



East Carolina University

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Respiratory Protection Program

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DISTRIBUTION:

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- Office of Prospective Health
- Affected Departments
- EH&S website (www.ecu.edu/oehs)

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East Carolina University

Respiratory Protection Program

1. Introduction

The East Carolina University's Office of Environmental Health and Safety (EH&S), has developed this Respiratory Protection Program in compliance with state and federal laws regulated by the Occupational Safety and Health Administration (OSHA). The basis of this standard found at 29 CFR 1910.134 requires the protection of all employees from respiratory hazards through proper selection and use of respirators. However, the use of such protection shall only apply after exhausting other engineering and/or administrative controls.

The respiratory protection is accessible to employees of the University whose responsibilities expose them to contaminants such as dusts, mists, fumes, gases, and toxic materials etc., to a concentration that is above the OSHA permissible exposure limits (PEL), or who are working in oxygen deficient environment.

2. Scope

This program applies to faculty, staff and other authorized personnel that require the use of respiratory protection based on exposure to hazardous environment. To satisfy the minimum requirements of the standard, OSHA requires every program content to cover some basic elements as listed:

- i. Adequate selection of respirators.
- ii. Medical evaluation to establish fitness and ability to use the respirators without restrictions.
- iii. Fit testing, for tight-fitting respirators.
- iv. Adequate air quality, air quantity and airflow for atmosphere-supplying respirators.
- v. Training on handling, use, storage and limitations of respirators.
- vi. Maintenance and inspection of respirators.
- vii. Program review and update.

3. Responsibilities

The following are responsible for the successful implementation of this program:

Office of Environmental Health and Safety shall be responsible for:

- i. Developing and periodically reviewing this program with its Industrial Hygienist or other approved EH&S staff as the "Respiratory Protection Administrator."
- ii. Identifying locations, work areas, processes or tasks that require protection, and evaluate respiratory hazards to ensure personnel have appropriate respirators.
- iii. Recommending appropriate respiratory protective equipment.
- iv. Scheduling and coordinating respirator fit-testing and training.
- v. Administering the medical surveillance program.
- vi. Providing supervision and guidance to principal investigators and/or supervisors in the selection and use of approved respirators.
- vii. Maintaining records of exposure assessments, training, and respirator fit testing.
- viii. Collaborating with Prospective Health for employee medical evaluation.

Office of Prospective Health shall be responsible for:

- i. Medical evaluation and maintenance of medical records.
- ii. Evaluating and fit testing employees for protection against infectious agents.
- iii. Documenting and maintaining medical surveillance records.
- iv. Determining the frequency of medical evaluation follow-up and notify EH&S for adequate program management.

Departmental Principal Investigators/ Supervisors shall be responsible for:

- i. Informing EH&S of work sites, labs or locations suspected to be contaminated.
- ii. Performing independent chemical hazard assessment and notify EH&S where the use of respiratory protection is needed.

- iii. Making the content of this program available to affected employees (new and existing) to understand respirable hazards and why they need to support the program.
- iv. Providing approved respirators to employee at no cost.
- v. Coordinating training and fit testing with the EH&S office.
- vi. Coordinating employee medical evaluation with the Office of Prospective Health.
- vii. Ensuring the goals of the program are met by making sure that respirators provided are adequately utilized and maintained.

Affected Employee or Respirator Users shall be responsible for:

- i. Adhering to the content of this program by utilizing provided respirators in a manner in which they were trained.
- ii. Notifying supervisors and/or EH&S of any harm or severe physical/medical changes arising from the use of respirators.
- iii. Ensuring proper maintenance of respirators: equipment must be cleaned, disinfected and properly stored.
- iv. Complying with supervisory instructions regarding the success of this program.
- v. Wearing only approved respirators as recommended.
- vi. Participating in training sessions.
- vii. Being responsive to medical surveillance.
- viii. Demanding results and records of assessments as necessary.

4. Procedures

The department shall prepare and maintain a hazard assessment report for personal protective equipment and a copy shall be forwarded to EH&S. Where respiratory protection is indicated, the department shall contact EH&S for confirmation of assessment and assistance in the identification of suitable respirator. The department shall also ensure employee completes the medical evaluation questionnaire and forward same to Prospective Health for evaluation.

