if he or she is wearing them. If the employee must wear eyeglasses, he or she will be fitted for a half-mask respirator while wearing these glasses. If a full facepiece respirator is to be fitted, eyeglasses must be removed. A spectacle insert can be purchased to accommodate eyeglass wearers who must use full facepiece respirators.
- c. To determine if the test subject can detect the irritant smoke, a weak concentration is directed at the subject prior to donning the respirator.
- d. Once sensitivity to irritant smoke is verified, have the test subject don their respirator performing the correct user seal checks.
- e. Instruct the employee to close his or her eyes tightly and to breathe normally.

- f. Irritant smoke is puffed around the entire face seal and cartridge seal, slowly at first and with increasing smoke density if the wearer experiences no irritation.
- g. Smoke is continually introduced as the employee goes through a series of exercises. These include slowly moving his or her head from side to side in 180 degree arcs, up and down 90 degrees, bending over, deep breathing and talking. For the talking exercise, the test subject may choose to recite a song or poem, count backwards from 100, or repeat the Rainbow Passage (see below). Each exercise should be continued for at least 15 seconds.
- h. If no discomfort from the smoke is noted, the fit testing is complete. If coughing, gagging or irritation occurs, readjust the respirator straps or select a different model and repeat negative and positive user seal checks.

*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*

## **B. QUANTITATIVE FIT TEST PROTOCOL**

The following protocol establishes procedures for quantitative fit testing.

1. General Information
  - a. Whenever possible, each employee will be fit tested with his/her own personal respirator.
  - b. A special pre-probed filter or mask will be used depending on the type and brand of respirator.
  - c. A TSI Portacount Plus Model 8020 Respirator Fit Tester will be used to determine measured fit factors for each employee.
2. Procedures
  - a. Preliminary Procedures
    - i. Set up and turn on Portacount (let instrument complete "Daily Checks" self-diagnosis cycle). Make certain ambient particulate concentration is sufficient to attain adequate sensitivity.
    - ii. Inspect all test respirators for defects and cleanliness.
  - b. Quantitative Fit Test Procedures
    - i. Describe test procedures to subject ensuring that he/she understands actions expected of him/her.
    - ii. Instruct subject to don respirator and adjust until a comfortable fit is achieved, according to established procedures. (Note: Compatibility with eyewear is a key consideration in the trial process. Every effort should be made to select a brand of respirator which does not interfere with eyewear.)

- iii. Equip respirator with a set of P100 HEPA filters (in some cases, one of which is specially probed to accept a sample line). Cap or cover the probed inhalation port and conduct positive and negative user seal checks. Attach sampling line from Portacount to the probed filter or probed mask.
- iv. Instruct test subject to perform the exercises displayed by the Fit Test Plus software. Each exercise used to determine the overall measured fit factor will be conducted for 60 seconds. The following exercises will be performed by the test subject in a normal standing position.
  - a. normal breathing with head motionless
  - b. deep breathing with head motionless
  - c. turning head slowly side to side while breathing, pausing for at least two breaths before changing direction
  - d. moving head up and down while breathing, pausing for at least two breaths before changing direction
  - e. talking out loud while breathing normally; subject may count backward from 100, read the Rainbow Passage, or recite a memorized poem or song
  - f. grimace and distort face to challenge seal of mask (only performed for 30 seconds and not included in determination of overall fit factor)
  - g) bend at waist to touch toes or jog in place while breathing normally
  - h) normal breathing (same as (a) above)
- v. After the test, sampling line is disconnected and subject removes respirator. Subject is then questioned on overall comfort of respirator and any pressure points are noted.
- vi. The Fit Test Plus software calculates fit factors for each exercise and for the entire test as a whole. Exercise specific fit factors are displayed directly by the Portacount and the overall fit factor is calculated by taking the arithmetic average of all individual exercise values.
- vii. Results from each test subject should be recorded to identify the test by number, date, subject, type of respirator, protection factors for each exercise, and overall fit factor for the test. This information will be entered on the subject's fit test record. Satisfactory performance on the test shall be determined by the overall measured fit factor, not the individual tests.
- viii. For half-mask air-purifying negative pressure respirators, an overall fit factor of at least 100 must be attained to provide adequate protection. For full-face air-purifying negative pressure respirators, an overall fit factor of at least 500 must be attained to provide adequate protection. For full-face masks used with a SCBA, quantitative fit testing will be performed in the negative pressure mode and an overall fit factor of at least 500 must be attained to provide adequate protection.
- ix. Regardless of the fit factor achieved, the determining factor on whether the respirator is issued should be based upon user comfort.

## APPENDIX VI

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Locate the respirator number of a specific job or hazard in Chart A and determine the type of respirator the number represents from Chart B.

