NYSNA Continuing Education

The New York State Nurses Association is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This course has been awarded 3.0 contact hours.

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How to Take This Course

Please take a look at the steps below; these will help you to progress through the course material, complete the course examination and receive your certificate of completion.

1. **REVIEW THE OBJECTIVES**

   The objectives provide an overview of the entire course and identify what information will be focused on. Objectives are stated in terms of what you, the learner, will know or be able to do upon successful completion of the course. They let you know what you should expect to learn by taking a particular course and can help focus your study.

2. **STUDY EACH SECTION IN ORDER**

   Keep your learning "programmed" by reviewing the materials in order. This will help you understand the sections that follow.

3. **COMPLETE THE COURSE EXAM**

   After studying the course, click on the "Course Exam" option located on the course navigation toolbar. Answer each question by clicking on the button corresponding to the correct answer. All questions must be answered before the test can be graded; there is only one correct answer per question. You may refer back to the course material by minimizing the course exam window.

4. **GRADE THE TEST**

   Next, click on "Submit Test." You will know immediately whether you passed or failed. If you do not successfully complete the exam on the first attempt, you may take the exam again. If you do not pass the exam on your second attempt, you will need to purchase the course again.

5. **FILL OUT THE EVALUATION FORM**

   Upon passing the course exam you will be prompted to complete a course evaluation. You will have access to the certificate of completion **after you complete the evaluation**. At this point, you should print the certificate and keep it for your records.

Introduction

The United States Department of Labor, Occupational Safety and Health Administration (OSHA) (2004), estimates that throughout the US, 5 million workers are required to wear respirators in 1.3 million workplaces. Respirators protect workers against insufficient oxygen environments, harmful dusts, fogs, smokes, mists, gases, vapors, and sprays. Respiratory hazards include pathogens and particulates that are harmful to those who are exposed to them. These hazards may cause cancer, lung impairment, other diseases, or death.

Since long before the days of Florence Nightingale, providing care to patients has always carried a risk to the nurse. As the pathogen that causes a disease has been identified, managed or eliminated, the risk to healthcare providers has changed over the years. What has not changed is the need for protection against the pathogens that can impact the nurse's own health and the health of patients.

Compliance with the OSHA Respiratory Protection Standard (29 CFR 1910.134) could avert hundreds of deaths and thousands of illnesses annually. This course presents a model program for respiratory protection. The purpose of this course is to provide nurses with information regarding the protection of their respiratory health; and to provide a sample program so that employers and employees can comply with the Respiratory Protection Standard thereby maintaining the health and safety of staff and patients.

This model is presented to provide guidance only. The Respiratory Protection Standard specifies only the minimum requirements for an effective respiratory protection program. Employers are encouraged to exceed these minimum criteria if doing so enhances the safety and health of their employees.

About the Author

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Thomas Lowe is the Health and Safety Representative for the New York State Nurses Association. He obtained a master's in Public Health from New York Medical College, a bachelor's in Social Sciences from St. Bonaventure University and an associate's in Nursing from Rockland Community College. Tom is a Certified Occupational Health Nurse Specialist and a Certified Occupational Health & Safety Technician.

Tom has developed and taught workshops on a state, regional and national level on a variety of Health and Safety topics including: Vaccine Preventable Disease in Public Safety Workers, Crisis Intervention for First Responders, Emergency Preparedness for Nurses, Violence in the Workplace, Hepatitis A thru C, Infection Control, and Managing the Rehab Sector of Incident Command.

In his spare time Tom volunteers as an Assistant Chief with the Harriman Volunteer Fire Department. He also holds the position of Deputy Commander of the NY-4 Disaster Medical Assistance Team, part of the National Disaster Medical System under the Department of Homeland Security. Tom also serves on the Board of Directors for the New York State Association of Occupational Health Nurses.

Objectives

Upon completion of this course, the learner will be able to:

- Define the revised OSHA Respiratory Protection Standard that went into effect on July 2, 2004.
- Discuss the purpose of the Respiratory Protection Standard.
- Describe various respirators and their uses.
- Identify components of the respiratory protection plan.
- Describe how to rate your own facility's compliance with the standard.

What is the Respiratory Protection Standard?

OSHA's revised Respiratory Protection Standard went into effect April 8, 1998. The final standard replaces the respiratory protection standards adopted by OSHA in 1971 (1910.134 and 1926.103). The 1910.139 respirator standard that applied only to respiratory protection against Mycobacterium Tuberculosis was withdrawn December 31, 2003. Establishments whose respirator protection programs for tuberculosis formerly covered under 29 CFR 1910.139 were required to adapt their programs to comply with the requirements of 29 CFR 1910.134, effective July 2, 2004.

The Respiratory Protection Standard (29 CFR 1910.134) requires employers to establish and maintain a respiratory protection program to protect their respirator-wearing workers. The revised standard incorporates new scientific principles and technologies that have emerged since 1971. Because of advances in technology, many areas in the previous standard had become outdated.

This standard is intended to:

- Enhance the protection of worker health.
- Promote more effective use of respirators.
- Make it easier to comply with its provisions.
- Make it easier to understand the policy and procedures to follow when implementing a respiratory protection program.

Definitions

APR - Air Purifying Respirator. These can be either half face or full face. It has a filter which purifies air that has adequate oxygen (between 19.5% & 24%). This type of respirator is considered a negative pressure respirator because when the user breathes in, the atmospheric pressure inside the device is negative relative to outside the respirator.

Decon - Decon is industry jargon and is short for **Decontamination**. Decon refers to the procedure that is used to clean hazardous materials from people and equipment.

Hazmat - Hazmat is also industry jargon; it is the abbreviation for **Hazardous Materials**.

IDLH - The abbreviation for **Immediately Dangerous to Life and Health**. Under the final standard's definition, atmospheres where a short, one-time exposure (i.e., an acute exposure) may cause death or irreversible adverse health effects immediately, within a few hours, or within a few days or weeks, are considered IDLH atmospheres.

