Eastern Kentucky University

Respiratory Protection Program

Section Page

Appendices:

1.0 Purpose and Scope

The Eastern Kentucky University Respiratory Protection Program (RPP) establishes the minimum requirements for employees who must use respirators. The RPP outlines government-wide procedures according to the Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard 29CFR1910.134. The purpose of this regulation is to control occupational diseases caused by breathing contaminated air. This RPP covers the proper selection and use of respirators, medical evaluations, fit-testing, interior structural firefighting, maintenance and care, training, monitoring, and program evaluation for respiratory protective equipment.

2.0 Policy

Every consideration will be given to the use of engineering controls to eliminate or reduce exposure to respiratory hazards. However, when feasible engineering controls are not effective in controlling toxic substances, each division will provide applicable and suitable respiratory protective equipment to the employee at no charge.

3.0 Codes and Regulations

Occupational Safety and Health Administration 29CFR1910.134
NFPA 1404 Standard for Fire Service Respiratory Protection
ANSI Z88 Series

4.0 Responsibilities

All Employees – All employees are charged with the responsibility to assist in and support the implementation of this program and enforcement of its use.

Authorized Employees – Employees who will be required to don and doff respirators as part of their job.

Volunteers – All volunteers are charged with the responsibility to assist in and support the implementation of this program and enforcement of its use.

Program Administrators – The Eastern Kentucky University Program Administrators are listed below by title. These administrators are responsible to oversee and evaluate the respiratory protection program. The Program Administrators will be trained and hold an accountable position for the management of this program. Specifically, the administrator's duties are as follows:

Environmental Health and Safety Director – The Director of EH&S is responsible for the creation and maintenance of this program.

Facilities Services – Each affected department Director is responsible for implementation and enforcement of this program throughout their respective area(s). These areas include the Heat Plant, Paint Shop, and Pesticide Department.

Fire Extinguisher Laboratory Lab Coordinator - is responsible for the implementation and enforcement of this program throughout the fire extinguisher lab and any live fire scene of which they have control.

Fire and Safety Engineering Technology Department Chair - is responsible for the implementation and enforcement of this program the Eastern Kentucky University Fire Safety Engineering Technology Program for professors and staff actively participating in live fire demonstrations and similar activities requiring respiratory protection.

Police Chief – The Police Chief is responsible for the implementation and enforcement of this program throughout the Police Department and within the respective specialized programs.

Student Health Services Staff Physician – is responsible for the implementation and enforcement of this program in the Student health Services Department.

When evaluations reveal a failure to follow this program, appropriate steps, including disciplinary actions, will be taken as required by the Eastern Kentucky University Disciplinary policy.

5.0 Purchase of Equipment

In order to comply with OSHA's Standard on Respiratory Protection, all respiratory protective equipment purchased will be certified by the National Institute for Occupational Safety and Health (NIOSH) and will be used in compliance with the conditions of its certification. Each department will be responsible for the cost incurred in implementing this program. Equipment will be provided to Eastern Kentucky University employees free of charge.

The Chief, Director or designated program administrator of each respective department/area will be responsible for ensuring all required respiratory protection and related items are purchased.

6.0 Respirator Selection

The respiratory protective devices must be certified by NIOSH per 42 CFR Part 84

Each employee shall be given the opportunity to select a respirator which provides the most comfortable fit while not jeopardizing safety. Each authorized employee will be given at least two (2) styles of respirators to choose from. For safety reasons, Eastern Kentucky University has determined that Scott brand respirators will be used for firefighting operations.

All respirators selected will be certified by the National Institute for Occupational Safety and Health (NIOSH) and will be used in compliance with the conditions of its certification.

In selecting the correct respirator for a given circumstance, the respiratory hazard, IDLH atmospheres, assigned protection factors, and respirator limitations will be considered.

Due to the fact that Eastern Kentucky University cannot identify or reasonably estimate firefighter exposures, these users are considered to be in IDLH atmospheres unless otherwise determined.

