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Stanford University
RESPIRATORY PROTECTION PROGRAM

RESPIRATORY PROTECTION PROGRAM

1.0 INTRODUCTION

"It is the policy of Stanford University to maintain a safe and healthy work environment. Managers and supervisors are responsible for the establishment and maintenance of good health and safety practices."[1] When effective engineering or administrative controls are not feasible or practical, or in emergency situations, the use of personal respiratory protective equipment may be necessary to protect the health of the employee. An effective respiratory protection program is essential to assure that the personnel using such equipment are adequately protected.

Requirements outlined in this manual that are mandatory by regulation where the word "**shall**" is used and are advisory in nature where the word "**should**" is used.

1.1 Objective

This Respiratory Protection Program document is designed to protect employees and students by establishing accepted practices for respirator use, providing guidelines for training and respirator selection, and explaining proper storage, use and care of respirators. This program shall conform to California OSHA requirements.[2]

1.2 Scope

This program applies to all Stanford University employees and students who need to wear a respirator to perform assigned duties. In addition, any employee or student who voluntarily wears a respirator when one is not required is subject to the medical evaluation, cleaning, maintenance, and storage elements of this program, and will be provided with necessary training. Employees or students who voluntarily wear filtering face pieces (dust masks) are not subject to the medical evaluation, cleaning, storage, and maintenance provisions of this program.

2.0 RESPONSIBILITIES

2.1 Supervisors and Principal Investigators

Supervisors have the primary responsibility for implementation of the Respiratory Protection Program in their work area. This involves:

- Supervising employees and students to ensure that the Respiratory Protection Program elements are followed. [8CCR3203(a)(4),(6), & (7); 8CCR5144(a)(2)]
- Identifying employees and students and their jobs or tasks which may require respiratory protection, providing this information to the Program Administrator (Environmental Health & Safety), and seeking their assistance in evaluation of respiratory hazards. [8CCR3203(a)(4),(6), & (7); 8CCR5144(a)(2)]

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[1] Stanford University Administrative Guide Memo 25.5

[2] Title 8, Section 5144 of the California Code of Regulations, Article 107

- Purchasing appropriate respirators and making them available for authorized use by respirator users.[8CCR5144(a)(2)]
- Enforcing the proper use of respiratory protection.
- Ensuring that respirators are properly cleaned, maintained and stored according to this program.
- Ensuring that respirator users under their supervision (including new hires) receive appropriate training, fit testing and annual medical evaluation.
- Identifying changes in jobs or tasks which may require re-evaluation of the respirator use and notifying the Respirator Protection Program Administrator (Environmental Health & Safety). [8CCR3203(a)(4); 8CCR5144(l)(2)(B)&(C)].
- Maintaining, storing, and monthly inspection of emergency use respirators as required so they are readily accessible and operational when needed.[8CCR5144(h)(3)(A)2.]

2.2 Environmental Health and Safety (EH&S)

The Environmental Health & Safety Program is responsible for the development, implementation and administration of the Stanford University Respiratory Protection Program. The Respiratory Protection Program Administrator within EH&S is responsible for:

- Reviewing and updating the written Respiratory Protection Program.[8CCR5144(c)]
- Evaluating respiratory hazards in the work areas.[8CCR5144(d)(1)(C)]
- Providing guidance to the supervisor for the selection and purchase of approved respirators.[8CCR5144(d)(1)(B)]
- Providing training (including refresher sessions) on the proper use, maintenance, and storage of respirators to all respirator users, including emergency Self Contained Breathing Apparatus (SCBA) users.[8CCR5144(k)]
- Providing a fit testing program for respirator users.[8CCR5144(c)(1)(C)]
- Maintaining records on respiratory protective equipment assignments, fit testing and training.[8CCR3203(b)(2); 8CCR5144(m)]
- Evaluating the overall effectiveness of the respirator program.[8CCR5144(l)]

2.3 Respirator User

The respirator user is responsible for following the requirements of the written program. This involves:

- Using the respirator in accordance with the manufacturer's instructions and the training received.
- Storing, cleaning, maintaining, and guarding against damage to the respirator. [8CCR5144(h)(1)&(2)]
- Reporting any malfunction of the respirator to his/her supervisor.
- Inspecting the respirator before each use.[8CCR5144(h)(3)]
- Promptly reporting to his/her supervisor any symptoms of illness that may be related to respirator usage or exposure to hazardous atmospheres.
- Informing the supervisor of operation changes or health status changes that could affect the safe use of the equipment.

