DEPARTMENT OF FIRE AND RESCUE SERVICES

GENERAL ORDER

150.09

Originating From	Issue Date	Revision Date	Attachments
Administration	**08/04/2000**	**N/A**	**A-E**

SUBJECT: Respiratory Protection

APPLICABILITY: All Personnel

POLICY:

It is the policy of Howard County Department of Fire and Rescue Services (DFRS) to ensure that all fire and rescue personnel use safe and efficient procedures on all emergency incidents. To ensure their safety, the DFRS will provide properly fitted, tested, and maintained respiratory protective equipment for all fire and rescue personnel. Personnel must be trained in and consistently use these devices in all areas where an IDLH atmosphere may exist. Personnel will be provided with SCBA and/or SAR, as appropriate, which meet the requirements of NIOSH, MSHA, and NFPA applicable standards at the time of purchase.

1 GENERAL

1.1 This policy shall be in compliance with 29 CFR 1910.134, Respiratory Protection Standard, issued by the United States Department of Labor, Occupational Safety and Health Administration (OSHA).

1.1.1 Maryland Occupational Safety and Health (MOSH) has determined that where career and volunteer firefighter/rescuers are deployed together, *all* firefighter/rescuer personnel (both career and volunteer firefighters) must comply with these requirements. DFRS is adopting this policy to ensure the health and safety of all its personnel with firefighter/rescuer operational status.

1.2 For more information regarding this policy, please contact the Howard County Fire and Rescue Occupational Health and Safety Officer.

2 DEFINITIONS

2.1 **ANSI Z88.6 - 1984** is an American National Standards Institute, Inc. standard for respiratory protection - respirator use - physical qualifications for personnel.

2.2 **Compressed breathing air** is defined as air with a minimum air quality of Grade E, as well as a water vapor level of less than 24 ppm as specified by NFPA 1500, Compressed Gas Association, G-7.1, 1992 Edition, commodity specification for air.

2.3 The **facepiece** is a component of the respirator which covers the wearer's nose, mouth, and in some cases the eyes. It includes the headbands, exhalation valves and in some cases components that are required to connect it to a respirable air supply.

2.4 The **Fire Chief** is the uniformed head of Howard County Department of Fire and Rescue Services, who has all powers of a department director, administers all fire and rescue services provided in the county and implements the policies of Howard County Fire and Rescue.

2.5 **Howard County Department of Fire and Rescue Services (DFRS)** is a combination system of career and volunteer personnel providing fire, rescue and emergency medical services to the citizens of Howard County Maryland.

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

2.7 The **Mine Safety Health Administration (MSHA)** is a federal agency that regulates the mining industry in the safety and health arena.

2.8 The **National Fire Protection Administration (NFPA)** is an organization of firefighters, insurance carriers and other interested parties who establish and publish the National Fire Standards, National Electrical Code and related materials.

2.9 The **National Institute for Occupational Safety and Health (NISOH)** is a federal agency that conducts research on health and safety concerns as well as tests and certifies respirators.

2.10 A **Pass Device** is a acronym for the personal Alert Safety system unit attached to the turnout gear or built in the self-contained breathing apparatus.

2.11 A **Qualitative Fit Test (QLFT)** is a facepiece testing process used to determine the proper size facepiece for individual personnel by **determining 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.**

2.12 A **Quantitative Fit Test (QNFT)** is a facepiece testing process used to determine the proper size facepiece for individual personnel by numerically measuring the amount of leakage into the facepiece.

2.13 A **Respiratory Protective Equipment (RPE)** is a device designed to protect the wearer from inhaling harmful atmospheres.

2.14 A **Supplied Air Respirator (SAR)** is a device which provides air from a stationary storage cylinder through a high pressure hose. SARs include an escape cylinder with at least five minutes of breathing air.

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

2.16 A **Trans-Fill System** is a trans-fill hose and fittings, which allows two users of similarly equipped SCBA to share a common air supply during an emergency situation.

2.17 **Using SCBA** refers wearing full protective gear, SCBA in place, facepiece on, breathing from the SCBA, and PASS device activated.

2.18 **Wearing SCBA** refers to full protective gear, SCBA in place, facepiece ready for use, not breathing from the SCBA, and PASS device, if not an integral part of the air supply, activated.