If an employee wears corrective lenses, Eastern Kentucky University will purchase respiratory protection that allows the employee to use the lenses. Full-face respirators capable of accepting an insert for corrective lenses will be available.

- A list of approved respirators and filters is located in Appendix E, "Respirator and Filter Selection."

It is the policy of the Eastern Kentucky University that there will be ***no voluntary use of respirators in the workplace.*** For reference, see 1910.134(c)(2).

7.0 Respiratory Hazards

Nature of the Hazard – The nature of the hazard that requires respiratory protection must be identified in order to protect the worker. Oxygen deficiency, properties of the toxic or harmful substance, effects on the body, concentrations or the toxic substance, and the Permissible Exposure Limits (PEL's) will be considered.

Workplace Factors – Workplace factors will be considered when selecting a respirator. These factors include the operation or task details; physical hazards such as temperature, humidity and length of exposure; and the degree of knowledge of the substance(s) that workers will be exposed.

Employee Exposure – A reasonable estimate of the employee's anticipated exposure must be documented. This includes monitoring data or other objective studies and/or information that will give an approximate exposure for the task. The physical state and chemical form of the hazard (if known) must be included in this documentation. Some operations will have unknown exposures (i.e. firefighting, police response to a drug lab, etc.) that will be treated as IDLH atmospheres due to the hazard of the environment.

7.1. IDLH Atmospheres

For Immediately Dangerous to Life and Health (IDLH) atmospheres, the most protective and reliable respiratory protection is a pressure demand Self Contained Breathing Apparatus (SCBA) with at least a 30-minute service life or combination pressure demand supplied air respirator with auxiliary self contained air supply. Either of these systems must be used for any IDLH environment. All oxygen deficient atmospheres are IDLH unless they are within the ranges in Table II.

Table II

Altitude in Feet	**Oxygen deficient atmosphere for which the employer may rely on atmosphere-supplying respirators**
Less than 3,001	16.0 – 19.5
3,001 – 4,000	16.4 – 19.5
4,001 – 5,000	17.1 – 19.5
5,001 – 6,000	17.8 – 19.5
6,001 – 7,000	18.5 – 19.5
7,001 – 8,000[1]	19.3 – 19.5

[1]Above 8,000 feet the exception does not apply. Oxygen enriched breathing air must be supplied above 14,000 ft.

Table II Note – The exception for IDLH use respirator: if the employer demonstrates that the oxygen concentration can be maintained within the ranges in table II, then an appropriate atmosphere supplying respirator may be used.

7.2. Non-IDLH Atmospheres

Respirators must be selected by their ability to reduce employee exposure thereby protecting the employee from the particular contaminant(s) in routine job tasks and in reasonably foreseeable emergency situations.

Gas or Vapor Atmospheres – The respirator must protect against breakthrough when exposed to a gas or vapor. This must be guaranteed by implementing a replacement schedule for cartridges and canisters or changing them according to the end-of-service

life indicator (ESLI). The method of using the odor threshold (changing the cartridge when the contaminant is detected by smell) or other warning properties **cannot** be used.

Particulate Atmospheres – Selection for protection against particulates must be an air-purifying respirator used with a High Efficiency Particulate Air (HEPA) filter or a filter certified under 42 CFR Part 84 or a respirator with supplied air. The HEPA filter must be 99.7% efficient in removing monodisperse particles of 0.3 micrometers in diameter.

NIOSH Color Coding System for Air-Purifying Respirators and NIOSH Filter Classes

Color	**Cartridges for Air-Purifying Respirators – Negative Pressure**
Black	Organic Vapors (OV)
Black (paint)	OV, Paints, Lacquers & Enamels (no urethane or diisocyanate paints)
Chartreuse	Pesticides
Green	Ammonia & Methylamine
Magenta	Asbestos, Dusts, Fumes and Mists
Magenta/Black	OV, Dusts, Mists and Asbestos
Magenta/Yellow	OV, chlorine, Formaldehyde, Hydrogen Chloride, Sulfur Dioxide, Dusts, Fumes, Mists, Raidonuclides & Asbestos
Orange	Mercury
Yellow	OV, Acid Gas, Formaldehyde, Sulfur Dioxide