Upon notification of medical clearance by Prospective Health, EH&S will provide appropriate respiratory protection training and a quantitative or qualitative fit test (for negative pressure respirators). Training will include:

- i. What respirator was selected and its intended purpose;
- ii. How to properly don, doff, adjust and wear the respirator;
- iii. Limitations of the respirator;
- iv. Proper care, maintenance and useful life of the respirator;
- v. How to perform negative and positive fit checks.
- vi. All training shall be documented by EH&S or PH as appropriate.
- vii. Respirator must be inspected before each use, cleaned and stored in a closed airtight storage bag on a flat surface out of direct sunlight, and maintained at regular intervals.

PROGRAM ELEMENTS

5. Hazard Assessment

The EH&S office through its program administrator will select adequate respirators only after the implementation of engineering and administrative controls prove unfeasible. Selection of respirators will be based on hazard assessment of the contaminated environment to determine the list and type of hazardous substance(s) present. In addition, a work process review will be made to determine where potential exposures to these substances may occur. This review will include but not limited to physical observation, workplace survey, process review, changes in work conditions, employee engagement and feedback.

Upon completion of hazard assessment, airborne concentrations of the hazardous agents will be estimated through air sampling to quantify potential hazardous exposures. Where possible, professional judgment and experience may also be used to predict airborne concentrations of hazardous agents. In the case of actual air sampling, monitoring shall be performed by EH&S.

Employees who feel they need respiratory protection must notify their supervisors or EH&S directly for attention. For such request, EH&S shall initially conduct a hazard evaluation of the worksite and inform employee and/or department of assessment results. If respiratory protection is necessary, all elements of this program will apply.

The hazard assessment will be revised and updated any time work process changes which may potentially affect exposure.

6. Respirator Selection

Only respirators certified by NIOSH (National Institute for Occupational Safety and Health) will be selected for use in the University. In addition to NIOSH-certified respirators, selected respirators must:

- i. be appropriate for the physical and chemical state/properties of the air concentration of the contaminant.
- ii. provide protection above the permissible exposure limits (PEL).
- iii. where necessary, provide protection against a potential oxygen-deficient IDLH (Immediately Dangerous to Life and Health) environment.
- iv. have all canisters, cartridges or filter media appropriate for the physical and chemical state of the contaminant.

Respirators for Immediately Dangerous to Life and Health (IDLH) atmospheres

If determined that employee will work in any IDLH environment or where an unknown respiratory hazard exists, a selection will be made from the following respirator types:

- i. A full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or
- ii. A combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.

Respirators provided only for escape from IDLH atmospheres shall also be NIOSH-certified. All oxygen-deficient atmospheres shall be considered IDLH except if it is established that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Appendix A, then any atmosphere-supplying respirator may be used.

Respirators for atmospheres that are not IDLH

An adequate respirator will be provided to protect employee and ensure compliance with OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

Respirator restrictions:

Respiratory protection equipment shall be used in accordance with required specifications, although some restrictions may apply. If certain physical or health conditions prevent obtaining a tight face seal for good performance, a respirator may not be worn. Some of these conditions include: facial hair, missing denture, eyeglasses etc. This condition shall only apply to respirators that rely on facepiece seal between the respirator inlet covering and underlying skin. Employee affected by any of these factors will be specially evaluated by EH&S and Prospective Health.

The following measures will apply to ensure proper use of the equipment:

- i. Employees with facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function will not be permitted to wear tight-fitting facepieces. Employees must be clean-shaven.
- ii. Employees with any condition that interferes with the face-to-facepiece seal or valve function will not be permitted to wear "tight-fitting facepieces".
- iii. If an employee wears corrective glasses, goggles or other personal protective equipment, such equipment must be worn in a manner that does not interfere with the seal of the facepiece to the face of the user.
- iv. Employees who wear tight-fitting respirators are required to perform a user seal check each time they put on the respirator.
- v. Each disposable respirator will be used until the cartridge or filter media requires replacement or until the facepiece is dirty.

7. Medical Evaluation

Medical evaluations shall be performed prior to the use of any selected respirators, except for voluntary users, in which case, it is recommended but not required. Employees are not permitted under any circumstance to wear respirators until it has been medically ascertained that they are fit to do so.

