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Aerospace Medicine

RESPIRATORY PROTECTION PROGRAM



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This standard implements Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.134, Respiratory Protection, for Air Force installations. That OSHA standard, and this standard, comprise a unit which prescribes the minimum requirements for an effective respiratory protection program. Major Commands (MAJCOM), Direct Reporting Units (DRU), and Field Operating Agencies (FOA) may not waive any of these requirements but may supplement this standard with additional or more stringent criteria. Report conflicts in guidance between this standard, federal standards, or Air Force directives through MAJCOM, DRU, or FOA Surgeons to: Air Force Medical Operations Agency (AFMOA/SGOE), 110 Luke Avenue, Room 405, Bolling AFB DC 20332-7050. Refer to AFI 91-301 for instructions on processing supplements and variances.

SUMMARY OF REVISIONS

Three major changes are incorporated into this standard. First, guidance for respiratory protection (RP) against tuberculosis (TB) is added. In addition to stating general RP program considerations for TB, authority is delegated to the medical facilities to determine the appropriate recurring fit test frequency. Second, the total prohibition on use of contact lenses with respirators is deleted; soft and gas permeable contact lenses are permitted. Third, the standard incorporates 29 CFR 1910.134 requirements for medical qualification for RP users and fit test protocols. Refer to the 8 January 1998 and 23 April 1998 Federal Registers for 29 CFR 1910.134 and corrections, respectively. Several minor changes and corrections are also incorporated throughout this standard. New or significantly changed paragraphs are annotated with a bar (|). Prescribed forms do not appear in this standard; they may be accessed at either <http://afpubs.hq.af.mil> or the Air Force Electronic Publications Library (AFEPL).

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1. Introduction.

1.1. Applicability:

1.1.1. This standard contains the minimum elements required to conduct an acceptable base-level respiratory protection program. It applies to operations performed by Department of the Air Force (DAF) civilians and military employees and direct hire foreign nationals (as established by Status of Forces Agreements) of the Air Force, Air National Guard, and Air Force Reserve. These requirements and procedures do not apply to government-owned, contractor-operated (GOCO) operations. Also, these requirements and procedures do not apply to military-unique respiratory protection devices which are designed for use in nuclear, biological, or chemical warfare environments. Military-unique respiratory protection devices shall not be used for protection of workers in peacetime operations.

1.1.2. The specific requirements outlined below in this standard are based on the 29 CFR 1910.134 requirements at the time of publication. Should additional OSHA requirements be published (★including publication of 29 CFR 1910.139 on Tuberculosis) that are more stringent than the requirements in this standard, they shall apply and this standard shall be changed. The respiratory protection requirements outlined for specific contaminants in 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, 29 CFR 1926.1101, Asbestos, and 29 CFR 1926.62, Lead, shall apply. In addition, the respiratory protection requirements in 10 CFR 20, Standards for Protection Against Radiation, shall apply.

1.2. Hazards and Human Factors:

1.2.1. Hazards . Adverse health effects may be caused by inhalation of toxic levels of hazardous materials. These exposures may be long-term, low-level (chronic) or short-term, high level (acute) or both. Health effects from these exposures may vary from minor irritation and temporary illness to permanent organ damage, cancer, and death. The proper use of approved respirators will protect the wearer from toxic levels of airborne chemicals.

1.2.2. Human Factors. Air Force employees who are given approved respirators, are trained in their use, care, and maintenance, and use them correctly will be much less likely to be injured by chemical hazards. The training, fit testing, maintenance, and written program requirements of this standard are designed to enhance health and safety awareness among workers, supervisors, and management.

2. Responsibilities.

2.1. SAF/MIQ. The Deputy Assistant Secretary of the Air Force (Environment, Safety, and Occupational Health) approves AFMOA provided policy and guidance in the respiratory protection program.

2.2. AFMOA. AFMOA/SGOE provides policy and guidance to ensure the effective implementation of the Air Force respiratory protection program.

2.3. USAF School of Aerospace Medicine. The USAF School of Aerospace Medicine will:

2.3.1. Provide respiratory protection training through Air Force specialty code awarding and advanced courses.

2.3.2. Recommend technical changes to this standard, as needed.

2.4. MAJCOM. MAJCOM Bioenvironmental Engineers (BEEs) resolve questions regarding specific interpretations of this standard, and if necessary, coordinate with AFMOA/SGOE.