PAPR - Powered Air Purifying Respirator. This type of respirator does not supply oxygen and so must be used when there is sufficient oxygen. PAPR's can either be tight fitting half or full face mask or loose fitting hood style and have a small fan that draws air through the filters and pushes the filtered air into the mask or hood on a continuous basis.

PLHCP – This is the abbreviation for **Professionally Licensed Health Care Professional**.

QLFT - QLFT is the abbreviation for **Qualitative Fit Test**. Fit testing is a requirement of the Respiratory Protection Standard and the QLFT is used for respirators used in most situations because it is economical, does not require special equipment and provides an adequate assessment of the fit of the respirator to the user.

QNFT - QNFT is the abbreviation for **Quantitative Fit Test**. This type of fit test requires specialized equipment that measures a differential of test particles inside the respirator to those outside. QNFT is required for tight fitting respirators used in IDLH atmospheres, such as would be encountered in a Hazmat environment.

SCBA - SCBA is the abbreviation for **Self Contained Breathing Apparatus** which is a specific type of supplied air respirator.

What is a Respirator?

Before addressing the respiratory protection program, it is important to identify and define respirators. Respirators are devices that protect workers from inhaling harmful substances. These substances can be in the form of airborne vapors, gases, dust, fogs, fumes, mists, smokes, or sprays. They can also be in the form of allergens or pathogens like mold and dander or bacteria and viruses. Some respirators also ensure that workers do not breathe air that contains dangerously low levels of oxygen. Respirators provide protection only from respiratory hazards when they are used properly.

There are two major types of respirators:

1. Air-purifying respirators, which remove contaminants from the air. They have filters, cartridges, or canisters that remove contaminants from the air by passing the ambient air through the air-purifying element before it reaches the user. There are three basic styles of APR's: tight fitting half or full face and loose fitting hood style (used with a power unit designed to move air through the filter and into the hood).

2. Atmosphere-supplying respirators, which provide clean air directly to the user from an uncontaminated source, rather than the surrounding air. There are basically two styles: SCBA and Supplied Air Respirator (SAR).

N95, N99, N100 - Three categories exist for filter efficiency and each category has three possible oil degradation resistances that may be selected and matched with filter efficiency. Each of the nine resulting respirator categories is designated by a code in which a letter -- N, R or P -- represents its oil resistance and a number -- 95, 99 or 100 -- represents filter efficiency.

	Respirator Categories		
	Oil Resistance		
Filter Efficiency	**N-series particulate filters Not resistant to oil.**	**R-series particulate filters Oil-resistant.**	**P-series filters Oil-proof.**
95%	N95 Not resistant to oil. May be used for solid particulate or liquid particulate hazards. No time limitations. Moderate filter efficiency.	R95 Oil-resistant. May be used for solid and liquid particulate hazards. Time limitation: 8 hours or manufacturer recommendation. Moderate filter efficiency.	P95 Oil-proof. Time limitation: manufacturer recommendation, usually more than 8 hours. Moderate filter efficiency.
99%	N99 Not resistant to oil. May be used for solid particulate or liquid particulate hazards. No time limitations. High filter efficiency.	R99 Oil-resistant. May be used for solid and liquid particulate hazards. Time limitation: 8 hours or manufacturer recommendation. High filter efficiency.	P99 Oil-proof. Time limitation: manufacturer recommendation, usually more than 8 hours. High filter efficiency.
99.97%	N100 Not resistant to oil. May be used for solid particulate or liquid particulate hazards. No time limitations. Very high filter efficiency.	R100 Oil-resistant. May be used for solid and liquid particulate hazards. Time limitation: 8 hours or manufacturer recommendation. Very high filter efficiency.	P100 Oil-proof. Time limitation: manufacturer recommendation, usually more than 8 hours. Very high filter efficiency. NOTE: long-term exposure to oil can lower efficiency to 95%.

Reprinted from Clemson University, Pesticide Information Program, accessed at http://entweb.clemson.edu/pesticid/saftyed/respclas.html.

What is a Respiratory Protection Program?

A respiratory protection program is a written, cohesive, comprehensive collection of worksite-specific procedures and policies that addresses all respiratory protection elements required by the standard. For example, a respiratory protection program must contain specific procedures describing how respirators will be selected, fitted, used, maintained and inspected in a particular workplace, as well as making provisions for the medical clearances for the users.

When is the Facility Required to Establish a Respiratory Protection Program?

Generally, whenever the employer requires employees to wear respirators, the facility is required to establish a respiratory protection program. For example, the establishment of a respiratory protection program may be needed if:

- Employees work in situations where the level of oxygen is insufficient, or potentially insufficient.
- Employees are potentially exposed to harmful levels of hazardous gases or vapors.
- Employees are exposed to other potential respiratory hazards, such as dust, mists, fumes, sprays, and other airborne particulates.
- Preferred and more permanent, effective measures to control respiratory hazards are either not feasible or in the process of being implemented. These preferred methods include:

    - Engineering controls, such as ventilation.
    - Substituting non-hazardous materials for the materials that pose respiratory hazards.
    - Administrative controls, such as scheduling workers for shorter exposure durations or when the hazard is at it's least dangerous level.

How does the new standard differ from the old standard that it replaces?

The new standard is different from the old standard in a number of ways. The new standard:

- Contains new provisions that recognize the needs of small workplaces.
- Requires written respiratory protection programs to include work-site specific procedures.
- Requires that a qualified "program administrator" oversee the respiratory protection.

The new standard requires that the Respiratory Protection Program provides:

- Definitions that will eliminate confusion about terminology and how these terms apply to respirators and their use.
- Criteria for selecting respirators.
- Clear language on the requirement for medical examinations of workers and the use of medical questionnaires.
- Requires employers to perform a hazard determination to identify respiratory hazards and work conditions and allows for proper selection of the respirator to be used.
- Requires annual fit testing for all tight-fitting respirators, and includes protocols for fit testing.
- Addresses the use of respirators in situations that OSHA characterizes as Immediately Dangerous to Life or Health (IDLH).