NIOSH Certified Filtering Facepieces

Filter and Efficiencies (%)	**Filtering Facepiece Use**
N95, N99, N100 (99.97%)	Not resistant to oil; for particulates and non oil-based aerosols
R95, R99, R100 (99.97%)	Resistant to oil (change every 8-hour shift); for particulates and oil-based aerosols
P95, P99, P100 (99.97%)	Oil proof; for particulates and oil-based aerosols

7.3. Assigned Protection Factors (APF)

The amount of protection the respirator can give is dependent upon the seal of the facepiece to he face, leakage around the valves, and leakage through or around cartridges or canisters. Through NIOSH studies, statistical numbers were derived for the various models of each kind of respirator. At least 95% of the population had fit factors equal to or greater than the assigned protection factor for that respirator. Fit factor equals the concentration of a contaminant outside the mask divided by the concentration inside the mask. EKU will use the assigned protection factors listed in the table below to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), EKU will ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.

Maximum Use Concentration (MUC)
EKU will select respirators for its' employees use that maintains the employee's exposure to the hazardous substance, when measured outside the respirator, at or below the MUC. EKU will not apply MUCs to conditions that are immediately dangerous to life or health (IDLH); instead, SCBA's will be used for these conditions.

All respirators and associated filters will be selected based on the chemical state and physical form of the contaminant(s) present in the work environment for which there is an exposure. In protecting against **gases and vapors**, EKU will provide either an atmosphere-supplying respirator or an air-purifying respirator, provided that: the respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or if there is no ESLI appropriate for conditions in the workplace, a change schedule for canisters and cartridges will be utilized that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. EKU will describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data (See Appendix G).

For protection against **particulates**, the employees will be provided either: an atmosphere-supplying respirator; or an air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or for contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH.

Assigned Protection Factors[5]

Type of respirator[1], [2]	Quarter mask	Half mask	Full facepiece	Helmet/ hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	[3]10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)	.....	50	1,000	[4]25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	.....	10	50	.....	.....
• Continuous flow mode	.....	50	1,000	[4]25/1,000	25
• Pressure-demand or other positive-pressure mode	.....	50	1,000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	.....	10	50	50	.....
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	.....	.....	10,000	10,000	.....

Notes:
[1]Employers may select respirators assigned for use in higher workplace concentrations of a hazardous

substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.
[2]The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.
[3]This APF category includes filtering facepieces, and half masks with elastomeric facepieces.
[4]The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.
[5]These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

7.4. Characteristics, Capabilities, and Limitations of Respirators

The American National Standards Institute (ANSI) Z88.2-1992 provides a description of various respirator characteristics, capabilities, and limitations. This has been incorporated into the EKU Respiratory Protection Program by reference.

8.0 Medical Evaluations

Using a respirator may place a physiological burden on Eastern Kentucky University Employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the individual employee.

Effective protection of a respirator is determined by the individual's ability to wear a respirator, as determined by a physician or other licensed healthcare professional. Most respiratory devices increase physical stress on the body, especially the heart and lungs. This program requires that a medical determination be made as to the individual's ability to wear a respirator for the duration of the work assignment.

Eastern Kentucky University employees will not be assigned tasks requiring the use of a respirator until it has been determined by a physician or a licensed healthcare professional that they are physically able to perform work in a respirator.

8.1. Medical Procedures

All employees who wear or could wear a respirator on their job will receive a medical evaluation to determine their capabilities and limitations. Eastern Kentucky University contracts the Occupational Medicine Center and the Instant Care Center for their physician or primary licensed healthcare professional. Student Health Services PLHCP may be used to review respirator questionnaires, but not perform physicals, on their staff. These agencies approve the medical evaluations. The EKU Program Administrators have the responsibility of medical approval through the medical evaluation. The respiratory questionnaire is located in Appendix C.