2.4 Occupational Health Provider or other licensed health care professional (PLHCP)

The Occupational Health Provider is responsible for:

- Performing initial & periodic medical evaluations and any necessary follow-up examinations of employees and students to determine their ability to wear a respirator.
- Providing a written evaluation of the employee's ability to use a respirator to Environmental Health & Safety.
- Conducting periodic medical evaluation of respirator users as necessary.

3.0 WORKPLACE EXPOSURE ASSESSMENT [8CCR3203(a)(4)]

Initially and whenever supervisors identify new substances, processes, or equipment that may represent an occupational safety and health hazard, they **shall** contact Environmental Health & Safety Program at 723-0448 to provide workplace exposure assessment. Based on data collected, the need for respiratory protection is determined.

4.0 RESPIRATOR SELECTION

Selection of a respirator for a specific operation and/or contaminants **shall** be made by the Environmental Health & Safety [8CCR5144(d)(1)(B)]. Selection **shall** be made from a sufficient number of models and sizes to allow proper fit [8CCR5144(d)(1)(D)].

4.1 General Considerations

The selection of a proper respirator for any given situation **shall** require evaluation of workplace respiratory hazards, including identification of the following [8CCR5144(d)(1)]:

- A reasonable estimate of the employee exposures to respiratory hazard(s)
- The contaminant’s chemical state (valence state) and physical form (gas, vapor, particulate, etc.).

4.2 Approved Respirators, Filters, Cartridges, and Canisters

- Only respirators certified by the National Institute of Occupational Safety and Health (NIOSH) **shall** be selected [8CCR5144(d)(1)(B)].
- All appropriate filters, cartridges, and canisters **shall** be labeled and color coded with the NIOSH approval label. Labeling **shall not** be removed and **shall** remain legible [8CCR5144(j)].

4.3 Respirators For Use In IDLH Atmospheres

The only types of respirators authorized for use in an IDLH (immediately dangerous to life and health) atmosphere are:

- Full facepiece pressure demand SCBA (self contained breathing apparatus) certified by NIOSH for a minimum service life of 30 minutes [8CCR5144(d)(2)(A)1.];
- A combination full facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply [8CCR5144(d)(2)(A)2.]; or
- For uses in emergency escape from IDLH atmospheres, respirators **shall** be NIOSH-certified for escape from the specific IDLH atmospheres involved [8CCR5144(d)(2)(B)].

4.4 Respirators For Use In Non-IDLH Atmospheres

4.4.1 Protection Against Gases and Vapors

As appropriate, respirator users **shall** be provided either an air-supplying respirator; or an air-purifying respirator. If an air-purifying respirator is selected:

- the respirator **shall** be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the specific contaminant [8CCR5144(d)(3)(C)2.a.]; or
- if no appropriate ESLI can be used, employees **shall** follow the cartridge/ canister change schedule assigned by EH&S for the specific operation identified [8CCR5144(d)(3)(C)2.b.]

4.4.2 Protection Against Particulates

Where appropriate, respirator users **shall** be provided:

- an air-supplying respirator, or an air-purifying respirator equipped with a NIOSH-certified HEPA (High Efficiency Particulate Air) filter or with a NIOSH-rated filter rated at N95 or higher [8CCR5144(d)(3)(D)2.]; or
- for contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH [8CCR5144(d)(3)(D)3.].

5.0 AUTHORIZATION FOR USE

Any respirator usage by employees and students, either required or voluntary (for comfort purposes), **shall** be pre-approved by the Respiratory Protection Program Administrator. Employees and students **shall** only wear the specific respirator-type(s) for which they were pre-approved [8CCR5144(c)] .

[EXCEPTION: Voluntary use of filtering facepieces (disposable dust masks) does not fall under the requirements of the Respiratory Protection Program [8CCR5144(c)(2)(B)]].