Evaluation of Your Facility's Compliance with the Respiratory Protection Standard

The following checklists are provided to be used to determine if a facility is in compliance with the OSHA Respiratory Protection Standard (29 CFR 1910.134). Employees of healthcare facilities should review these checklists to ensure that your facility is in compliance.

Checklist for Respiratory Protection Programs

Check to ensure that your facility has:

___ A written respiratory protection program that is specific to your workplace and covers the following:
___ Procedures for selecting respirators.
___ Medical evaluations of employees required to wear respirators.
___ Fit testing procedures.
___ Routine use and emergency respirator use procedures.
___ Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators.
___ Procedures for ensuring adequate air quality for supplied air respirators.
___ Training in respiratory hazards.
___ Training in proper use and maintenance of respirators.
___ Program evaluation procedures.
___ Procedures for ensuring that workers who voluntarily wear respirators (excluding filtering facepieces) comply with the medical evaluation, cleaning, storing & maintenance requirements of the standard.
___ A designated program administrator who is qualified to administer the program.
___ Updated the written program as necessary to account for changes in the workplace affecting respirator use.
___ Provided equipment, training, and medical evaluations at no cost to employees.
___ Respiratory hazards have been identified and evaluated.
___ Employee exposures that have not been, or cannot be, evaluated are considered immediately dangerous to life or health (IDLH).
___ Respirators are NIOSH certified, and used under the conditions of certification.
___ Respirators are selected based on the workplace hazards evaluated and workplace and user factors affecting respirator performance and reliability.
___ A sufficient number of respirator sizes and models are provided to correctly fit the users.

For Immediately Dangerous to Life and Health (IDLH) atmospheres:

___ Full facepiece pressure demand supplied-air respirator (SARs) with auxiliary self-contained breathing apparatus (SCBA) unit or full facepiece pressure demand SCBAs, with a minimum service life of 30 minutes, are provided.
___ Respirators used for escape only are National Institute for Occupational Safety and Health (NIOSH) certified for the atmosphere in which they will be used.
___ Oxygen deficient atmospheres are considered IDLH.

For Non-IDLH atmospheres:

___ Respirators selected are appropriate for the chemical state and physical form of the contaminant.
___ Air-purifying respirators used for protection against gases and vapors are equipped with end-of-service-life indicator (ESLIs) or a change schedule has been implemented.
___ Air-purifying respirators used for protection against particulates are equipped with NIOSH-certified high efficiency particulate air (HEPA) filters or other filters certified by NIOSH for particulates under 42 CFR part 84.

Checklist for Medical Evaluation

Check that at your facility:

___ All employees have been evaluated to determine their ability to wear a respirator prior to being fit tested for or wearing a respirator for the first time.
___ A physician or other licensed health care professional (PLHCP) has been identified to perform the medical evaluations.
___ The medical evaluations obtain the information requested in Sections 1 and 2, Part A of Appendix C of the standard, 29 CFR 1910.134 (See Appendix C of this course).
___ Employees are provided follow-up medical exams if they answer positively to any of questions 1 through 8 in Section 2, Part A of Appendix C, or if their initial medical evaluation reveals that a follow-up exam is needed (See Appendix C of this course).
___ Medical evaluations are administered confidentially during normal work hours, and in a manner that is understandable to employees.
___ Employees are provided the opportunity to discuss the medical evaluation results with the physician or other PLHCP.

The following supplemental information is provided to the PLHCP before they make a decision about respirator use:

___ Type and weight of the respirator.
___ Duration and frequency of respirator use.
___ Expected physical work effort.
___ Additional protective clothing to be worn.
___ Potential temperature and humidity extremes.
___ Written copies of the respiratory protection program and the Respiratory Protection standard.
___ Written recommendations are obtained from the PLHCP regarding each employee's ability to wear a respirator, and that the PLHCP has given the employee a copy of these recommendations.
___ Employees who are medically unable to wear a negative pressure respirator are provided with a power air-purifying respirator (PAPR) if they are found by the PLHCP to be medically able to use a PAPR.

Employees are given additional medical evaluations when:

___ The employee reports symptoms related to his or her ability to use a respirator.
___ The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
___ Information from the respiratory protection program suggests a need for reevaluation.
___ Workplace conditions have changed in a way that could potentially place an increased burden on the employee's health.

Checklist for Fit-Testing

Check that at your facility:

___ Employees who are using tight fitting respirator facepieces have passed an appropriate fit test prior to being required to use a respirator.
___ Fit testing is conducted with the same make, model, and size that the employee will be expected to use at the worksite.
___ Fit tests are conducted annually and when different respirator facepieces are to be used.
___ Provisions are made to conduct additional fit tests in the event of physical changes in the employee that may affect respirator fit.

___ Employees are given the opportunity to select a different respirator facepiece, and be retested, if their respirator fit is unacceptable to them.
___ Fit tests are administered using OSHA-accepted quantitative fit test (QNFT) or qualitative fit test (QLFT) protocols.
___ QLFT is only used to fit test either PAPRs, SCBAs, or negative pressure APRs that must achieve a fit factor of 100 or less.
___ QNFF is used in all situations where a negative pressure respirator is intended to protect workers from contaminant concentrations greater than 10 times the PEL.
___ When QNFT is used to fit test negative pressure respirators, a minimum fit factor of 100 is achieved for tight-fitting half-facepieces and 500 for full-facepieces.

For tight-fitting atmosphere-supplying respirators and powered air-purifying respirators:

___ Fit tests are conducted in the negative pressure mode.
___ QLFT is achieved by temporarily converting the facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure APR.
___ QNFT is achieved by modifying the facepiece to allow for sampling inside the mask midway between the nose and mouth. The facepiece is restored to its NIOSH approved configuration before being used in the workplace.