2.5. Base Level:

2.5.1. Unit Commanders, Directors, and Functional Managers will:

2.5.1.1. Establish and conduct a respiratory protection program conforming to the requirements of this standard and applicable OSHA standards when respiratory protection is used within their organization.

2.5.1.2. Provide personnel using or supervising others who use respiratory protection devices training as outlined in this standard.

2.5.2. Workplace supervisors, where respiratory protection is used, have a direct responsibility for protecting their workers. The supervisor will:

2.5.2.1. Maintain this standard. and develop, maintain, and enforce a workplace operating instruction (OI) according to the guidance in paragraph 9 of this standard. The supervisor shall provide a copy of the OI to Bioenvironmental Engineering (BE) for approval;

2.5.2.2. Contact BE whenever workplace operations change to schedule appropriate evaluations when new chemicals are introduced, processes or procedures are changed, or engineering controls are modified or added;

2.5.2.3. Document initial and annual training on AF Form 55, Employee Safety and Health Record, or electronic equivalent;

2.5.2.4. Provide and document initial and annual training to all personnel in their workplace who use "elective use" filtering face piece devices. Training consists of the limitations in the use of these devices and the potential hazards from their improper use;

2.5.2.5. Provide for quality control of respirator breathing air (if required) according to TO 42B-1-22, Quality Control of Compressed and Liquid Breathing Air, and furnish sampling results to BE;

2.5.2.6. Appoint an individual to be responsible for the use, maintenance, inspection, and care of common use, emergency or escape respirators, as appropriate;

2.5.2.7. Ensure personnel on the respiratory protection program wear the correct respiratory protection for which they have been fit-tested and trained prior to utilization; and

2.5.2.8. Advise all respirator wearers that they may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require such relief.

2.5.3. Individuals who wear respiratory protection will :

2.5.3.1. Use the provided respiratory protection according to the instructions and training received.

2.5.3.2. Guard against its damage.

2.5.3.3. Report to their supervisor any change in medical status which may impact their ability to safely wear respiratory protection.

2.5.3.4. Inspect, clean, and maintain any respiratory protection device issued to them for their individual use.

2.5.3.5. Wear only that respiratory protection for which they have received fit-testing and training, and only for the tasks specified.

2.5.3.6. Maintain the integrity of the NIOSH/MSHA certification by not mixing parts from different manufacturers.

2.5.4. Bioenvironmental Engineering (BE)

2.5.4.1. Is the office of primary responsibility for the base respiratory protection program.

2.5.4.2. Is the authority for determining if respiratory protection is required.

2.5.4.3. Will administer or appoint another individual to administer the base respiratory protection program. **This program "administrator" will:**

2.5.4.3.1. Be qualified through one of the means stated below:

2.5.4.3.1.1. Graduate of USAFSAM Course B3AZY4BOX1-015, Advanced Respiratory and Personal Protective Equipment.

2.5.4.3.1.2. Graduate of USAFSAM Course B3OBY9121-000, Bioenvironmental Engineering.

2.5.4.3.2. Develop and maintain a base directive. An example template is at [Attachment 1](#).

2.5.4.3.3. Maintain current copies of 29 CFR 1910, 29 CFR 1926, and the NIOSH Certified Equipment List. The list is available free of charge by calling NIOSH at 1-800-35NIOSH (1-800-356-4674) or at the NIOSH web site: <http://www.cdc.gov/niosh/homepage.html>.

2.5.4.3.4. Identify all requirements outlined in applicable OSHA standards.

2.5.4.3.5. Be the base level authority on selection, use, fit-testing, limitations, and maintenance of respirators used for protection against inhalation of harmful atmospheres.

2.5.4.3.6. Give guidance to shop supervisors as necessary, in the preparation of the shop respiratory protection program OI and annual training program.

2.5.4.3.7. Ensure fit-testing is conducted according to provisions in this standard.

2.5.4.3.8. Educate and train workplace supervisors, workers, and those individuals appointed to oversee the use, maintenance, and care of common use or emergency escape respirators during the initial and annual respirator fit-testing protocol.