8.2. Medical Evaluation

The employee must answer the medical evaluation questionnaire during normal working hours or at a time and place convenient to the employee. The answers are confidential and should not be seen by the employer. A physical examination, or other tests as deemed appropriate by the PHLCP, may occur after the completion of the questionnaire. Medical clearance is required before the employee can be fit tested or is required to wear a respirator in the workplace.

The physician or licensed healthcare professional will determine the employees' ability to wear a respirator upon review of the medical evaluation questionnaire and physical examination. Eastern Kentucky University designates the following Primary Licensed Healthcare Professionals (PLHCP's) to review respirator questionnaires and perform medical examinations:

Occupational Medicine Center
646 University Shopping Center
Richmond, KY 40475
(859) 623-0535 – phone
(859) 624-0003 - fax

Student Health Services (SHS) (only for SHS staff)
Eastern Kentucky University
521 Lancaster Avenue
Richmond, KY 40475
(859) 622-1761 - phone
(859) 622-1767 - fax

The physical exam will include necessary tests to determine the employees' ability to wear a respirator. This exam will emphasize the respiratory system and may include:

- Respiratory questionnaire (mandatory)
- Basic physical examination (if needed)
- Any other test deemed necessary by the physician or other licensed healthcare professional to make a final determination (i.e. pulmonary function test).

The Director of Environmental Health and Safety will provide the physician or primary licensed healthcare professional information regarding:

- The type and weight of the respirator to be worn;
- The duration and frequency of use including for rescue and escape use;
- The expected physical work effort;
- Additional clothing and equipment to be worn; and
- The temperature and humidity extremes that may be encountered.

The Director of Environmental Health and Safety will also make available to the physician or primary licensed healthcare professional a copy of the Eastern Kentucky University Respiratory Protection Plan and the OSHA standard 1910.134 including the required appendixes.

8.3. Written Recommendation

The physician or licensed healthcare professional will provide a written recommendation regarding the employees' ability to wear a respirator and any limitations due to workplace or medical conditions to the Director of Environmental Health and Safety.

The Director of Environmental Health and Safety will ensure that the employee has received a copy of the written recommendation within thirty (30) days of the examination. Should a follow-up appointment be deemed necessary by the physician or licensed healthcare professional, the employee will be made aware of this recommendation and be supplied with a copy of the doctors' statement (if applicable).

If a negative pressure respirator is to be used and an employee has a medical condition determined by a physician or licensed healthcare professional that may place the employees health at risk if the respirator is used, Eastern Kentucky University shall supply a Powered Air Purifying Respirator (PAPR) as long as the environment allows its use.

8.4. Medical Evaluation Frequency

The medical evaluation questionnaire and the physical examination will be performed ***prior to the employee being fit-tested***. Additional or follow-up exams will be given under the following conditions:

- An employee reports medical problems while using the respirator;
- The physician or licensed healthcare professional, supervisor, or program administrator informs Human Resources that an employee needs re-evaluation;
- Observations made during fit-testing or program evaluation indicate a need;
- Information gathered from respiratory program evaluations;
- The employee experiences a physical change due to a variance in workplace conditions that would increase the physiological burden on the employee.

Each current employee who has not completed a physical examination that meets the minimum requirements of this program is required to be evaluated within 90 days of being notified of this programs' inception.

9.0 Medical Records

The Human Resource Department will keep a copy of all medical records pertinent to this program. These records will be kept in accordance with HIPPA regulations and be made available in accordance with 29CFR1910.1020. Specifically, the medical records for each employee shall be preserved and maintained for the duration of employment plus thirty (30) years.

Eastern Kentucky University shall furnish, upon request, one copy of the employees' medical records free of charge to the employee or designated representative within fifteen (15) days of the request. If the copies cannot be furnished within fifteen days, then the employee will be given an explanation for the delay and be given the earliest date when the record can be made available. Additional copies may have a reasonable fee associated to cover the costs incurred. Any x-ray that is on file may be temporarily loaned to the employee.

EKU shall furnish, upon request, medical records to the representatives of the Assistant Secretary of Labor for Occupational Safety and Health without delay. The specific rules governing this access are located in 29CFR1913.10. Whenever OSHA seeks access to personally identifiable employee medical information in writing, the written access order and the cover letter will be posted for fifteen (15) working days in a prominent location.