Checklist for Proper Use of Respirators

Check your facility to be certain that:

___ Workers using tight-fitting respirators have no conditions, such as facial hair, that would interfere with a face-to-facepiece seal or valve function.
___ Workers wear corrective glasses, goggles, or other protective equipment in a manner that does not interfere with the face-to-facepiece seal or valve function.
___ Workers perform user seal checks prior to each use of a tight-fitting respirator.
___ There are procedures for conducting ongoing surveillance of the work area for conditions that affect respirator effectiveness, and that, when such conditions exist, you take steps to address those situations.
___ Employees are permitted to leave their work area to conduct respirator maintenance, such as washing the facepiece, or to replace respirator parts.
___ Employees do not return to their work area until their respirator has been repaired or replaced in the event of breakthrough, a leak in the facepiece, or a change in breathing resistance.

Checklist for Respirator Maintenance and Care

Check to make sure that your facility has met the following requirements:

Cleaning and Disinfecting
___ Respirators are provided that are clean, sanitary, and in good working order.
___ Respirators are cleaned and disinfected using the procedures specified in Appendix B- 2 of the standard. Respirators are cleaned and disinfected:
___ As often as necessary when issued for the exclusive use of one employee.
___ Before being worn by different individuals.
___ After each use for emergency use respirators.
___ After each use for respirators used for fit testing and training.

Storage
___ Respirators are stored to protect them from damage from the elements, and from becoming deformed.
Emergency respirators are stored:

___ To be accessible to the work area.
___ In compartments marked as such.
___ In accordance with manufacturer's recommendations.

Inspections
___ Routine-use respirators are inspected before each use and during cleaning.
___ SCBAs and emergency respirators are inspected monthly and checked for proper function before and after each use.
___ Emergency escape-only respirators are inspected before being carried into the workplace for use.

Inspections include:
___ Check of respirator function.
___ Tightness of connections.
___ Condition of the facepiece, head straps, valves, and cartridges.
___ Condition of elastomeric parts.
___ For SCBAs, inspection includes checking that cylinders are fully charged, and that regulators and warning devices function properly.
___ Emergency use respirators are certified by documenting the inspection, and by tagging the information either to the respirator or its compartment, or storing it with inspection reports.

Repairs
___ Respirators that have failed inspection are taken out of service.
___ Repairs are made only by trained personnel.
___ Only NIOSH-approved parts are used.
___ Reducing and admission valves, regulators and alarms are adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Training and Information Checklist

Check that employees can demonstrate knowledge of:

___ Why the respirator is necessary and the consequences of improper fit, use, or maintenance.
___ Limitations and capabilities of the respirator.
___ How to effectively use the respirator in emergency situations.
___ How to inspect, put on, remove, use, and check the seals of the respirator.
___ Maintenance and storage procedures.
___ The general requirements of the respirator standard.
___ Training is understandable to employees.
___ Training is provided prior to employee use of a respirator.

Retraining is provided:
___ Annually.
___ Upon changes in workplace conditions that affect respirator use.
___ Whenever retraining appears necessary to ensure safe respirator use.
___ Appendix D of the standard is provided to voluntary users.

Program Evaluation Checklist

Check that at your facility:

___ Workplace evaluations are being conducted as necessary to ensure that the written respiratory protection program is being effectively implemented.

___ Employees required to wear respirators are being regularly consulted to assess the employees' views & to identify problems with respirator fit, selection, use & maintenance.
___ Any problems identified during assessments are corrected.

Recordkeeping Checklist

Check that at your facility:

___ Records of medical evaluations have been retained.
___ Fit testing records have been retained.
___ A copy of the current respiratory protection program has been retained.
___ Access to these records is provided to affected employees.

Sample Respiratory Protection Program

In addition to the previous checklists that nurses can use to evaluate their employer's compliance with the Respiratory Protection Standards, the next section of this course provides a sample Respiratory Protection Program for a **fictional** community hospital.

Disclaimer: The following sample Respiratory Protection Program is for demonstration purposes only. Community Service Hospital is not intended to represent an actual facility. The hospital is a hypothetical facility that has been chosen for interpretation of certain provisions of 29 CFR 1910.134 in ways that could be different from the way another hospital might choose to implement it. It is provided here for training purposes.

Community Service Hospital
Respiratory Protection Program

1.0 Purpose

Community Service Hospital has determined that employees who care for, or service equipment used by, respiratory patients and who are exposed to respiratory hazards during routine activities and in emergency situations will be required to wear respiratory protection. These hazards include dust, particulates, vapors, biologicals, and aerosols.

The purpose of this program is to ensure that all Hospital employees are protected from exposure to these respiratory hazards.

Engineering controls, such as ventilation and substitution of less toxic materials, are the first line of defense; however, engineering controls have not always been feasible for some of the operations, or have not always completely controlled the identified hazards. In these situations, respirators and other protective equipment must be used. The activities requiring respirator use at the Hospital are outlined in Table 1 in the Scope and Application section of this program. In addition, some employees have expressed a desire to wear respirators during certain operations that do not require respiratory protection. As a general policy, the hospital will review each of these requests on a case-by-case basis. If the use of respiratory protection in a specific case will not jeopardize the health or safety of the worker(s), the hospital may provide respirators for voluntary use. As outlined in the Scope and Application section of this program, voluntary respirator use is subject to certain requirements of this program.

2.0 Scope and Application

This program applies to all employees who are required to wear respirators during normal work operations. This includes employees who care for respiratory patients or service equipment used by respiratory patients. All employees working in these areas and engaged in certain processes or tasks (as outlined in the table below) must be enrolled in the hospital's respirator protection program.

In addition, any employee who voluntarily wears a respirator when a respirator is not required is subject to the medical evaluation, cleaning, maintenance, and storage elements of this program, and must be provided with certain information specified in this section of the program. Employees participating in the respiratory protection program do so at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment will be borne by the hospital.

Table 1. Voluntary and Required Respirator Use at Community Service Hospital

- Filtering facepiece (dust mask) - Voluntary use for facility service workers;

- N95 or N100 or Half-facepiece APR or PAPR with P100 filter - Nurses, Aides and Physicians caring for patients with TB and other respiratory diseases;
- N95 or N100 - technicians servicing respiratory equipment when aerosolization of contaminants may happen;
- Half-facepiece APR - HazMat Patient De-Con Team member response

3.0 Responsibilities

Program Administrator

The Program Administrator is responsible for administering the respiratory protection program. Duties of the program administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards.
- Selection of respiratory protection options.
- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Arranging for and/or conducting training.
- Ensuring proper storage and maintenance of respiratory protection equipment.
- Conducting qualitative fit testing with Bitrex.
- Administering the medical surveillance program.
- Maintaining records required by the program.
- Evaluating the program.
- Updating written program, as needed.