2.19 **29 CFR 1910.134** is a respiratory protection standard issued by the United States Department of Labor, Occupational Safety and Health Administration (OSHA) that provides rules and regulations on the selection, maintenance and use of self contained breathing apparatus.

3 GENERAL USER/EQUIPMENT GUIDELINES

3.1 Personnel using SCBA must operate in crews of two or more when entering an IDLH atmosphere. Contact among crew members is to be visual and/or verbal at all times. They should remain in close proximity to each other, enabling them to provide mutual assistance in case of an emergency.

3.2 The SCBA/SAR will operate only in the positive pressure mode. SCBA must have a minimum rated service duration of 30 minutes. In the absence of an integrated PASS device, personnel must activate an independent PASS device prior to entering the hot zone, and the PASS device must remain in the active mode until the member exits the hot zone.

3.3 Disposable Air Purifying Particulate Filter Respirators will be provided for pre-hospital medical care. These respirators must meet at least the minimum standards of

protection as defined in NIOSH Standard 42 CFR 84. All personnel will follow DFRS's policy on Infection Control regarding levels of personal protection in dealing with patients that may create an exposure hazard.

4 GUIDELINES FOR RESPIRATORY PROTECTION CERTIFICATIONS AND FIT TESTING

4.1 All personnel who may be exposed to IDLH atmospheres must use RPE. Personnel who are required to use RPE must be medically certified by a Licensed Health Care Provider (LHCP).

4.1.1 At a minimum, medical certification must follow the guidelines provided in 29 CFR 1910.134, attachment C.

4.1.2 Records of medical certification for the use of RPE will be maintained with personnel health records. LHCP must advise the Fire Chief or designee of personnel who are not qualified to use RPE.

5 GUIDELINES FOR SCBA TRAINING AND ANNUAL RECERTIFICATION

5.1 All personnel must receive initial SCBA training as part of the Essentials of Firefighting course (or through an approved equivalent program), and annual recertification through the in-service training program.

5.1.1 The Training Division is responsible for distributing SCBA training materials.

5.1.2 DFRS Battalion Chiefs or volunteer department training coordinators must ensure that the SCBA training distributed by the DFRS Training Division is completed in their districts and in their stations, and that Level I Instructors are available for recertification and other SCBA training.

5.1.3 The training program for initial and annual recertification must include at least these elements:

5.1.3.1 Construction and operation of SCBA;

5.1.3.2 IDLH atmosphere identification;

5.1.3.3 Recognition of medical signs and symptoms that may limit or prevent the effective use of respirators;

5.1.3.4 A "Skills to be Completed" checklist;

5.1.3.5 Failures and emergency procedures;

5.1.3.6 Reporting procedures for defective SCBA;

5.1.3.7 Record keeping; and,

5.1.3.8 Routine station maintenance after use.

5.1.4 Personnel who have not participated in field operations for six months or longer must complete a re-entry program that includes SCBA recertification.

5.1.5 The Fire Chief or designee must maintain records of this training.

6 GUIDELINES FOR USING AND WEARING RESPIRATORY PROTECTION EQUIPMENT

6.1 All personnel who may be exposed to IDLH atmospheres must wear SCBA. They may be required to use SCBA during the attack and overhaul of fires, or while working at any other incident.

6.2 The RPE must be worn until command determines the atmosphere is safe. Personnel may voluntarily continue to wear RPE after command has determined that it can be removed.

7 GUIDELINES FOR FACEPIECES

7.1 All personnel must be provided with a correctly fitted facepiece. Correct facepiece fit will be determined by a quantitative fit test (QNFT) or qualitative fit test (QLFT) pursuant to 29 CFR 1910.134: Fit Testing (Attachment A).

7.2 Personnel will be tested during initial recruit/probationary training, annually, and when a new facepiece design is adopted. Only personnel who have been trained in the fit testing procedure will conduct the quantitative fit testing.

7.2.1 Records of facepiece testing will be kept at the station and copies will be sent to the Breathing Apparatus Repair Shop.

7.3 Personnel who are required to use RPE must not allow any object to enter or pass through the area where the facepiece must seal with the face or interfere with exhalation valve operation.

7.3.1 Helmets, head coverings, and protective hoods must be worn outside the facepiece seal, head harness and straps.

7.3.2 Personnel who are required to use RPE must not have beards or facial hair that interferes with the facepiece seal.

7.3.3 Personnel who wear eyeglasses must not use frames that interrupt the seal area of the facepiece. HCFR will provide spectacle kits for personnel.