6.0 TRAINING

Any employee or student *required* to wear a respirator **shall** receive training in the proper use, care, and limitation of the selected respirator [8CCR5144(k)(1)]. The training course will cover the following topics:

The Stanford University Respiratory Protection Program;
The Cal/OSHA Respiratory Protection Standard (Title 8 CCR Section 5144);
Respiratory hazards encountered at workplace and their health effects;
Proper selection and use of respirators;
Limitations of respirators;
Respirator donning and user fit checks;
Fit testing;
Emergency use procedures;
Maintenance and storage; and
Medical signs and symptoms limiting the effective use of respirators.

Each wearer **shall** be trained upon initial assignment and at least once every 12 months thereafter. Retraining **shall** also be provided when [8CCR5144(k)(4 &5)]:

- changes in workplace or respirator render previous training obsolete;
- deficiencies in the employee's knowledge show important information has not been retained; or
- any other situation where retraining appears necessary.

6.1 Training for Voluntary Respirator Usage (for comfort purposes)

Before voluntary respirator use is approved by the Respiratory Protection Program, the employee or student:

- must receive *initial* training in the proper use, care, and limitations of the selected respirator.
- **shall** review, sign, and submit the Voluntary Respirator Use Agreement (Appendix A) to Environmental Health & Safety [8CCR5144(k)(6)].

7.0 RESPIRATOR FIT TESTING

The Respiratory Protection Program **shall** provide qualitative and/or quantitative respirator fit tests for individuals prior to approval to use respirators with negative- or positive- pressure tight-fitting facepiece [8CCR5144(f)].

7.1 General Requirements

Where respirator use is *required*, fit testing **shall** be conducted as follows:

- Prior to initial use and at least annually [8CCR5144(f)(2)].
- Whenever an employee switches to a different tight-fitting facepiece (size, style, model, or make) [8CCR5144(f)(2)].
- Whenever the employee reports, or the Occupational Health Physician, supervisor, or Respiratory Protection Program Administrator notices changes in the employee's physical condition that could

affect respirator fit (changes such as facial scarring, dental changes, cosmetic surgery, or obvious changes in body weight) [8CCR5144(f)(3)].

- For air-supplying respirators, fit-testing **shall** be performed in a negative-pressure mode [8CCR5144(f)(8)].
- Fit testing **shall** follow procedures as listed in Appendix B- General Fit Testing Procedures [8CCR5144(f)(5)].

7.1.1 Fit Testing for Voluntary Respirator Usage (for comfort purposes)

Before voluntary respirator use is approved by the Respiratory Protection Program, the employee must pass an initial fit testing.

7.2 Qualitative Fit Test (Bitrex™ Protocol)

Qualitative fit testing **shall** only be performed for negative pressure air-purifying respirators that must achieve a fit factor of 100 or less [8CCR5144(f)(6)]. [EXCEPTION: This method is suitable for voluntary usage of any tight-fitting respirator]

The qualitative fit test is performed using the Bitrex™ Solution Aerosol Fit Test Protocol. For complete procedures, see Appendix B1- Bitrex™ Solution Aerosol Fit Test Protocol.

7.3 Quantitative Fit Test (Portacount™ Protocol)

The quantitative fit test may be performed for any respirator as long as a sampling probe can be adapted onto the surrogate respirator being tested [8CCR5144(f)(5&7)]. For complete procedures, see Appendix B2- Ambient Aerosol Portacount™ Fit Test Protocol.

8.0 RESPIRATOR USE

8.1 Facepiece Seal Protection

Any tight-fitting facepiece respirator **shall not** be worn when conditions prevent a proper seal of the respirator to the wearer [8CCR5144(g)(1)]. Remedies to common facepiece seal problems:

- Facial hair interference– shaving facial areas that interfere with face-to-facepiece seal or areas that interfere with respirator valve function.
- Glasses/ PPE interference – ensure glasses and equipment are worn in a way to avoid facepiece seal interference.