Eastern Kentucky University shall inform each current employee annually of the following:

- The existence, location, and availability of these medical records;
- The person responsible for maintaining and providing access to records; and
- Each employee's rights of access to these records.
    - Note: a copy of the 29CFR1910.1020 standard must be made available to any employee who requests a copy.

10.0 Fit-Testing Requirements

OSHA requires that respirators be fitted properly and that they be tested for the facepiece-to-face seal. There are two methods used for conducting these tests; qualitative and quantitative. The qualitative method is a test that measures the quality of the facepiece seal. The quantitative method is a more exact test that measures the protection factor by using a scientific test method.

10.1. Fit-Test Procedures

The Eastern Kentucky University will provide the same make, model, style, and size respirator for fit-testing that will be used on the job per 29CFR1910.134(f). A qualified person must administer the fit-test. The qualified person must be able to prepare the test solutions, calibrate equipment, recognize invalid tests, ensure the equipment works properly, and calculate fit-factors. This person must be able to complete procedures for conducting fit-tests. Fit-test procedures are presented in Appendix A.

Eastern Kentucky University requires that employees in the following job duties be required to undergo qualitative fit-testing:

- Environmental Health and Safety employees
- Facilities Services Heat Plant employees
- Facilities Services Paint Shop employees
- Student Health Services employees

Eastern Kentucky University requires that employees in the following job duties be required to undergo quantitative fit-testing:

- Faculty/Staff performing firefighter duties
- Police Officers who will wear APR's

Quantitative fit-testing will be will be accomplished by modifying the users facepiece to allow for sampling air inside the seal or by using an identical permanent probed facepiece. A fit factor of 500 or greater is considered passing for tight-fitting full facepieces.

The PortaCount™ Fit-Testing Instrument is available through the Fire Extinguisher Laboratory. The Program Administrator or person responsible for fit-testing can check out this instrument for the length of time needed to conduct these tests.

If after passing the fit tests the employee notifies their Supervisor, Program Administrator, or physician or other licensed healthcare professional that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator facepiece and is to be retested.

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air purifying respirators (PAPR) shall be accomplished by performing the tests in the negative pressure mode, regardless of the mode of operation of that unit.

10.2. Fit-Test Frequency

Eastern Kentucky University will ensure employees using a respirator with a tight-fitting facepiece pass a fit-test prior to initial use. Employees will also be re-tested:

- At least annually
- When a different size facepiece, style, model, or make is used by the employee;
- When visual observation of the physical condition of the employee (i.e. facial scaring, dental changes, cosmetic surgery, or an obvious change in body weight) made by the employee, Supervisor, Program Administrator, Human Resource Department, or the physician or licensed healthcare professional indicate a need for re-testing.

10.3. Facepiece Seal Protection

User Seal Check. A user seal check must be performed every time a tight-fitting respirator is put on and prior to entering a contaminated area. The user seal check consists of the positive pressure and the negative pressure tests.

Positive Pressure Test:

This test only applies to respirators that have an exhalation valve. The exhalation valve cover may have to be removed for this test;

1. Close or block off the exhalation valve with the palm of one hand
2. Exhale gently into the facepiece;
3. If a slight positive pressure is built up with no apparent outward leakage around the seal, then the facepiece-to-face seal is satisfactory;
4. Proceed to the negative pressure test.

Negative Pressure Test:

1. Close or block off the exhalation valve with the palm of the hand;
2. Inhale gently so that the facepiece collapses slightly and hold the breath for ten (10) seconds;
3. If the facepiece remains slightly collapsed and no inward leakage occurs, then the facepiece-to-face seal is satisfactory.

Corrective Glasses, Goggles, or PPE. If corrective glasses, goggles or other personal protective equipment (PPE) is required, they must be worn so the fit and facepiece-to-face seal is not compromised. Proper selection of equipment will minimize or avoid this problem.