7.3.4 Personnel who are required to use RPE must not wear hard contact lenses; however, they may wear soft contact lenses.

7.4 If the LHCP determines during routine medical examinations that an individual may not be able to obtain a facepiece seal because of physical changes (weight loss, dental work, etc.), LHCP staff must recommend to the Fire Chief or designee that a

supplemental fit test be performed.

7.4.1 Each user is to check his/her facepiece seal pursuant to 29 CFR 1910.134 : User Seal Check Procedures (Attachment B).

7.5 Personnel will be fit tested when they report problems related to obtaining a facepiece seal, or if supervisory or LHCP staff observe conditions (such as excessive weight loss) that could affect a proper fit.

7.6 Personnel must not risk exposure by removing the facepiece or disconnecting the regulator in hazardous atmospheres.

7.7 Personnel who detect vapor or gas breakthrough, changes in breathing resistance, or facepiece leakage must leave the IDLH atmosphere and must not re-enter until the problem has been resolved. If a maintenance problem may be the cause, the unit must be taken out of service and repaired pursuant to Section 9 of this policy.

7.8 Each primary piece of apparatus will carry one medium facepiece for each SCBA on the unit.

7.9 Small and large facepieces will be made available.

8 GUIDELINES FOR TRANS-FILL SYSTEMS

8.1 The Trans-Fill system connection may be used when a system fails or the firefighter depletes the air supply of the cylinder in use.

8.1.1 The Trans-Fill system may be used only by personnel who have been trained in its use, and according to manufacturer's instructions.

8.1.2 Trans-filling between two users of SCBA should only be attempted during life threatening emergency situations, or during simulated training exercises. After trans-filling, both donor and receiver must return to fresh air immediately.

8.1.3 Trans-filling shall not be attempted from one SCBA to another SCBA if the donor's audible alarm is ringing.

9 GUIDELINES FOR SCBA MAINTENANCE AND REPAIR REQUIREMENTS

9.1 An SCBA unit must be taken out of service when any defect is found in its assembly.

9.2 An SCBA repair tag must be completed and attached to the unit, and notification

must be made to the Breathing Apparatus Repair Shop.

9.2.1 If maintenance is required, the unit must be transported to the assigned maintenance facility. It may be returned to operational status after shop maintenance has been completed.

9.3 An SCBA used by a firefighter who suffers respiratory injuries, burn injuries, or line of duty death must be impounded by the Incident Commander. The unit's identification must include the name of the user, the date and location of the incident, and a description of the problem. The Incident Commander must take possession of the unit and all appropriate documentation and deliver it to the Health and Safety Officer or designee. All personnel who have handled the respirator involved must sign off on the documentation as the unit is transferred to the Health and Safety Officer.

9.4 All SCBA must be inspected, cleaned and disinfected pursuant to 29 CFR 1910.134: Respirator Cleaning Procedures (Attachment C), and serviced after each use according to the manufacturer's recommendations. Routine inspections, in-station preventive maintenance, and annual maintenance must also comply with the manufacturer's requirements.

9.4.1 In-station inspections must be logged on forms provided by DFRS. Station officers must ensure that these forms are used daily and monthly, and that the unit is identified either by its serial number or a number the station assigned to that unit. The forms below must be used:

9.4.1.1 Daily/weekly vehicle inspection forms used in each station; and

9.4.1.2 Breathing Apparatus Monthly Inspection forms (Attachment D)

9.4.2 Original copies of these reports must be stored in the station for 12 months and a copy must be sent to the Breathing Apparatus Repair Shop on a monthly basis.

9.4.3 All SCBA carried on first-line response units must be inspected daily, before and after use.

9.4.4 All SCBA carried on staff vehicles must be inspected weekly.

9.4.5 All SCBA at the training academy must be inspected before and after use on the days the equipment is used.

9.4.6 All SAR must be inspected daily.

9.4.7 Individual facepieces must be inspected before and after use.

9.5 All SCBA/SAR must receive both preventive maintenance and shop maintenance. All maintenance performed on SCBA must comply with the manufacturer's manual for operations and maintenance. Deviations may be permitted only if authorized in

writing by the manufacturer.