8.1.1 User Seal Checks

Either the positive/ negative pressure check or the respirator manufacturer's recommended user seal check method **shall** be used to ensure an adequate seal is achieved each time the respirator is put on [8CCR5144(g)(1)(C)]. User seal checks are not substitutes for qualitative or quantitative fit tests. Refer to the Respiratory Protection Safety Training (IH Report No. 98-012) for specific user seal check procedures.

8.2 Change Schedules

Respirator cartridges shall be replaced as determined by the Program Administrator, supervisor, and manufacturers' recommendations including ESLI (see section 4.4.1).

8.3 Continuing Respirator Effectiveness

When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the employee **shall** request their supervisors to contact Environmental Health & Safety Program for re-evaluation of respiratory hazards [8CCR5144(g)(2)].

8.4 Procedures For IDLH Atmospheres [8CCR5144(g)(3)]

For work in all IDLH atmospheres, the supervisor shall ensure that work operations are done in accordance with the Appendix C- Supplied-Air Respirator Use.

9.0 MAINTENANCE AND CARE OF RESPIRATORS

Each respirator **shall** be properly maintained to retain its original effectiveness by cleaning/ disinfecting, proper storage, periodic inspections, and repair of respirators used by employees.

9.1 Cleaning And Disinfecting Respirators

Respirator users are responsible for cleaning and sanitizing their respirators as covered in the Respiratory Protection Safety Training (IH Report No. 98-012). Frequency of cleaning and disinfecting are as follows [8CCR5144(h)(1) & (k)(1)(E)]:

- An individually assigned respirator which is used routinely **shall** be cleaned as often as necessary to keep it in a sanitary condition.
- Respirators not individually assigned **shall** be cleaned and disinfected before each use. [EXCEPTION: Respirators kept for emergency/ rescue use or fit-testing **shall** be cleaned and disinfected after each use]

9.2 Storage

Respirator users are responsible for properly storing their respirators as covered in the Respirator Protection Safety Training (IH Report No. 98-012) [8CCR5144(h)(2) & (k)(1)(E)].

9.3 Periodic Inspection

Respirator users **shall** inspect their respirators before each use and during cleaning as covered in the Respirator Protection Safety Training (IH Report No. 98-012) [8CCR5144(h)(3) & (k)(1)(D)].

9.3.1 Additional Inspection Requirements for Emergency Use Respirators

Supervisors **shall** ensure that emergency use respirators are inspected as follows:

- check for proper function before and after each use [8CCR5144(h)(3)(A)]

- inspect at least monthly, and in accordance with manufacturer's recommendations; and certify the respirator by documenting inspection dates, the inspector's identification, findings, and remedial actions. The documentation **shall** be provided as a tag or label attached to the respirator's storage compartment or is included in inspection reports on paper or electronic files. This information **shall** be kept until replaced by a subsequent certification [8CCR5144(h)(3)(A&C)].
- Emergency escape-only respirators **shall** be initially inspected before bringing into the workplace for use [8CCR5144(h)(3)(A)].

9.4 Respirator Repair

Respirators which do not pass inspection **shall** be removed from service and brought to the supervisor's attention immediately [8CCR5144(h)(4)].

- Minor repairs (such as replacing valves for air-purifying respirators or replacing straps) **shall** be made as specified by the respirator manufacturer's instructions using the manufacturer's NIOSH-approved parts.
- No attempt **shall** be made to replace components, or make adjustments, modifications or repairs beyond the manufacturer's recommendation. If a respirator cannot be user-repaired according to manufacturer, the unit **shall** be disposed of or the manufacturer should be contacted for further assistance.
- Reducing and admission valves, regulators, and alarms **shall** be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

9.5 Breathing Air Quality For Supplied-Air Respirators/ SCBAs

Supervisors **shall** ensure that employees using atmosphere-supplying respirators (supplied-air and SCBA) be supplied with breathing gases of high purity [8CCR5144(i)]. Refer to Appendix C-Supplied-Air Respirator Use.