### CHART A

JOB OR HAZARD	RESPIRATOR NUMBER
Acids (inorganic, low concentration)	7
Acids (inorganic, moderate concentration)	12
Animal Hair	1
Ammonia	5, 13
Asbestos (Patching or wet removal)	6, 11, 15
Atmosphere deficient in oxygen	15
Fiberglass	6, 11
Formaldehyde	3, 10
Glue Vapors	2, 8
Lead Dust or Fume	6, 11, 15
Mercury	14
Metal Dust (except lead)	6, 11
Nuisance dust	1
Organic solvents	2, 8
Painting	4, 9
Soldering	4, 9
Welding	6, 11
Wood dust	1, 6, 11

## CHART B

### RESPIRATOR TYPES

1. N95 Filtering Facepiece (Disposable Dust/Mist/Fume Mask)
2. Half Mask, Organic Vapor Cartridge
3. Half Mask, Formaldehyde Cartridge
4. Half Mask, Combination N95 Pre-filter/Organic Vapor Cartridge
5. Half Mask, Ammonia Cartridge
6. Half Mask, P100 HEPA Filter
7. Half Mask, Acid Gas/Mist Cartridge
8. Full Facepiece Mask, Organic Vapor Cartridge
9. Full Facepiece Mask, Combination N95 Pre-filter/Organic Vapor Cartridge
10. Full Facepiece Mask, Formaldehyde Cartridge
11. Full Facepiece Mask, P100 HEPA Filter
12. Full Facepiece Mask, Acid Gas/Mist Cartridge
13. Full Facepiece Mask, Ammonia Cartridge
14. Half or Full Facepiece Mask, Mercury Cartridge
15. Contact EH&S

## APPENDIX VII

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### A. RESPIRATOR PROGRAM AUDIT PROTOCOL

#### I. Introduction

A periodic audit of respirator use will be conducted at UCSC in an effort to comply with CAL-OSHA Regulations and this Campus Policy. Specifically, Title 8 Section 5144 f(3) of the California Code of Regulations (CCR) as well as Sections VI.B. of this policy and procedures manual, require evaluation for the purpose of verifying program effectiveness. The protocol described below is designed to audit the field use aspect of the Campus Respiratory Protection Program.

#### II. General Discussion

Periodically, campus employees will be examined on their respirator use habits. Respirator users and Supervisors will be audited to determine compliance with the general responsibilities listed in Sections II C and II D of this manual. All listed items will be examined through means such as questioning of individuals, observation of work practices and inspection of equipment. If deficiencies are present, they will be noted and corrected.

#### III. Auditing Elements

- a. Each supervisor, Principal Investigator, or Director in charge of an activity where respiratory protection is used or may be required shall be audited on the following provisions:
  1. Proper and complete identification of those employees who may need respiratory protection equipment.
  2. Prompt scheduling of employees required to wear respiratory protection for initial and subsequent fit testing, medical testing and training as required by the Policies and Procedures Manual.
  3. Strict enforcement of the use of respiratory protection equipment when required.
- b. Each employee who wears a respirator shall be audited on the following provisions:
  1. Proper and appropriate use of issued respiratory protection equipment in accordance with the Policies and Procedures Manual and training.
  2. Prompt notification of his/her supervisor of any personal health problems that may be aggravated by the use of respiratory protection equipment.
  3. Assurance that respirators have not been damaged or altered in any way that would compromise the effectiveness of the equipment.
  4. Proper sanitation of respiratory protection equipment (regular use of sani-wipes or expedient cleaning and maintenance of heavily contaminated equipment).

5. Immediate reporting of malfunctioning respiratory protection equipment to supervisors.
6. Appropriate use of issued respirator(s) for which he/she was specifically trained and fitted.
7. Appropriate use of the correct type of respirator and cartridge/filter for the nature of the hazard involved.
8. Prompt notification of his/her supervisor and/or EH&S of new situations/exposures which arise where respiratory protection equipment may be necessary.



**B. RESPIRATOR AUDIT FORMS**

**Departmental Audit of Respirator Use**

Department: \_\_\_\_\_ Craft: \_\_\_\_\_

Auditor: \_\_\_\_\_ Date: \_\_\_\_\_

**Supervisor Responsibilities**

Satisfactory

Unsatisfactory

\_\_\_\_\_

\_\_\_\_\_

1. Proper identification of employees who may need to wear respirator.

\_\_\_\_\_

\_\_\_\_\_

2. Prompt scheduling of employees for fit testing, medical testing and training.

\_\_\_\_\_

\_\_\_\_\_

3. Strict enforcement on use of respirators.

Supervisor: \_\_\_\_\_

Comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Employee/User Responsibilities