2.5.4.3.9. Conduct a respiratory protection program review according to provisions in this standard.

2.5.4.3.10. Ensure BE is on the NIOSH respirator user's notices mailing list. To be added to the list, submit a written request to the following address:

Chief, Certification and Quality Assurance Program

Division of Safety Research

National Institute for Occupational Safety and Health
944 Chestnut Ridge Road
Morgantown, WV 26505

Respirator user's notices may also be viewed at the NIOSH web site: <http://www.cdc.gov/niosh/homepage.html>.

2.5.4.3.11. Prepare a master respiratory protection inventory for the base.

2.5.4.3.12. Resolve inconsistencies between technical orders (TOs) and this standard using official channels (AFTO Form 22).

2.5.4.3.13. Coordinate completion of medical evaluation questionnaires by respirator users.

2.5.5. The Aeromedical Council will establish a medical evaluation protocol for respirator users.

2.5.6. The Chief, Public Health, will ensure all respirator users have been correctly coded to receive baseline and annual medical evaluations.

2.5.7. The Physical Examinations Section or Occupational Medicine Services will arrange for and conduct initial and routine medical surveillance of respirator users required by this standard and applicable OSHA standards.

2.5.8. The Commander, Aerospace Medicine Squadron, will ensure a physician or other licensed health care professional (PLHCP), as defined in 29 CFR 1910.134, para (b), makes the determination that a worker is physically able to wear a respirator.

2.5.9. The Chief, Ground Safety will refer any suspected problems on respirator usage discovered during their inspections to BE.

2.5.10. The Chief, Fire Department , will

2.5.10.1. Provide training on the use and maintenance of self contained breathing apparatuses (SCBA).

2.5.10.2. Ensure required maintenance for regulating or admission valves, regulators, and alarms for SCBA's is performed by the respirator manufacturer or appointed individual(s) trained and certified by the manufacturer to conduct such maintenance.

3. Base level Program Elements

3.1. General Discussion . Bioenvironmental Engineering is the base level authority on respiratory protection and conducts all aspects of a base level program unless otherwise specified by this standard. The base level authority on medical surveillance of respirator users is the Aeromedical Council.

3.1.1. The use of respiratory protection should be a last resort. Substituting less hazardous materials or processes, eliminating hazards through engineering changes or controls, isolating hazardous operations, or providing administrative controls shall be considered before the decision is made to protect workers with respirators.

3.1.2. Only government-provided respirators shall be used by government employees in Air Force workplaces. No privately-procured respiratory protection device will be used by government employees in Air Force workplaces.

3.1.3. No government employee may wear a respirator unless required or recommended by BE.

3.1.4. If inconsistencies between a technical order (TO) and this standard are found, official channels (AFTO Form 22, Technical Order Improvement Report and Reply) should be used to request a change to the TO. Base BE will send a coordinated copy of the AFTO Form 22 to the MAJ-COM BEE.

3.2. Categories of Respirator Usage. Bioenvironmental Engineering shall identify the location and use of all respirators worn by government employees on base and categorize them as follows:

3.2.1. Required . Respirator use shall be required only:

3.2.1.1. When other means of control do not reduce exposure below the OEL;

3.2.1.2. When other means of control are not feasible (this may include use during intermittent, non routine operations);

3.2.1.3. In emergency situations;

3.2.1.4. When specified by an OSHA standard or Air Force directive. Some substance-specific OSHA standards, such as the lead standard, require the employer to provide workers with respirators whenever they request them, even if exposures are below applicable OELs. Since these respirators must be provided by law, they fall into this standard's "required" category.

3.2.1.5. As an interim measure while permanent controls are being designed or installed;

3.2.1.6. When, in the BEE's professional opinion, exposures could potentially be greater than an OEL.

3.2.2. Recommended . Respirator use is recommended when, in the BEE's professional opinion, short-term operations could result in significant acute exposures which would be expected to be less than applicable time-weighted OELs but high enough to warrant protecting the workers.

3.2.3. Elective . Elective use respirators **will not** be worn by government employees in Air Force workplaces.

3.2.3.1. Employees may request an evaluation of their individual work conditions by BE if they are not already on the respiratory protection program but believe they have special reasons to want to wear respiratory protection.