10.0 MEDICAL SURVEILLANCE

Before any employee is fit tested for required respirator use in the workplace, medical evaluation **shall** be provided to determine the employee's ability to use a respirator [8CCR5144(e)(1)]. A medical evaluation is not required for:

1. Voluntary use of filtering (N, P, or R 95/99/100) facepieces (dust masks).
2. Escape-only respirators.

10.1 Medical Evaluation

Employees and students **shall** be provided an initial medical evaluation to determine if they are medically able to use a respirator. Employees should contact our Occupational Health Provider and students should contact Vaden Health Center for their medical evaluation.

1. The initial medical evaluation will be conducted using the Respirator Medical Evaluation Questionnaire (SUMS-1c) provided in Appendix D.

2. Physician's review of SUMS-1c: For positive responses to any questions among questions 5-12 of Section 1, follow-up medical exam shall include any medical tests, consultations, or diagnostic procedures the physician deems necessary [8CCR5144(e)(3)(B)].

10.2 Provision of Supplemental Information to the Evaluating Physician (PLHCP)

Prior to making any determination regarding an employee's ability to wear a respirator, the evaluating physician **shall** be provided [8CCR5144(e)(5)]:

- A copy of the written SU Respirator Protection Program
- Specific information regarding the employee's respirator usage (refer to Appendix E - Respirator Use Profile and Appendix D - Respirator Medical Evaluation Questionnaire (SUMS-1c)).

10.3 Medical Determination

10.3.1 Required Elements

The PLHCP **shall** provide a written recommendation regarding the employee's ability to use the respirator. The recommendations shall provide only the following information [8CCR5144(e)(6)]:

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

10.3.2 Alternative Respirators

If the PLHCP identifies a medical condition that may place the employee's health at increased risk during assigned use of a negative pressure respirator [8CCR5144(e)(6)(B)]:

- a PAPR (powered air-purifying respirator) **shall** be approved for use if the PLHCP's evaluation indicates that a PAPR would be suitable; and
- the PLHCP must indicate in a written recommendation if a subsequent medical evaluation finds the employee medically able to use a negative pressure respirator.

10.4 Additional Medical Evaluations

Medical evaluations **shall** be promptly provided whenever [8CCR5144(e)(7)]:

- An employee reports medical signs or symptoms that affect his/ her ability to use a respirator;
- A PLHCP, supervisor, or the Respiratory Protection Program Administrator believes that an employee needs to be re-evaluated;
- Information from the Respiratory Protection Program Administrator, including observations made during fit testing and program evaluation, indicates a need for employee re-evaluation; or
- A change in workplace conditions (e.g., physical work effort, protective clothing, temperature) may result in a substantial increase in the physiological burden placed on an employee.

11.0 PROGRAM EVALUATION

As necessary, EH&S **shall** conduct workplace evaluations to ensure that provisions of the current written program are being effectively implemented [8CCR5144(l)(1)].

To assist in program evaluation, both voluntary and required respirator users must fill out a questionnaire (Appendix F- Respirator Use Annual Questionnaire) on an annual basis to communicate any problems or concerns regarding respirator use. Any problem that EH&S identifies from this questionnaire **shall** be corrected [8CCR5144(l)(2)].

12.0 RECORD KEEPING

The Respiratory Protection Program Administrator **shall** ensure that records of the following are maintained [8CCR5144(m)(1-4)]:

(1) Medical evaluation: EH&S will maintain the medical clearance form and the Occupational Health Physician will maintain the questionnaires and any additional documentation
(2) Respirator training (including completed Voluntary Respirator Use Information Sheets)
(3) Respirator fit testing
(4) Written copy of the current Respiratory Protection Program

The Supervisor **shall** ensure that records of the following are maintained [8CCR5144(m)(1-4)]:

(1) Respirator training (including completed Voluntary Respirator Use Information Sheets)
(2) Respirator inspection/maintenance records
(3) Monthly inspection record for emergency use respirators.

Appendix A: Voluntary Respirator Use Agreement

Stanford University Respiratory Protection Program
Voluntary Respirator Use Agreement

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

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

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

Employee Information (Please print clearly)

Employee Name (Last, First)	**Department/ Shop**
Respirator Type: _____ **Filtering Facepiece (disposable dust mask)** _____**Other:**	

I have read and understood the information provided above regarding voluntary respirator use.