East Carolina University's Office of Prospective Health will provide medical evaluation to prospective user. This initial evaluation and eventual clearance will be valid as long as there is no change in the job requirements or the individual health status. This shall be closely monitored using the annual clearance assessment form (see Appendix B).

Employees will not be responsible for any fees or charges associated with this medical exam. Medical evaluation procedures are as follows:

- i. The medical evaluation will be conducted using the OSHA approved medical evaluation questionnaire. A follow-up medical examination will be provided for any employee who gives a positive response to any question among questions 1-8 in section 2, part A of the medical questionnaire or whose initial medical examination demonstrates the need for a follow-up medical examination.
- ii. Employee will be given a copy of the medical questionnaire to fill out, and will be permitted to fill out the questionnaire while at work.
- iii. Employee will be allowed the opportunity to speak with a Licensed Health Care Professional about their medical evaluation if they so request.
- iv. The program administrator will provide the responsible physician at the Office of Prospective Health or Licensed Health Care Professional (as may be required) a copy of this program and a copy of OSHA's respiratory protection standard. For each employee requiring evaluation, the physician/health care professional will be provided with information regarding the employee work area, job title, proposed respirator type and weight, length of time required to wear the respirator, expected physical work load (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing required.

After an employee has received clearance to wear a respirator, additional medical evaluations will be provided under any of the following circumstances:

- i. The employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing;
- ii. The health care professional or supervisor informs the Program Administrator that the employees needs to be reevaluated;
- iii. Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation; and
- iv. A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

NOTE: All examinations and questionnaires are to remain confidential between the employee and the physician and/or Licensed Health Care Professional.

8. Fit Testing

For protection against contaminants, employees who are required to use a tight-fitting facepiece must pass the appropriate qualitative fit test or quantitative fit test. This is to assure the expected level of protection is provided by minimizing the total amount of contaminant leaking into the facepiece. This shall be done prior to the equipment issuance and at least annually according to the standard. The fit tested respirator shall be the same type that the user would wear into the work environment. However, each time a new respirator model, manufacture type/brand, or size is required; or where there is a significant change in health/physical characteristic (e.g. facial change, surgery, eyeglasses loss of dentures) of a user, a fit test must be performed. Additional fit test will be conducted when a user reports that the fit of the respirator is unacceptable. In which case, a different respirator facepiece will be selected and retested for use. All fit tests will be administered according to OSHA-approved QLFT (Qualitative Fit Test) or QNFT (Quantitative Fit Test) protocols as contained in Appendix D of the Respiratory Standard (1910.134).

All records of fit testing are maintained by the Office of Environmental Health and Safety. Such records shall include:

- i. The name or identification of the employee tested;
- ii. Type of fit test performed;
- iii. Specific make, model, style, and size of respirator tested;
- iv. Date of test; and
- v. The pass/fail results

9. Use of Respirators

General Use Procedures

EH&S will ensure that the use of respirators in the University complies with the elements of this program. Users of tight fitting respirator must conduct user seal checks each time they have to use the respirator. A positive and negative pressure check (see Appendix D) shall be done to ensure a good seal is achieved. Employee shall be permitted to leave the work area to maintain their respirator for the following reasons: to clean their respirator if the respirator is impeding their ability to work, change filters or cartridges, replace parts, or to inspect respirator if it stops functioning as intended. Employees should notify their supervisor before leaving the area.

Employees are not permitted to wear tight fitting respirators if they have any condition, including headphones, jewelry, or other articles that may interfere with the facepiece to face seal.

10. Voluntary Use

In line with OSHA approval, this program shall allow employees who wish to use respiratory protection for personal comfort or wellbeing, even when it is established that there is no hazard present or form of exposure. All such "voluntary users" shall obtain approval from EH&S to ensure the respirator itself does not constitute a hazard to the employee or other employee.

Dust Mask (N95 and N100): Voluntary users of this type of respirators will be excluded from the requirement of being fit-tested annually or made to undergo medical clearance. Initial fit testing is however recommended to ensure proper respirator selection. Other voluntary users will be treated on a case-by-case basis, depending on specific workplace conditions and results of medical evaluations. EH&S will provide employee "volunteer" a copy of Appendix D of the standard. Employees choosing to wear a half facepiece air purifying respirators (APR) must comply with the procedures for medical evaluation, respirator use, and cleaning, maintenance and storage.