Facial Hair. OSHA and Eastern Kentucky University will not allow an employee to wear a tight-fitting respirator if facial hair comes between the sealing surface or interferes with the valve function.

10.4. Fit-Test Records

A record of the fit-test results will be kept for the duration of employment and will include the following (if applicable):

- Name or identification of the employee;
- Type of fit-test performed;
- Specific make, model, style, and size of respirator tested;
- Date of test;
- The pass/fail results; and
- Strip chart recording or other recording of the test results.

11.0 Respirator Effectiveness

The purpose of this respiratory protection program is to ensure the employee is protected in a hazardous atmosphere and to ensure protection for the duration of the shift.

Employees will be allowed to leave the immediate work area where respiratory protection is required:

- To wash the face and respirator to prevent eye and skin irritation;
- If the employee detects breakthrough, breathing resistance, or leakage; and/or
- To replace filters, cartridges, or canister elements.

If the respirator looses effectiveness, the respirator will be repaired or replaced before the employee is allowed to return to the work area where respiratory protection is required by this program.

Appropriate workplace surveillance shall be maintained, where applicable, to note changes in degree of exposure or stress that would affect the respirator effectiveness.

12.0 IDLH Atmospheres or Interior Structural Firefighting

The standard has established procedures for working in Immediately Dangerous to Life and Health (IDLH) atmospheres and for interior structural firefighting.

12.1. IDLH Procedures

At least one employee must be located on the outside when employees are working in IDLH atmospheres. Communication must be maintained between the employees inside and outside the atmosphere. The employer must be notified prior to entry.

The employees outside the IDLH atmosphere must be trained and ready for rescue. They must be equipped with at least:

- Pressure demand or positive pressure SCBA or supplied air with SCBA backup;
- Retrieval equipment that does not increase the overall risk; and
- Equivalent means of rescue if equipment would increase risk.

12.2. Interior Structural Firefighting

The two in/two out rule applies and requires constant communication. All employees must use SCBAs. The above IDLH requirements concerning rescue and equipment must be followed.

One of the two persons located outside can perform other duties as long as they are able to perform rescue duties when needed without jeopardizing the safety or health of other firefighters.

These requirements are not to prevent emergency rescue activities from occurring before an entire team arrives on site.

13.0 Maintenance and Care

Eastern Kentucky University will provide for the cleaning, storage, inspection, and regular repair of respirators.

Personnel involved in respirator maintenance must be thoroughly trained. Substitution of parts from different brands or types of respirators invalidates NIOSH approval of the device and therefore shall not be used. Repairs and adjustments must never be made beyond the manufacturer's recommendations and shall be in accordance with current training.

Whenever a respirator fails an inspection or is otherwise found to be defective shall be removed from service until sufficiently repaired to the manufactures specifications with NIOSH approved parts. All repairs are to be conducted by specially trained and competent persons.

Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or technician trained by the manufacturer. Should the unit or any part of the unit be unrepairable, it shall be destroyed and/or immediately discarded to ensure that it will not be confused for a good component.

13.1. Cleaning

Eastern Kentucky University will supply a respirator that is sanitary and clean and in good working order. Cleaning procedures are located in Appendix B. The manufacturer's recommendations for cleaning and disinfecting can be used provided they are equal to the procedures outlined in the standard. The cleaning frequency is described below.

- **Exclusive Use –** Those used only by one employee will be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- **Multiple Employee Use –** Respirators must be cleaned before the next employee wears it.
- **Emergency Respirators –** Respirators for emergency use must be cleaned after each use.
- **Training and Fit-Testing Respirators –** These shall be cleaned after each use.

13.2. Storage

All respirators shall be protected from sunlight, extreme temperatures, extreme moisture, contaminants, chemicals and dust. They must be stored to prevent damage or deformation to the exhalation valves and the facepiece.

Emergency respirators must adhere to the above storage requirements and must also:

- Be accessible to the work area;
- Be stored in well marked containers labeling them as emergency use respirators;
- Follow and other manufacturer's recommendations.