The Program Administrator for Community Service Hospital is Mrs. Regina Haskell.

Supervisors and Unit Managers

Supervisors are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees under their charge.

Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing, and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection plan.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

Employees

Each employee has the responsibility to wear their respirator when and where required and in the manner in which they were trained. Employees must also:

- Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
- Inform their supervisor if the respirator no longer fits well, and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.

4.0 Program Elements

Selection Procedures

The Program Administrator will select respirators to be used on site, based on the hazards to which workers are exposed and in accordance with all OSHA and State standards. The Program Administrator will conduct a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluation will include:

1. Identification and development of a list of hazardous substances used in the workplace, by department, or work process.
2. Review of work processes to determine where potential exposures to these hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing records, and talking with employees and supervisors.
3. Exposure monitoring to quantify potential hazardous exposures. Monitoring will be contracted out. Community Service Hospital currently has a contract with ABC Industrial Hygiene Services to provide monitoring when needed.

Updating the Hazard Assessment

The Program Administrator must revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure). If an employee feels that respiratory protection is needed during a particular activity, they are to contact their supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard (with outside assistance as necessary). The Program Administrator will then communicate the results of that assessment back to the employees. When determined that respiratory protection is necessary, all other elements of this program will be in effect for those tasks & this program will be updated accordingly.

NIOSH Certification

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.

Voluntary Respirator Use

Community Service Hospital will provide respirators at no charge to employees for voluntary use for the following work processes:

- Employees may wear half-facepiece APRs with organic vapor cartridges while working in the Power Plant for certain maintenance activities. (i.e. boiler cleaning, gasket and seal replacements);
- Warehouse and Central Supply workers may wear filtering facepieces;

- Maintenance personnel may wear half-facepiece APRs with P100 cartridges while cleaning equipment or working on general maintenance above the ceiling tile grid system.

The Program Administrator will provide all employees who voluntarily choose to wear either of the above respirators with a copy of Appendix D of the standard. (Appendix D details the requirements for voluntary use of respirators by employees.) Employees choosing to wear a half facepiece APR must comply with the procedures for Medical Evaluation, Respirator Use, and Cleaning, Maintenance and Storage.

The Program Administrator shall authorize voluntary use of respiratory protective equipment as requested by all other workers on a case-by-case basis, depending on specific workplace conditions and the results of the medical evaluations.

Medical Evaluation

Employees who are either required to wear respirators, or who choose to wear an APR voluntarily, must pass a medical exam before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has determined that they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use. Employees are advised that in certain areas (i.e. Emergency Department Respiratory Isolation Room) the use of a respiratory is an essential part of the job function.

A licensed health care professional (the certified hospital infection control nurse) will provide the medical evaluations. Medical evaluation procedures are as follows:

- The medical evaluation will be conducted using the questionnaire provided in Appendix C of the respiratory protection standard (available in Appendix C of this course). The Program Administrator will provide a copy of this questionnaire to all employees requiring medical evaluations. To the extent feasible, the hospital will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee will be sent directly to the nurse for medical evaluation. All affected employees will be given a copy of the medical questionnaire to fill out, along with a stamped and addressed envelope for mailing the questionnaire to the hospital infection control nurse.

- Employees will be permitted to fill out the questionnaire on hospital time.

- Follow-up medical exams will be granted to employees as required by the standard, and/or as deemed necessary by the Infection control nurse.

- All employees will be granted the opportunity to speak with the nurse or physician about their medical evaluation, if they so request.

- The Program Administrator has provided the Infection control nurse with a copy of this program, a copy of the Respiratory Protection Standard, the list of hazardous substances by work area, and, for each employee requiring evaluation:

    - their work area or job title;
    - proposed respirator type and weight;
    - length of time required to wear respirator;
    - expected physical work load (light, moderate, or heavy);
    - potential temperature and humidity extremes; and

- any additional protective clothing required (i.e. HazMat Patient De-Con Team).

Any employee required for medical reasons to wear a positive pressure air purifying respirator will be provided with a powered air purifying respirator.

After an employee has received clearance and begun to wear their respirator, additional medical evaluations will be provided under the following circumstances:

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

All examinations and questionnaires are to remain confidential between the employee and the nurse or physician.

Fit Testing

Fit testing is required for employees wearing full or half-facepiece powered air-purifying respirator (PAPRs) N95 and N100 respirators.
Employees will be fit tested:

- Prior to being allowed to wear any respirator with a tight fitting facepiece.
- Annually.
- When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.).

Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit. Fit testing of PAPRs is to be conducted in the negative pressure mode.
The Program Administrator will conduct fit tests following the approved Bitrex Solution Aerosol QLFT Protocol in Appendix A (B4b) of the Respiratory Protection Standard.

The Program Administrator has determined that quantitative fit test, QNFT, is not required for the respirators used under current conditions at Community Service Hospital. If conditions affecting respirator use change, the Program Administrator will evaluate on a case-by-case basis whether QNFT is required.

Respirator Use

Respiratory protection is required for the following personnel:

Table 2. Hospital Personnel in Respiratory Protection Program

Job Description	ALL patient care personnel taking care of patients with respiratory diseases
	Maintenance personnel servicing equipment where respiratory airborne hazards exist
	Respiratory therapy and Biomedical Personnel who use, service or adjust filters of respirator equipment when aerosolization of biohazards is possible
	HazMat Patient Decon team members

General Use Procedures

Employees will use their respirators under conditions specified by this program, and in accordance with the training they receive on the use of each particular model. In addition:

- The respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.
- All employees shall conduct user seal checks each time that they wear their respirator.
- Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the Respiratory Protection Standard.
- All employees shall be permitted to leave the work area to go to the locker room to maintain their respirator for the following reasons: to clean their respirator if the respirator is impeding their ability to work, to change filters or cartridges, to replace parts, or to inspect the 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, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal.
- Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the facepiece-to-face seal.