Respirator Malfunction

Employee must report any respirator malfunction such as breakthrough, facepiece leakage, improper working valve, etc., to their supervisor, and must immediately leave the work environment to a safe place. The supervisor must contact EH&S to ensure employee receives the needed parts or is provided a new respirator.

11. Maintenance and Care Procedures

To ensure respirators do not on their own constitute a hazard, it is necessary to establish and implement proper maintenance and care procedures and schedules. Users of respirators, based on this program, must be trained on proper care and maintenance for continuous protection. The following methods shall be employed in the maintenance of selected respirators:

Cleaning & Disinfecting

Only new, clean, sanitized and suitable working respirators are assigned for individual protection. Depending on respirator type, frequency of use and degree of exposure, respirators will be cleaned and disinfected immediately after leaving the work area to a routine weekly or monthly schedule. If in doubt, users can contact EH&S to determine maintenance schedules.

Respirators must be cleaned and disinfected using the procedures specified in Appendix E, or procedures recommended by the respirator manufacturer, provided such procedures are of equivalent effectiveness.

Respirators are cleaned and disinfected:

- i. As often as necessary when issued for the exclusive use of one employee;
- ii. Before being worn by different individuals;
- iii. After each use for emergency use respirators; and
- iv. After each use for respirators used for fit testing and training.

12. Storage

Proper storage of respirators must be done for adequate protection and use. Respirators must be stored in a clean, dry area and away from environmental conditions that may cause deterioration. It must also be protected from factors such as contaminants, dust, extreme temperatures, sunlight, damaging chemicals, moisture or any other conditions as stated in the manufacturer's instructions. Each part shall be stored separately in a sealed airtight plastic bag and placed in a separate box. Parts should not be suspended or pressed against walls as this might cause strain leading to part deterioration. EH&S will ensure that all unused respirators and parts (filter, cartridges, canisters, valves etc.) are stored in the original manufacturer's seal or bag until ready for use.

Emergency respirators must be stored:

- i. To be accessible to the work area;
- ii. In compartments or covers that are clearly marked as containing emergency respirators; and
- iii. In accordance with manufacturer's recommendations.

Respirator Inspection

Respirators will be inspected after each use and at least monthly depending on the type and the type of exposure. Defective respirators must not be worn, but returned to EH&S. Employee must not modify or repair respirators at any time. All such issues must be reported to supervisors or EH&S office.

Respirators shall be inspected as follows:

- i. All respirators used in routine situations shall be inspected before each use and during cleaning;
- ii. Respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with manufacturer's recommendations, and shall be checked for proper function before and after each use; and
- iii. Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

Respirator inspections shall include the following:

- i. A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; and
- ii. Check of elastomeric parts for pliability and signs of deterioration.

A checklist for routine or monthly inspections is contained in Appendix F.

Respirator Filter & Canister Replacement/Change Schedule

An important part of the Respiratory Protection Program includes identifying the useful life of canisters and filters used on air purifying respirators. Each filter and canister shall be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or if there is no ESLI appropriate for conditions, a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life.

Cartridges/Filters shall be changed based on the most limiting factor below:

- i. Prior to expiration date
- ii. Manufacturer's recommendations for use and environment
- iii. After each use
- iv. When requested by employee
- v. When restriction to air flow has occurred as evidenced by increased effort by user to breathe normally

Recommended cartridge change schedules which is based on OSHA's standard and manufacturer's recommendations is contained in Appendix G.