_____ _____

Employee Signature **Date**

Appendix B: General Fit-Testing Procedure

Stanford University Respiratory Protection Program
General Fit-Testing Procedures

A. Fit Testing Procedures--General Requirements. Fit-testing **shall** conducted using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both qualitative and quantitative.

1. Prior to the selection process, the test subject **shall** be shown:
   - how to put on a respirator
   - how it should be positioned on the face
   - how to set strap tension
   - how to determine an acceptable fit

   A mirror **shall** be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

2. From the selection of pre-approved respirators, the test subject **shall** be asked to select the respirator type and size that provides the most acceptable fit.

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

4. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.5.

   If the test subject is not familiar with using a particular respirator, the test subject **shall** be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

5. Assessment of comfort **shall** include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
   - Position of the mask on the nose
   - Room for eye protection
   - Room to talk
   - Position of mask on face and cheeks

6. The following criteria **shall** be used to help determine the adequacy of the respirator fit:
   - Chin properly placed;
   - Adequate strap tension, not overly tightened;
   - Fit across nose bridge;
   - Respirator of proper size to span distance from nose to chin;
   - Tendency of respirator to slip;

- Self-observation in mirror to evaluate fit and respirator position.

7. The test subject **shall** conduct a user seal check, either the negative and positive pressure seal checks described in the Respiratory Protection Safety Training (IH Report No. 98-012) or those recommended by the respirator manufacturer which provide equivalent protection. Before conducting the negative and positive pressure checks, the subject **shall** be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece **shall** be selected and retested if the test subject fails the user seal check tests.

8. The test shall not be conducted if there is any hair growth and/ or clothing between the skin and the facepiece sealing surface.

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

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

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

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

13. Test Exercises.

(a) The following test exercises are to be performed for both fit testing methods described in Appendix B1 and B2. The test subject **shall** perform exercises, in the test environment, in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

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

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

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

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

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

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

(8) Normal breathing. Same as exercise (1).

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

Appendix B1: Bitrex™ Solution Aerosol Fit Test Protocol

Stanford University Respiratory Protection Program
Bitrex™ Solution Aerosol Fit Test Protocol

1. General

(a) The individual administering the Bitrex fit testing **shall** able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

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

2. Bitrex™ Solution Aerosol Qualitative Fit Test Protocol. Background: Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure **shall** be explained to the test subject prior to the conduct of the screening test.

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

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

(2) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor **shall** spray the Threshold Check Solution (3M Bitrex Sensitivity Solution) into the enclosure. This Nebulizer **shall** be clearly marked to distinguish it from the fit test solution nebulizer.

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

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

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

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

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

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

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

(b) Bitrex Solution Aerosol Fit Test Procedure.

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

(2) The fit test uses the same enclosure as that described in 2. (a)(1) above.

(3) The test subject **shall** don the enclosure while wearing the respirator selected according to the General Fit Testing Procedure in Appendix B. The respirator **shall** be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the 3M Fit Test Solution into the enclosure. This nebulizer **shall** be clearly marked to distinguish it from the sensitivity solution nebulizer.

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

(6) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes given with the Sensitivity Solution.

(7) After generating the aerosol, the test subject **shall** be instructed to perform the exercises in the General Fit Testing Procedure in Appendix B.

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

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

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

Appendix B2: Ambient Aerosol Portacount™ Fit Test Protocol

Stanford University Respiratory Protection Program
Ambient Aerosol Portacount™ Fit Test Protocol

1. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol. The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount TM) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. **A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator.** The entire screening and testing procedure **shall** be explained to the test subject prior to the conduct of the screening test.

(a) Portacount Fit Test Requirements.

(1) The test subject **shall** don the respirator selected according to the General Fit Testing Procedure in Appendix B. The respirator **shall** be properly adjusted and equipped with a particulate filtration rating of at least N95.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable.

(3) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(4) The test subject **shall** be instructed to perform the exercises in the General Fit Testing Procedure in Appendix B.