Satisfactory

Unsatisfactory

\_\_\_\_\_

\_\_\_\_\_

1. Proper and appropriate use of issued respiratory protection equipment.

\_\_\_\_\_

\_\_\_\_\_

2. Prompt notification of supervisor of any health problems exacerbated by use of respirator.

\_\_\_\_\_

\_\_\_\_\_

3. Adequate protection of respiratory protection equipment against damage.

\_\_\_\_\_

\_\_\_\_\_

4. Proper sanitization of respiratory protection equipment.

\_\_\_\_\_

\_\_\_\_\_

5. Immediate reporting of malfunctioning respiratory protection equipment.

\_\_\_\_\_

\_\_\_\_\_

6. Appropriate use of issued respirator(s).

\_\_\_\_\_

\_\_\_\_\_

7. Use of correct type of respirator and cartridge/filter for nature of hazard encountered.

\_\_\_\_\_

\_\_\_\_\_

8. Prompt notification of supervisor and/or EH&S of new conditions where respirator(s) may be necessary.

Employee(s): \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## APPENDIX VIII

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### Self-Contained Breathing Apparatuses (SCBA)

#### I. General Discussion

Departments which assign personnel to use SCBA equipment shall purchase the equipment (as approved by EH&S) and provide for proper storage, monthly inspection, and maintenance of the equipment.

Medical qualification is done through the Campus Health Center and training is coordinated through EH&S.

#### II. Description

SCBA units provide the user with a pure supply of breathing air regardless of ambient air contamination. They may be used in IDLH atmospheres, in confined spaces, and for emergencies where the identity and concentration of contaminants is unknown. SCBA units may be used in IDLH atmospheres, only in conjunction with a positive-pressure full facemask.

#### III. Limitations

The air supply in a standard SCBA cylinder is normally rated for a 30-minute duration. However, heavy exertion and stress will increase breathing rates and deplete the air in less than 30 minutes. When the alarm bell on the unit sounds, the wearer has only about 5 minutes of air remaining and should leave the area immediately. No one shall work alone in hazardous atmospheres. A standby with SCBA and proper communication equipment should always be present. The positive-pressure full facemask used with the SCBA unit cannot be worn when facial hair extends under the facepiece sealing area of the mask.

#### IV. Inspection/Donning Procedures

1. Check cylinder gauge to ensure it reads "FULL"
2. Make sure connection between cylinder and high-pressure hose is snug.
3. Check by-pass knob; it should be fully closed.
4. Check main-line knob; it should be fully open and the locking ring engaged.
5. Make sure "DON/USE" switch is in the "DON" position (up).
6. Open cylinder valve and make sure the regulator gauge reads within 10% of the cylinder gauge.
7. Close cylinder valve and watch regulator gauge for "creepage" (more than one increment on gauge indicates a leak).
8. Place mouth over regulator opening and take several breaths to make sure air is flowing.

9. Very Important: With mouth still over the opening, blow back into regulator until the diaphragm takes a seat. You should NOT be able to force air back into the system.
10. Cup the palm of your hand over regulator opening and slowly switch regulator to "USE" positive pressure position (down); then slowly allow air to escape while watching regulator gauge. Bell should ring at about 1000 psig on regulator gauge.
11. Switch regulator to "DON" position (up); open cylinder valve fully and engage locking ring.
12. Put unit on and adjust harness.
13. Stretch hose; check overall condition of mask (straps, lens, etc.).
14. Put mask on and adjust, ( bottom, temple, then top straps).
15. Place palm over end of hose and inhale slowly until mask is drawn toward face and check for leakage (negative pressure check).
16. With palm still over the end of the hose exhale and check for leaks (positive pressure check).
17. Connect breathing hose to regulator.
18. Always switch regulator to "USE" positive pressure mode position (down) before entry into hostile environment.

## V. CAL-OSHA REQUIREMENTS FOR COMPRESSED BREATHING AIR

### CCR Title 8 Sec 5144

- (i) Breathing air quality and use. This subsection requires the employer to provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity.
  - (1) The employer shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:
    - (A) Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and
    - (B) Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specifications for Air, G-7.1-1989, to include:
      - 1. Oxygen content (v/v) of 19.5-23.5%;
      - 2. Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
      - 3. Carbon monoxide (CO) content of 10 ppm or less;
      - 4. Carbon dioxide content of 1,000 ppm or less; and
      - 5. Lack of noticeable odor.
  - (2) The employer shall ensure that compressed oxygen is not used in atmosphere-supplying respirators that previously used compressed air.
  - (3) The employer shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.
  - (4) The employer shall ensure that cylinders used to supply breathing air to respirators meet the following requirements:
    - (A) Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR 173 and part 178)
    - (B) Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air; and
    - (C) The moisture content in the cylinder does not exceed a dew point of -50 deg. F (-45.6 deg. C) at 1 atmosphere pressure.
  - (5) The employer shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:
    - (A) Prevent entry of contaminated air into the air-supply system;
    - (B) Minimized moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (-5.56 deg. C) below ambient temperature;
    - (C) Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.
    - (D) Have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag shall be maintained at the compressor.
  - (6) For compressors that are not oil-lubricated, the employer shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.
  - (7) For oil lubricated compressors, the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature

alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

- (8) The employer shall ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.
- (9) The employer shall use breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

## APPENDIX IX

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### **Appendix D to CCR Title 8 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.