9.5.1 SCBA must receive a complete preventive maintenance inspection on a monthly basis, in accordance with the manufacturer's recommendations.

9.5.2 SCBA must receive periodic shop maintenance, performed by employees who have been trained and certified by the manufacturer.

9.5.3 Individual facepieces must receive preventative maintenance during fit testing.

10 GUIDELINES FOR SCBA/SAR RECORDS

10.1 A records program must be established and maintained for all SCBA/SAR.

10.2 The records program begins with receipt of the unit and ends with its disposal. Documentation must include a complete history of all maintenance performed on any component.

10.3 Records must be established for the regulator, back-pack assembly, and cylinders.

10.4 Each completed assembly must be identified by a station number tag.

11 GUIDELINES FOR CYLINDER AND COMPRESSED BREATHING AIR TESTING AND MAINTENANCE

11.1 Compressed breathing air used in breathing apparatus must meet the requirements of NFPA 1500, Compressed Gas Association, G-7.1, 1992 Edition, commodity specification for air. The minimum air quality is Grade E, with a water vapor level of less than 24 ppm and dew point of -65°F.

11.2 All cylinders must be maintained in accordance with the Compressed Gas Association and SCBA manufacturer's requirements.

11.2.1 SCBA cylinders must be maintained in a fully charged state.

11.2.2 SCBA cylinders must be hydrostatically tested according to the manufacturer's recommendations, normally every three years. These tests must comply with the United States Department of Transportation's rules and regulations.

11.3 Sources of compressed gas breathing air, such as compressors, cascade systems, and storage receivers used for filling SCBA cylinders, must be tested at least every three months.

11.3.1 Breathing air compressors must be maintained according to the manufacturer's recommendations.

11.3.2 A compressor operational log must be maintained at every facility where compressed air is manufactured.

11.3.3 Maintenance records will be kept for all preventative maintenance, repairs and filter changes. Records will be kept at the station and copies will be sent to the Breathing Apparatus Repair Shop.

12 GUIDELINES FOR DFRS PERSONNEL RESPONSIBILITIES

12.1 All personnel must ensure that their SCBA is in working order and ready for use with the correctly sized facepiece when they are assigned a riding position, before entering an IDLH atmosphere, and after each use.

12.2 All officers must require their personnel to follow these procedures to ensure their personal safety.

12.3 The Health and Safety Officer and SCBA Workgroup is responsible for reviewing, evaluating, and making appropriate recommendations on the Respiratory Protection Program as outlined in 29 CFR 1910.134 (I): Program evaluation (Attachment E).

Approved:

Joseph A. Herr
Fire Chief

(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 attachment 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.

29 CFR 1910.134: Fit Testing

Part I. OSHA-Accepted Fit Test Protocols

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, and 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. 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 Attachment B of this policy or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Attachment B. 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, 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) The following test exercises are to be performed for all fit testing methods prescribed in this attachment except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:

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

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

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

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

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text 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).

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.

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 C 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 respirator is fitted with a high-efficiency filter and that the sampling probe and line are properly attached to the facepiece.
(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 Part I A. #14 of this attachment.
(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 attachment.
(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.

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.

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.

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.

29 CFR 1910.134: User Seal Check Procedures

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.

29 CFR 1910.134: Respirator Cleaning Procedures

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 below. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth below, 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 [100°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 [100°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 [100°F] maximum); 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 [100°F] maximum); 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 [100°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.

29 CFR 1910.134 (I): Program evaluation

This section requires the employer to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly.

(1) The employer shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

(2) The employer shall regularly consult employees required to use respirators to assess the employees views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

(i) Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);

(ii) Appropriate respirator selection is for the hazards to which the employee is exposed;

(iii) Proper respirator use under the workplace conditions the employee encounters; and,

(iv) Proper respirator maintenance.

Station ___

Masks

Unit #	Date Inspected	Location	Cylinder Pressure	Regulator & Audi-Larm OK	Facepiece OK	Harness OK	Cleaned & Sanitized	Comments	Initials

Please Fax to Breathing Apparatus Repair Shop (410) 313-2652

Station ___

Cylinders

Cylinder	Location	Hydro Date	Comments

Cylinder	Location	Hydro Date	Comments

Please Fax to Breathing Apparatus Repair Shop (410) 313-2652

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