3.2.3.2. Filtering face piece devices are the only type of respiratory protection that may be worn at the discretion of a government employee ("for comfort purposes") in an Air Force workplace. Personnel who wear elective use filtering face piece devices must receive initial and update training. Supervisors shall clearly train workers on the limitations of the devices.

3.3. Basic Elements. The elements of a respiratory protection program include: workplace exposure monitoring and surveillance, selection criteria; training and fit-testing procedures; written OIs; use, maintenance, and care procedures; administrative procedures; guidelines for emergency use of respirators; medical surveillance; and procedures for program evaluation. These elements shall be addressed in the base regulation required by this standard and shop OIs.

3.4. Procedures . The BE program administrator uses the following procedures when establishing a respiratory protection program:

3.4.1. A list of the workplaces which use respiratory protection is made. The list (master respirator inventory) includes at least the name of the workplace, the workplace identifier, the type of respirator used, category of use, and the operations or processes during which the respirator is used. Quarterly updates will be furnished to the Physical Examinations section, Public Health, and the wing safety office.

3.4.2. An evaluation of the requirement for and adequacy of the respirators used in the workplace is conducted. This may include air sampling of contaminants in the workplace, review of workplace respirator operating procedures (use, care, inspection, and maintenance) and OIs, and review of the respiratory protection equipment available in the shop. This may be done as a part of the BE workplace evaluation.

3.4.2.1. As a part of this evaluation, BE will check that the correct type of respirator is being used. Also, if air-purifying respirators are used, BE will check that the correct cartridges, filters, or canisters have been selected and are on hand. Paragraph 4. of this standard shall be used for selection of respiratory protection.

3.4.2.2. When respirators are used for protection against chemicals with substance-specific OSHA standards, all requirements of the OSHA standard shall be met.

3.4.3. Categorize respirator usage according to criteria in paragraph 3.2. above.

3.4.4. Medical qualification of workers who wear respirators is determined. Workers shall receive initial and annual training and fit-testing (see exception for TB fit testing, para 4.2.2.19.5.). Public Health ensures respirator users are identified for baseline and annual physical examinations. Bioenvironmental Engineering conducts the fit-testing and training as specified in this standard. Supervisors ensure workers have received the necessary examinations, training, and fit-testing. Supervisors receive training from BE as specified in paragraph 7. of this standard.

3.4.5. Procedures for controlling the ordering and issue of respirators are established. Stock levels of respirators and replacement parts may be established.

3.4.6. After the base respiratory protection program is established, it is evaluated annually as required by paragraph 9. of this standard.

3.5. Filtering Face Piece Devices. The only use of filtering face piece devices authorized by this standard for required or recommended respiratory protection is for protection of workers against Tuberculosis (TB). Also refer to paragraphs 3.2.3.2. and 4.2.2.19. of this standard.

4. Selection, Use, and Limitations of Respirators.

4.1. General Considerations:

4.1.1. Worker Activity . Each worker's activity and location in a hazardous area shall be considered when selecting the proper respiratory protection. For example, whether the worker is in the hazardous area continuously or intermittently during the work shift and whether the work rate is light, medium, or heavy.

4.1.2. Respirator Use Conditions . The period of time a respirator must be worn is an important factor that shall be taken into account in selecting a respirator. Consideration shall be given to the type of respirator application, such as for routine, non routine, emergency, or rescue use.

4.1.3. Location of the Potential Hazardous Area . The location of the hazardous area with respect to a safe area, which has respirable air, shall be considered when selecting a respirator. This will permit planning for the escape of workers if an emergency occurs, for the entry of workers to perform maintenance duties, and for rescue operations.

4.1.4. Operational Limitations . Environmental conditions and level of effort required of the respirator wearer may affect respirator service life. For example, extreme physical exertion can cause the user to deplete the air supply in a SCBA such that its service life is reduced by half or more.

4.1.5. Approved respirators .

4.1.5.1. Respirators designed for use in nuclear, chemical, and biological contingency environments (MCU-2A/P, etc.), which do not carry NIOSH or MSHA approval, shall NOT be used for industrial respiratory protection, including emergency escape.

4.1.5.2. Only respirators approved by NIOSH or MSHA shall be used.

4.2. Selection. Respirator selection involves the review of each operation to determine what hazards may be present (hazard determination) and to select the type or class of respirators which offers adequate protection.