(5) After the test exercises, the test subject **shall** be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether

(2) A record of the test **shall** be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

Appendix C: Supplied-Air Respirator Use

Stanford University Respiratory Protection Program
Supplied-Air Respirator Use

Procedures For Use of Supplied-Air Respirators in IDLH Atmospheres [8CCR5144(g)(3)]

For all IDLH atmospheres, the Supervisor shall ensure the following:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere;
- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;
- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;
- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;
- The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation;
- Employee(s) located outside the IDLH atmospheres are equipped with:
  - Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
  - Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
  - Equivalent means for rescue where retrieval equipment is unsuitable.

Breathing Air Quality For Supplied-Air Respirators/ SCBAs

Supervisors shall ensure that employees using atmosphere-supplying respirators (supplied-air and SCBA) be supplied with breathing gases of high purity.

- The compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration shall meet the following specifications:
  - Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and
  - Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.

- The compressed oxygen shall not be used in atmosphere-supplying respirators that have previously used compressed air.
- Oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.
- Cylinders used to supply breathing air to respirators shall meet the following requirements:
  - Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178);
  - 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 the moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure.
- Compressors used to supply breathing air to respirators are constructed and situated so as to:
  - Prevent entry of contaminated air into the air-supply system;
  - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (-5.56 deg.C) below the ambient temperature;
  - 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.
  - 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.
- For compressors that are not oil-lubricated, the carbon monoxide levels in the breathing air shall not exceed 10 ppm.
- For oil-lubricated compressors, a high-temperature or carbon monoxide alarm, or both, shall be used 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.
- Breathing air couplings shall be incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.
- Only breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84, shall be used.

Appendix D: Respirator Medical Evaluation Questionnaire

SUMS FORM 1c

STANFORD UNIVERSITY

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE

Name (Last, First, M.I.)	Sex (M or F)	Age	Today's Date
Department/ Job Title		Work Phone Best time to call:	

INSTRUCTIONS: 1) Complete the necessary sections of this form;
2) Make a photocopy for your own records; and
3) Use the send the form to: Stanford University Occupational Health Center
480 Oak Rd.
Stanford, CA 94305-8007
MC 8007 for Internal Mail

RESPIRATOR USE INFORMATION (Employee must complete)

Type of respirator(s) used: Disposable Filter-Mask____ Air Purifying Half-face____ Air Purifying Full-face____ Airline____ SCBA____	
Frequency of respirator use: (Check one) Daily___ Weekly___ Monthly___ Yearly___	Duration of each respirator use: (Check one) Minutes____ Hours____
Additional protective equipment worn while wearing respirator:	
Working in hot or humid environments while wearing respirator? ___ Yes ___ No	
Level of physical exertion during respirator use: ___ Light (ex: Standing while operating a drill press) ___ Moderate (ex: Standing while nailing or filing, or lifting/ carrying a load of about 35 lbs.) ___ Heavy (ex: Shoveling, or lifting/ carrying a load of about 50 lbs.)	

Section 1 (Please print or circle yes/ no response):

1. Can you read English? …….. □ 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.
Has your employer told you how to contact the health care professional who will review this questionnaire?
□ Yes □ No

2. Your height: _____ ft. _____ in.

3. Your weight: _____ lbs.

4. Have you previously worn a respirator? …….. □ Yes □ No
If "yes," what type(s):

5. Do you currently smoke tobacco, or have you smoked tobacco in the last month? ……. □ Yes □ No

6. 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

7. 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

8. 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

9. 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

10. 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

11. 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

12. If you've used a respirator, have you ever had any of the following problems?
(If you've never used a respirator, check the following space and go to question 13) ____

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

13. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire? ……... □ Yes □ No

IF YOU ARE SELECTED TO USE EITHER A FULL-FACEPIECE RESPIRATOR OR A SELF-CONTAINED BREATHING APPARATUS (SCBA), COMPLETE SECTION 2 BELOW

Section 2 (QUESTIONS FOR FULL-FACEPIECE RESPIRATOR OR SCBA USERS)

1. Have you ever lost vision in either eye (temporarily or permanently) …….. □ Yes □ No

2. 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

3. Have you ever had an injury to your ears, including a broken ear drum ……. □ Yes □ No

4. 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

5. Have you ever had a back injury …….. □ Yes □ No

6. 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

Appendix E: Respirator Use Profile

Employee Name (Last, First, M.I.)	Last 4 of SSN
Department/ Job Title	Today's Date