13. Training

EH&S shall perform training prior to respirator issuance, at the change of respiratory hazard and during annual fit testing. Supervisors will also be trained prior to using a respirator in the workplace or supervision of employees using respirators. The training objectives would ensure that employees and supervisors demonstrate good knowledge of this Respiratory Protection Program as well as OSHA Respiratory Protection Standard and their responsibilities. At least, the following items will be covered during the training session:

- i. Contents of the EH&S Respiratory Protection Program/ OSHA Respiratory Protection Standard
- ii. The unfeasibility of engineering controls and efforts to minimize the hazards and reduce the use of respirators.
- iii. The nature of respiratory hazards encountered and their health effects (this would include the nature of contaminants, exposure concentration, effects and symptoms caused by lack of respirators)
- iv. The need for proper selection and use of respirators
- v. Limitations of respirators
- vi. Respirator donning and user seal (fit) checks
- vii. Fit testing
- viii. Emergency use procedures
- ix. Maintenance and storage
- x. Medical signs and symptoms limiting the effective use of respirators

Employees must demonstrate understanding of the above-listed topics covered and may be made to undergo a hands-on exercise or written test. The EH&S office will document all trainings conducted including the respirator information (manufacturer, type, model, and size) of respirator for which each employee has been trained and fit tested.

14. Program Evaluation

EH&S shall conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluation will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and review of records. Identified problems will be noted and corrected by the EH&S office in making sure that the provisions of this program are being implemented effectively and continue to be effective.

15. Documentation and Recordkeeping

The EH&S office will maintain a copy of this program as well as the OSHA standard. In addition, copies of training and fit test records will be maintained and updated as necessary. Updates will be made as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted. The records that to be maintained shall include:

Name of employee

Date of fit test

Name and type of facepiece issued (as passed during fit-testing)

Certificate of medical clearance from Prospective Health

The ECU Office of Prospective Health will maintain copies of the medical records for employees covered under the Respirator Protection Program. The completed medical questionnaire and the physician's documented findings are confidential and will remain with Prospective Health. EH&S will only retain the physician's written recommendation regarding each employee's ability to wear a respirator. However, medical records will be made to the affected employee upon request.

Appendices:

**OSHA Respiratory Protection Standard

- A. Oxygen Concentration Range for Altitudes

- B. Annual Respirator Medical Assessment and Clearance Form

- C. OSHA Accepted Fit Test Protocols

- D. Respiratory User Seal Check

- E. Procedures for Cleaning Respirators

- F. Respirator Inspection Checklist

- G. Cartridge Change Schedule

**OSHA's Respiratory Protection Standard (29 CFR Part 1910.134) available at:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716

Appendix A

Oxygen Concentration Range for Altitudes

| Altitude (feet) | Oxygen deficient atmospheres (%O ₂) for which atmosphere supplying respirators may be used |
|-----------------|--|
| Less than 3,001 | 16.0 – 19.5 |
| 3,001 – 4,000 | 16.4 – 19.5 |
| 4,001 – 5,000 | 17.1 – 19.5 |
| 5,001 – 6,000 | 17.8 – 19.5 |
| 6,001 – 7,000 | 18.5 – 19.5 |
| 7,001 – 8,000* | 19.3 – 19.5 |

*Above 8000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

Appendix B

Annual Respirator Medical Assessment and Clearance Form

Office of Environmental Health & Safety

ANNUAL RESPIRATOR MEDICAL ASSESSMENT AND CLEARANCE FORM

Please complete all parts of this form by typing directly on the fillable text control as indicated. Completed form should be emailed directly to safety@ecu.edu

Last Name: [Click here to enter text.](#)

First Name: [Click here to enter text.](#)

Department: [Click here to enter text.](#)

Job Title: [Click here to enter text.](#)

Supervisor: [Click here to enter text.](#)

Email: [Click here to enter text.](#)

Please check as applicable:

I have had signs or symptoms (such as shortness of breath, dizziness, chest pains, or wheezing etc) for the past one year that affects my ability to use the respirator.

I have had changes in my health as it relates to [smoking](#) [medication](#) [pulmonary](#) [cardiac](#) [blood pressure](#) or other health changes

Prospective Health or a Licensed Health Care Professional (PLHCP) recommended a re-evaluation at my last medical evaluation.

My supervisor has observed a medical problem that impedes my ability to use the respirator.

Changes (such as physical work effort, type of respirator used, protective clothing, temperature etc.) have occurred in my office or workplace that has increased my physiological burden in using the respirator.

None of these apply to me, and since my last fit test, there have been no significant changes in my health status.