13.3. Inspection

Inspection must include respirator function and tightness of connections as well as the condition of the various parts including:

- Facepiece and straps;
- Valves and connecting tube;
- Cartridges, canister(s), or filters;
- Elastic parts for pliability and signs of deterioration; and/or
- Lenses.

The frequency of inspections is as follows:

- **Routine Use –** Before each use and during cleaning
- **Emergency Respirators –** At least monthly according to the manufacturer's recommendations, and before and after each use for proper function.
- **Emergency Escape Only Respirators –** before being carried into the workplace.
- **SCBA's –** On a monthly basis. The cylinders must be charged and recharged whenever the pressure falls below 90% of full.

13.4. Certification for Emergency Respirators

Inspections for emergency respirators must be certified by documenting:

- Date of inspection;
- Name and signature of inspector;
- Findings and any action taken; and
- Respirator identification number or serial number.

Certification information must be provided and kept until the next certification in one of these ways:

- On a tag or label attached to the storage compartment,
- With the respirator,
- With inspection reports, either electronic or hard copies.

13.5. Repairs

Any respirator that fails an inspection or is otherwise found to be defective will be removed from service and will be discarded or repaired. If the respirator is to be repaired, the following procedures will be followed:

> Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator; repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

13.6. Breathing Air Quality

Air quality and air flow must have procedures to ensure the air is suitable for breathing. It must be traceable back to the manufacturer and tested for quality. The standard requires proof and documentation that it meets Type 1, Grade D breathing air described in ANSI/CGA Commodity Specification for Air G-7.1-1989 and include:

- Oxygen content (v/v) of 19.5-23.5%;
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
- Carbon dioxide content of 1,000 ppm or less; and
- Lack of noticeable odor.

Compressed air systems must have a tag attached to the compressor with the most recent filter change date and signature of the person who changed it. Compressed air must have:

- Carbon monoxide detection;
- Construction so as to prevent contaminated air into the system;
- Minimization of moisture into the air supply; and
- In-line sorbent beds and filters to purify the air.

Oil lubricated compressors will use a high temperature or carbon monoxide alarm or both to ensure carbon monoxide levels remain below 10ppm. If only a temperature alarm is used, monitoring must be conducted at regular intervals to ensure the requirement is met.

Cylinders used to supply breathing air to respirators shall:

- Be tested and maintained per 49 CFR parts 173 and 178);
- Certificates for purchased air that states it meets Class D breathing air requirements; and
- Have a moisture content not to exceed a dew point of -50 degrees F at 1 atmosphere pressure.

Non-oil lubricated compressors must also ensure carbon monoxide levels remain below 10ppm.

13.7. Maintenance and Care Records

A written record or a maintenance and care program must be maintained within each division. Information contained on this record should include inspection reports, replacement parts used, dates of repair, cleaning and type of disinfectant used, and the names of the persons doing the work. The respirator should be identified by manufacturer, model, serial number or identification number.

Records shall be maintained for at least five (5) years.

14.0 Training

Eastern Kentucky University shall provide adequate and effective training to those employees required to wear respirators. The training will be understandable and comprehensive. Eastern Kentucky University must be able to show the employee can demonstrate knowledge of the respiratory protection standard.

14.1. Training Program

Eastern Kentucky University will provide training to each employee required to use respirators before the respirator is worn and at least annually thereafter. If a new employee received training within the last twelve (12) months of their employment, and can demonstrate knowledge of all the items listed below, training can wait until twelve (12) months after the date of the last training.

Employees must be retrained when there are changes in the workplace, the employee shows a need or lack of understanding or skill, or as deemed otherwise necessary.

Training must be inclusive and include the following:

- Why the respirator is necessary;
- How proper fit usage and maintenance is imperative to effective protection;
- Instruction of the respirator's limitations, emphasizing oxygen deficiency and IDLH situations;
- How to use emergency respirators to include what to do in case of a malfunction;
- Inspection, donning and doffing to include user seal checks;
- How and when to change filters (change out schedules);
- Procedures for respirator maintenance and storage;
- Recognition of medical symptoms that would impair proper protection; and
- The general requirements of 29 CFR 1910.134.