Respirator Malfunction

*APR or **PAPR** Respirator Malfunction*:

For any malfunction of an APR (e.g., such as breakthrough, facepiece leakage, or improperly working valve), or of a PAPR (e.g., power pack failure) the respirator wearer should immediately exit the area and go to the designated safe area to maintain the respirator. The wearer is to inform their supervisor that the respirator no longer functions as intended. The supervisor must ensure that the employee has a replacement respirator and that the needed repair to the malfunctioning respirator is completed.

Cleaning, Maintenance, Change Schedules and Storage

Cleaning

Serviceable and reusable respirators are to be regularly cleaned and disinfected at the designated respirator cleaning station located in the employee locker room.

Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary. One time use, N95 and N100 respirators are to be discarded in BioHazard containers after each shift or when the become ineffective (visibly contaminated, wet, damaged).

The following procedure is to be used when cleaning and disinfecting reusable respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the facepiece and associated parts in a mild detergent with warm water. Do not use organic solvents.
- Rinse completely in clean warm water.
- Wipe the respirator with disinfectant wipes to kill germs.
- Air dry in a clean area.
- Reassemble the respirator and replace any defective parts.
- Place in a clean, dry plastic bag or other air tight container.

Note: The Program Administrator will ensure an adequate supply of appropriate cleaning and disinfection material at the cleaning station. If supplies are low, employees should contact their supervisor, who will inform the Program Administrator.

Maintenance

Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer.

The following checklists will be used when inspecting respirators:

- Facepiece:
    - cracks, tears, or holes
    - facemask distortion
    - cracked or loose lenses/faceshield
- Headstraps:
    - breaks or tears
    - broken buckles
- Valves:
    - residue or dirt
    - cracks or tears in valve material
- Filters/Cartridges:
    - approval designation
    - gaskets
    - cracks or dents in housing
    - proper cartridge for hazard

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards. Situations when this is permitted include washing their face and respirator facepiece to prevent any eye or skin irritation, replacing the filter, cartridge or canister, and if they detect vapor or gas breakthrough or leakage in the facepiece or if they detect any other damage to the respirator or its components.

Change Schedules

Employees wearing APRs or PAPRs with P100 filters for protection against biologicals and other particulates shall change the cartridges on their respirators when they first begin to experience difficulty breathing (i.e., resistance) while wearing their masks.

Based on discussions with our respirator distributor about Community Service Hospital's workplace exposure conditions, employees voluntarily wearing APRs with organic vapor cartridges shall change the cartridges on their respirators at the end of each month to ensure the continued effectiveness of the respirators.

Storage

Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program and will store their respirator in a plastic bag in their own locker. Each employee will have their name on the bag and that bag will only be used to store that employee's respirator. The Program Administrator will store the hospital supply of respirators and respirator components in their original manufacturer's packaging in the equipment storage room.

Defective Respirators

Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, they are to bring the defect to the attention of their supervisor. Supervisors will give all defective respirators to the Program Administrator. The Program Administrator will decide whether to:

- Temporarily take the respirator out of service until it can be repaired.
- Perform a simple fix on the spot such as replacing a headstrap.
- Dispose of the respirator due to an irreparable problem or defect.

When a respirator is taken out of service for an extended period of time, the respirator will be tagged out of service, and the employee will be given a replacement of similar make, model, and size. All tagged out respirators will be kept in the storage cabinet inside the Program Administrator's office.

Training

The Program Administrator will provide training to respirator users and their supervisors on the contents of the Hospital Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection Standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

The training course will cover the following topics:

- The Hospital Respiratory Protection Program.
- OSHA Respiratory Protection Standard.
- Respiratory hazards encountered at the hospital and their health effects.
- Proper selection and use of respirators.
- Limitations of respirators.
- Respirator donning and user seal (fit) checks.
- Fit testing.
- Emergency use procedures.
- Maintenance and storage.

- Medical signs and symptoms limiting the effective use of respirators.

Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

5.0 Program Evaluation

The Program Administrator will conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to Hospital management, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

6.0 Documentation and Recordkeeping

A written copy of this program and the Respiratory Protection Standard is kept in the Program Administrator's office and is available to all employees who wish to review it. Also maintained in the Program Administrator's office are copies of training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The Program Administrator will also maintain copies of the respiratory protection records for all employees. The completed medical questionnaire and the nurse or physician's documented findings are confidential and will remain at the Hospital Medical Clinic. The Hospital will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

Conclusion

Protecting the respiratory health of nurses and other healthcare workers is the aim of the OSHA Respiratory Protection Standard. It is important for nurses to understand the hazards they face in the workplace and it is critical for them to know how to adequately protect themselves against these hazards. In order for nurses to be well protected, each workplace must institute a Respiratory Protection Program. For their own health and safety, as well as the health and safety of our patients, nurses must be aware of and follow their facility's respiratory protection program.

References

United States Department of Labor, Occupational Safety and Health Administration (OSHA). (2004). Safety and Health Topics: Respiratory Protection. Accessed June, 2005 at http://www.osha.gov/SLTC/respiratoryprotection/.

Appendix A

Fit Testing Procedures (Mandatory)

Part I. 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.

B. Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

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

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper

towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

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

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

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

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100

ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

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

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

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

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

Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

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

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

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

(b) Saccharin solution aerosol fit test procedure.

(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 described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended,

and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

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

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

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

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

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

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

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

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

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) 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.

(8) 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.

(9) 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.

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

(11) 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.

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

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) 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 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) 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.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

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

(10) 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.

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

5. Irritant Smoke (Stannic Chloride) Protocol

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

(a) General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

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

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

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a

given exercise is taken to be representative of average penetration into the respirator for that exercise.

(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where ff_1, ff_2, ff_3, etc. are the fit factors for exercises 1, 2, 3, etc.