Employee Signature (Initial): [Click here to enter text.](#) **Date** [Click here to enter a date.](#)

For EH&S Use

Recommended for medical re-evaluation

Yes

No

Approved for fit testing with hazard assessment

Yes

No

Approved for fit testing without restrictions

Yes

No

Other Comments: [Click here to enter text.](#)

Appendix C

OSHA-Accepted fit test protocols

A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
 - (a) Position of the mask on the nose
 - (b) Room for eye protection
 - (c) Room to talk
 - (d) Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit:

- (a) Chin properly placed;
- (b) Adequate strap tension, not overly tightened;
- (c) Fit across nose bridge;
- (d) Respirator of proper size to span distance from nose to chin;
- (e) Tendency of respirator to slip;
- (f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

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

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

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

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

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

14. Test Exercises.

(a) Employers must perform the following test exercises for all fit testing methods prescribed in this appendix, except for the CNP quantitative fit testing protocol and the CNP REDON quantitative fit testing protocol. For these two protocols, employers must ensure that the test subjects (*i.e.*, employees) perform the exercise procedure specified in Part I.C.4(b) of this appendix for the CNP quantitative fit testing protocol, or the

exercise procedure described in Part I.C.5(b) of this appendix for the CNP REDON quantitative fit-testing protocol. For the remaining fit testing methods, employers must ensure that employees perform the test exercises in the appropriate test environment in the following manner:

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

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

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

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

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

Rainbow Passage

When the sunlight strikes raindrops in the air, they act 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.

(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 D

Respirator User Seal Check

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

I. Mask Positive and/or Negative Pressure Checks

A. Positive pressure check

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

B. Negative pressure check

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

II. Manufacturer's Recommended User Seal Check Procedures

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

Appendix E

Procedures for Cleaning Respirators

- A. Remove filters, cartridges, or canisters. Disassemble masks by removing speaking diaphragms, demand and pressure- demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- B. Wash components in warm (43 ° C [110 ° F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- C. Rinse components thoroughly in clean, warm, preferably running water.
- D. (1) When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
 - a. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of warm water; or,
 - b. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of warm water; or,
 - c. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- (2) Rinse components thoroughly in clean, warm, preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on masks may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- E. Components should be hand-dried with a clean lint-free cloth or air-dried.
- F. Reassemble mask, replacing filters, cartridges, and canisters where necessary.
- G. Test the respirator to ensure that all components work properly.

Appendix F

Respirators Inspection Checklist

Facepiece:

- i. cracks, tears, or holes
- ii. facemask distortion
- iii. cracked or loose lenses/faceshield

Headstraps:

- i. breaks or tears
- ii. broken buckles

Valves:

- i. residue or dirt
- ii. cracks or tears in valve material

Filters/Cartridges:

- i. approval designation
- ii. gaskets
- iii. cracks or dents in housing
- iv. proper cartridge for hazard

Air Supply Systems:

- i. breathing air quality/grade
- ii. condition of supply hoses
- iii. hose connections
- iv. settings on regulators and valves

Appendix G
Cartridge Change Guidelines

All air-purifying respirators used for protection against gases and vapors must have an end-of-service-life indicator (ESLI) or have a cartridge change schedule that is based on objective information or data to ensure that canisters or cartridges are changed before the end of their service life. The following change schedule is determined based on OSHA standards and manufacturer’s recommendations.

| CONTAMINANT | CHANGE OF SCHEDULE |
|----------------------------------|---|
| Acrylonitrile | End of shift |
| Ammonia | Maximum 8 hours use total (up to 125 ppm) |
| Benzene | Beginning of shift |
| Butadiene | every 1, 2, or 4 hours dependent on concentration (according to 29CFR1910.1051 Table 1), and at beginning of each shift |
| Formaldehyde | 3 hours or end of shift (whichever comes first) |
| HCl, SO ₂ , Chlorine | Maximum one shift |
| Methylene Chloride | No approved cartridges or canisters - must use supplied air |
| Nitric Acid | No approved cartridges or canisters - must use supplied air |
| Organic Vapors | Maximum 8 hours use total (up to 200 ppm) |
| Vinyl chloride | End of shift |
| All Cartridges for Emergency Use | Discard after use |
| HEPA filters | Restricted breathing or visibly dirty, wet, or compromised |
| Filtering dust masks | Visibly dirty/contaminated |