14.2. Training Frequency

Training will occur at the following intervals:

- Upon initial employment or enrollment in this program;
- Annually thereafter;
- Whenever the employee shows/reveals to a Supervisor a lack of understanding or skill concerning the proper use of the respirator.

14.3. Training Records

Training records must include who was trained and when, the training materials and procedures, tests and/or checklists that demonstrate employee knowledge.

15.0 Work Area Surveillance and Air Monitoring

Should work area surveillance and monitoring be deemed necessary for a fixed location, this will include identification of the contaminant, nature of the hazard, contaminant concentration at the breathing zone, and biological monitoring (if appropriate). The industrial hygienist or other adequately trained and competent person conducting the air sampling will carefully and fully document any apparent deficiencies in the respirator program.

16.0 Program Evaluation

The individual area Program Administer responsible for ensuring compliance will periodically assess the effectiveness of the respiratory protection program during all phases of operation. Frequent surveillance inspections during these activities shall be conducted to monitor and document compliance with the requirements of the program.

Specific evaluations of the respirator cleaning, inspection, maintenance, repair, storage, and use should be frequently conducted to ensure that the desired results of these operations are consistently achieved.

Factors to be assessed shall include:

- Respirator fit;
- Appropriate respirator selection for the hazards to which the employee is exposed;
- Proper respirator use under the workplace conditions the employee encounters; and
- Proper respirator maintenance.

These evaluations shall be conducted at least annually.

Part I. OSHA-Accepted Fit Test Protocols

Appendix A to §1910.134—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 °C (77 °F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known at 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 a3/4-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 paragraph3(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 a3/4inch (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:

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

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™) 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:

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

Where:

N = The number of exercises;

FF_1= The fit factor for the first exercise;

FF_2= The fit factor for the second exercise; and

FF_N= 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.

Appendix B–1 to §1910.134: 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.

Directions: Complete questions **1-15** and **STOP**

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

----------STOP HERE----------

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 °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):

_____
_____

[63 FR 1270, Jan. 8, 1998; 63 FR 20098, 20099, Apr. 23, 1998, as amended at 69 FR 46993, Aug. 4, 2004; 71 FR 16672, Apr. 3, 2006; 71 FR 50187, Aug. 24, 2006]

Respirator Medical Determination (Licensed Healthcare Professional to Complete)

Name of Employee: _____

_____ After reviewing this employee's medical history as stated in the Respiratory Questionnaire, it is determined that they **are suitable** to perform work while using the respirator equipment listed below.

_____ After reviewing this employee's medical history, it is determined that they will need to have a medical examination performed before they will have a medical clearance to use a respirator.

Signature of PLHCP approval: _____

Date: _____

_____ N-95
_____ Powered Air Purifying Respirator (PAPR)
_____ ½ Face Piece Respirator
_____ Full Face Piece Respirator
_____ Self Contained Breathing Apparatus (SCBA)
_____ Chemical Protective Suit with PAPR or APR
_____ Firefighter and/or Hazmat with SCBA or APR
_____ Other (please list):
_____
_____

PLHCP Name and Address

Fit Testing Certificate:

Brand and Model Number (if applicable) _____ Size _____ NIOSH Approval # (if applicable) _____

Limitations:

_____ Beard _____ Glasses _____ Dentures _____ None

Explain (if applicable)

_____

Fitting: ____ Satisfactory Qualitative Saccharin/Bitrix Fit Test ____ Donning and Removal
____ Satisfactory Positive Pressure Fit Check Test ____ Storage and Replacement Indicators
____ Satisfactory Negative Pressure Fit Check Test

Employee Signature: _____ Date: _____

Approval Signature: _____ Date: _____

Appendix D to §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.

_____ _____
Printed Name Date

_____
Signature

[63 FR 1270, Jan. 8, 1998; 63 FR 20098, 20099, Apr. 23, 1998, as amended at 69 FR 46993, Aug. 4, 2004; 71 FR 16672, Apr. 3, 2006; 71 FR 50187, Aug. 24, 2006]