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

3. 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. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. 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) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

(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. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for 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 the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

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

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) 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 or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

(3) A record of the test needs to 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.

4. Controlled negative pressure (CNP) quantitative fit testing protocol.

The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Occupational Health Dynamics of Birmingham, Alabama also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

(2) The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(**Note:** CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

(5) The employer must train the test subject to hold his or her breath for at least 10 seconds.

(6) The test subject must don the test respirator without any assistance from the test administrator who is conducting the CNP fit test. The respirator must not be adjusted once the fit-test exercises begin. Any adjustment voids the test, and the test subject must repeat the fit test.

(7) The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.

(b) CNP Test Exercises.

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

(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 for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes

for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. 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 a respirator shall be tried.

(c) CNP Test Instrument.

(1) The test instrument must have an effective audio-warning device, or a visual-warning device in the form of a screen tracing, that indicates when the test subject fails to hold his or her breath during the test. The test must be terminated and restarted from the beginning when the test subject fails to hold his or her breath during the test. The test subject then may be refitted and retested.

(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.

5. Controlled negative pressure (CNP) REDON quantitative fit testing protocol.

(a) When administering this protocol to test subjects, employers must comply with the requirements specified in paragraphs (a) and (c) of Part I.C.4 of this appendix ("Controlled negative pressure (CNP) quantitative fit testing protocol"), as well as use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in paragraph (b) of Part I.C.4 of this appendix.

(b) Employers must ensure that each test subject being fit tested using this protocol follows the exercise and measurement procedures, including the order of administration, described below in Table A-1 of this appendix.

Table A-1. -- CNP REDON Quantitative Fit Testing Protocol

Exercises[1]	Exercise procedure	Measurement procedure
Facing Forward	Stand and breathe normally, without talking, for 30 seconds.	Face forward, while holding breath for 10 seconds.
Bending Over	Bend at the waist, as if going to touch his or her toes, for 30 seconds.	Face parallel to the floor, while holding breath for 10 seconds
Head Shaking	For about three seconds, shake head back and forth vigorously several times while shouting.	Face forward, while holding breath for 10 seconds.
REDON 1	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask.	Face forward, while holding breath for 10 seconds.
REDON 2	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask again.	Face forward, while holding breath for 10 seconds.

[1] Exercises are listed in the order in which they are to be administered.

(c) After completing the test exercises, the test administrator must question each test subject regarding the comfort of the respirator. When a test subject states that the respirator is unacceptable,

the employer must ensure that the test administrator repeats the protocol using another respirator model.

(d) Employers must determine the overall fit factor for each test subject by calculating the harmonic mean of the fit testing exercises as follows:

$$\text{Overall Fit Factor} = \frac{N}{\left[1/FF_1 + 1/FF_2 + \ldots\ 1/FF_N\right]}$$

Where:
N = The number of exercises;
FF1 = The fit factor for the first exercise;
FF2 = The fit factor for the second exercise; and
FFN = The fit factor for the nth exercise.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.
[63 FR 20098, April 23, 1998; 69 FR 46993, August 4, 2004]

Appendix B

User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to 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 shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece 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 facepiece 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 facepiece 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 B-2 TO §1910.134: RESPIRATOR CLEANING PROCEDURES (MANDATORY)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble facepieces 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 (43 °C [110 °F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 °C (110 °F); or,

2. 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 water at 43 °C (110 °F); or,

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

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

To the employee:

Can you read (circle one): Yes/No

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

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

1. Today's date:_____

2. Your name:_____

3. Your age (to nearest year):_____

4. Sex (circle one): Male/Female

5. Your height: _____ ft. _____ in.

6. Your weight: _____ lbs.

7. Your job title:_____

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

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

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

11. Check the type of respirator you will use (you can check more than one category):
a. _____ N, R, or P disposable respirator (filter-mask, non-cartridge type only).
b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

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

If "yes," what type(s):_____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you **currently** smoke tobacco, or have you smoked tobacco in the last month: Yes/No

2. Have you **ever had** any of the following conditions?

a. Seizures (fits): Yes/No
b. Diabetes (sugar disease): Yes/No
c. Allergic reactions that interfere with your breathing: Yes/No
d. Claustrophobia (fear of closed-in places): Yes/No
e. Trouble smelling odors: Yes/No

3. Have you **ever had** any of the following pulmonary or lung problems?

a. Asbestosis: Yes/No
b. Asthma: Yes/No
c. Chronic bronchitis: Yes/No
d. Emphysema: Yes/No
e. Pneumonia: Yes/No
f. Tuberculosis: Yes/No
g. Silicosis: Yes/No
h. Pneumothorax (collapsed lung): Yes/No
i. Lung cancer: Yes/No
j. Broken ribs: Yes/No
k. Any chest injuries or surgeries: Yes/No
l. Any other lung problem that you've been told about: Yes/No

4. Do you **currently** have any of the following symptoms of pulmonary or lung illness?

a. Shortness of breath: Yes/No
b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
d. Have to stop for breath when walking at your own pace on level ground: Yes/No
e. Shortness of breath when washing or dressing yourself: Yes/No
f. Shortness of breath that interferes with your job: Yes/No
g. Coughing that produces phlegm (thick sputum): Yes/No
h. Coughing that wakes you early in the morning: Yes/No
i. Coughing that occurs mostly when you are lying down: Yes/No
j. Coughing up blood in the last month: Yes/No
k. Wheezing: Yes/No
l. Wheezing that interferes with your job: Yes/No
m. Chest pain when you breathe deeply: Yes/No
n. Any other symptoms that you think may be related to lung problems: Yes/No

5. Have you **ever had** any of the following cardiovascular or heart problems?

a. Heart attack: Yes/No

b. Stroke: Yes/No
c. Angina: Yes/No
d. Heart failure: Yes/No
e. Swelling in your legs or feet (not caused by walking): Yes/No
f. Heart arrhythmia (heart beating irregularly): Yes/No
g. High blood pressure: Yes/No
h. Any other heart problem that you've been told about: Yes/No