Respirator Use Category:

___ Respiratory Protection Required ___ Voluntary Respirator Use

Type of respirator(s) assigned:

Disposable Filtering Facepiece____ Negative Pressure Half-face____ Negative Pressure Full-face____
PAPR____ Airline____ SCBA____

Frequency of respirator use: (Check one)	Duration of each respirator use: (Check one)
Daily___ Weekly___ Monthly___ Yearly___	Minutes____ Hours____

Additional protective equipment worn while wearing respirator:

___ Safety glasses/ goggles
___ Faceshield
___ Hardhat
___ Gloves
___ Earplugs
___ Earmuffs
___ Protective coveralls
___ Other(s):
_____

Working in hot or humid environments while wearing respirator? ___ Yes ___ No

Level of physical exertion during respirator use:

___ Light (ex: Sitting or standing to control machinery, performing light hand or arm work)
___ Moderate (ex: Walking about with moderate lifting and pushing)
___ Heavy (ex: Pick and shovel work, heavy manual handling)

Profile completed by:

_____ _____

EH&S IH/ Safety Staff Member Date

Appendix F: Respirator Use Annual Questionnaire

STANFORD UNIVERSITY
RESPIRATOR USE ANNUAL QUESTIONNAIRE

Name (Last, First, M.I.)	Last 4 of SSN
Department/ Job Title	Today's Date

RESPIRATOR FIT (explain any "No" answers below)

	Yes/ No
Do you feel your respirator provides a proper face to facepiece seal?	
Does your respirator allow you to work without affecting your work performance?	
Explain any "No" Responses:	

EFFECTIVE RESPIRATORY PROTECTION (explain any "No" answers below)

	Yes/ No
Do you feel your respirator works well in providing respiratory protection?	
Do you know when to replace your filter cartridges?	
Do you know what to do if your respirator fails during actual use?	
Explain any "No" Responses:	

RESPIRATOR MAINTENANCE (explain any "No" answers below)

	Yes/ No
Do you have a proper container and location to store your respirator?	
Do you wash your respirator often enough to keep it sanitary?	
Do you inspect your respirator before every use and during cleaning?	
Explain any "No" Responses:	

ADDITIONAL COMMENTS

Appendix G: Definitions and Acronyms

Respiratory Protection Program Definitions and Acronyms

Administrative Controls: Controls include limiting the length of time an employee is exposed to hazardous atmospheres.

Air-purifying respirator means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned protection factor (APF) is the minimum anticipated protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users. The APF for a respirator is assigned by NOISH and with the MUC helps to determined the appropriate respirator.

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

Canister or cartridge means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

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

EH&S means Stanford University Environmental Health and Safety Program who is designated as the Respiratory Protection Program Administrator.

Emergency situation means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

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

Engineering Controls: Controls may include working in fume hoods, enclosures, or modify work processes/equipment to decrease the exposure of hazardous atmospheres.

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

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

Filter or air purifying element means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering facepiece (dust mask) means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

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

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

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

High efficiency particulate air (HEPA) filter means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

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

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

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

Maximum use concentration (MUC) is the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC usually can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the NIOSH recommended exposure limit (REL), permissible exposure limit, short term exposure limit, ceiling limit, peak limit, or any other exposure limit used for the hazardous substance.

Negative pressure respirator (tight fitting) means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

National Institute of Occupational Safety and Health (NIOSH) is the agency which tests and certifies respirators.

Oxygen deficient atmosphere means an atmosphere with an oxygen content below 19.5% by volume.

Program Administrator means the Stanford University Environmental Safety and Health – Occupational Health and Safety Program

Physician or other licensed health care professional (PLHCP) means an individual whose legally permitted scope or practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by Sections 2.4 and 10.

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

Powered air-purifying respirator (PAPR) means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

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

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

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

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

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

Service life means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Supplied-air respirator (SAR) or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Tight-fitting facepiece means a respiratory inlet covering that forms a complete seal with the face.

User seal check means an action conducted by the respirator user to determine if the respirator is properly seated to the face.