6. Have you **ever had** any of the following cardiovascular or heart symptoms?

a. Frequent pain or tightness in your chest: Yes/No
b. Pain or tightness in your chest during physical activity: Yes/No
c. Pain or tightness in your chest that interferes with your job: Yes/No
d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
e. Heartburn or indigestion that is not related to eating: Yes/ No
f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No

7. Do you **currently** take medication for any of the following problems?

a. Breathing or lung problems: Yes/No
b. Heart trouble: Yes/No
c. Blood pressure: Yes/No
d. Seizures (fits): Yes/No

8. If you've used a respirator, have you **ever had** any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)

a. Eye irritation: Yes/No
b. Skin allergies or rashes: Yes/No
c. Anxiety: Yes/No
d. General weakness or fatigue: Yes/No
e. Any other problem that interferes with your use of a respirator: Yes/No

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you **ever lost** vision in either eye (temporarily or permanently): Yes/No

11. Do you **currently** have any of the following vision problems?

a. Wear contact lenses: Yes/No
b. Wear glasses: Yes/No
c. Color blind: Yes/No
d. Any other eye or vision problem: Yes/No

12. Have you **ever had** an injury to your ears, including a broken ear drum: Yes/No

13. Do you **currently** have any of the following hearing problems?

a. Difficulty hearing: Yes/No
b. Wear a hearing aid: Yes/No
c. Any other hearing or ear problem: Yes/No

14. Have you **ever had** a back injury: Yes/No

15. Do you **currently** have any of the following musculoskeletal problems?

a. Weakness in any of your arms, hands, legs, or feet: Yes/No
b. Back pain: Yes/No
c. Difficulty fully moving your arms and legs: Yes/No
d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
e. Difficulty fully moving your head up or down: Yes/No
f. Difficulty fully moving your head side to side: Yes/No
g. Difficulty bending at your knees: Yes/No
h. Difficulty squatting to the ground: Yes/No
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No
j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

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

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

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

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No

If "yes," name the chemicals if you know them:_____
_____
_____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: Yes/No
b. Silica (e.g., in sandblasting): Yes/No
c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
d. Beryllium: Yes/No
e. Aluminum: Yes/No
f. Coal (for example, mining): Yes/No
g. Iron: Yes/No
h. Tin: Yes/No
i. Dusty environments: Yes/No
j. Any other hazardous exposures: Yes/No

If "yes," describe these exposures:_____

_____
_____

4. List any second jobs or side businesses you have:_____
_____

5. List your previous occupations:_____
_____

6. List your current and previous hobbies:_____
_____

7. Have you been in the military services? Yes/No

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

8. Have you ever worked on a HAZMAT team? Yes/No

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

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

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

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

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

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

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

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

If "yes," how long does this period last during the average shift:_____hrs._____mins.

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

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

If "yes," how long does this period last during the average shift:_____hrs._____mins.

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

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

If "yes," how long does this period last during the average shift:_____hrs._____mins.

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

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

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

14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No

15. Will you be working under humid conditions: Yes/No

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

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

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

Name of the first toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the second toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the third toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
The name of any other toxic substances that you'll be exposed to

while using your respirator:

_____
_____
_____

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

_____

Appendix D

(Mandatory) Information for Employees Using Respirators When not Required Under Standard. - 1910.134 App D

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** I
- **Subpart Title:** Personal Protective Equipment
- **Standard Number:** 1910.134 App D
- **Title:** (Mandatory) Information for Employees Using Respirators When not Required Under Standard.

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

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

You should do the following:

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

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

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

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

Course Exam

After studying the downloaded course and completing the course exam, you need to enter your answers online. **Answers cannot be graded from this downloadable version of the course.** To enter your answers online, go to e-leaRN's Web site, www.elearnonline.net and click on the Login/My Account button. As a returning student, login using the username and password you created, click on the "Go to Course" link, and proceed to the course exam.

1. Respiratory protection is needed to guard workers against insufficient oxygen environments, harmful dusts, fogs, smokes, mists, gases, vapors, and sprays. Respiratory hazards include pathogens and particulates that are harmful to those who are exposed to them.

    A. True.
    B. False.

2. The OSHA Respiratory Standard of 2004 replaces

    A. The Bloodborne Pathogen Standard.
    B. The Respiratory Standard of 1971.
    C. The Respiratory Standard of 1987.
    D. None of the above.

3. The two major types of respirators are:

    A. Air-purifying respirators and filter-efficiency respirators.
    B. Atmosphere-supplying respirators and oil-resistant respirators.
    C. Oil-resistant respirators and air-purifying respirators.
    D. Air-purifying respirators and atmosphere-supplying respirators.

4. Respirators provide protection only from respiratory hazards when they are used properly.

    A. True.
    B. False.

5. A respiratory protection program is a written, cohesive, comprehensive collection of worksite-specific procedures and policies that addresses all respiratory protection elements required by the standard.

    A. True.
    B. False.

6. A facility is required to establish a respiratory protection program whenever the employer requires employees to wear respirators.

    A. True.
    B. False.

7. A facility is not required to establish a respiratory protection program if preferred and more permanent, effective measures to control respiratory hazards are either not feasible or are in the process of being implemented.

    A. True.
    B. False.

8. Among the components of a respiratory protection program as outlined in the new standard are:

    A. Definitions of terms applicable to respirators and their use.
    B. Criteria for selecting respirators.
    C. Requirements for medical examinations of workers as well as the use of medical questionnaires.
    D. All of the above.

9. Additional required components of a respiratory protection program outlined in the new standard are:

    A. The performance of a hazard determination which identifies respiratory hazards and work conditions, which will then determine the proper selection of which respirators to be used.
    B. Annual fit testing and protocols for fit testing.
    C. Attention to the use of respirators in situations that are characterized by OSHA as Immediately Dangerous to Life or Health (IDLH).
    D. All of the above.

10. Employees of healthcare facilities should be vigilant in determining that their facility is in compliance with the OSHA Respiratory Protection Standard. One method for doing so is to utilize the checklists provided in this course to evaluate their facility's compliance.

    A. True.
    B. False.