4.2.1. Hazard Determination Steps :

4.2.1.1. Determine what contaminants may be present in the workplace.

4.2.1.2. Determine if there is an OEL or estimate the toxicity for the contaminants. Determine if the workplace contaminant concentration exceeds or could exceed the IDLH.

4.2.1.3. Determine if there is an OSHA substance-specific standard (e.g., lead, asbestos) for the contaminant. If so, there may be specific respirator requirements which will influence the selection process.

4.2.1.4. If the potential for an oxygen deficient environment exists, measure the oxygen content.

4.2.1.5. If the potential for an explosive atmosphere exists, measure the concentration of the contaminant, and determine if it is equal to or greater than 10 percent of the Lower Explosive Limit (LEL).

4.2.1.6. Measure or estimate the concentration of the contaminants. Air sampling shall be performed if the respirator is provided to reduce exposure to radionuclides. In all cases where respirator use is categorized as required or recommended, BE shall conduct air sampling to quantify worker exposure if and when it is feasible to do so.

4.2.1.7. Determine the physical state of the contaminants (i.e., aerosol or vapor).

4.2.1.8. Determine whether the contaminants present can be absorbed through the skin, produce skin sensitization, or be irritating or corrosive to the eyes or skin.

4.2.1.9. Determine for a gas or vapor contaminant if a known odor, taste, or irritation concen-

tration exists.

4.2.1.10. Determine if there is a potential for a sudden chemical release that could impair a worker's ability to egress the area safely. If so, an appropriate type of respirator should be worn in such circumstances, even though there normally is no air contaminant.

4.2.2. Selection of Respirators for Routine Use . Respirator selection involves professional judgment, and determining a step-by-step decision logic is not possible. Described below are minimum respiratory protection requirements. Respirators which provide more protection may be used. **Attachment 3** and the AF Form 2773, Respirator Selection Worksheet (at **Attachment 4**) shall be used to assist in the selection of appropriate respiratory protection. After completion, the AF Form 2773 shall be filed in the BE casefile.

4.2.2.1. If respirators are worn during fire fighting, select SCBA with full-face piece that is operated in the pressure-demand mode.

4.2.2.2. If unable to determine what potentially hazardous contaminant may be present (i.e., outdoor environmental hazardous materials sampling), consider the atmosphere as IDLH, and select a positive pressure SCBA with full-face piece or a full-face piece, supplied-air respirator with emergency escape SCBA.

4.2.2.3. If no OEL or guideline is available and estimates of the toxicity cannot be made in uncontrolled environments, consider the atmosphere IDLH, and select a positive pressure SCBA with full-face piece or a full-face piece, supplied-air respirator with emergency escape SCBA.

4.2.2.4. If measurements or estimates indicate the atmosphere is IDLH, select a positive pressure SCBA or a supplied-air respirator with escape SCBA. NOTE: A full-face piece respirator may be needed if contaminants irritating to the eyes are present.

4.2.2.5. If an atmosphere is oxygen deficient (less than 19.5 percent oxygen by volume), select a positive pressure SCBA or a supplied-air respirator with escape SCBA.

4.2.2.6. If the respirator is to be used in a confined space, refer to AFOSH standard 91-25 for respirator selection. However, ensure all requirements of this AFOSH standard are met.

4.2.2.7. If a more stringent standard (such as a substance-specific OSHA standard for lead, asbestos, cadmium, etc.) exists for the contaminants, follow those guidelines and requirements for respirator selection.

4.2.2.8. Divide the measured or estimated concentration of each contaminant by the OEL or guideline to obtain a hazard ratio. When two or more substances are present and act on the same target organ, calculate the compliance factor rather than considering each substance individually. The sum of the hazard ratio for two or more substances is the same as the compliance factor. Select a respirator with an assigned protection factor greater than the value of the hazard ratio, as listed in **Attachment 4**.

4.2.2.9. If the contaminant is a gas or vapor only, select a device with an assigned protection factor that is greater than the hazard ratio. Ensure the concentration is less than the maximum use concentration of the cartridge or canister.

4.2.2.10. If the contaminant is a gas or vapor and has poor warning properties, use an atmosphere supplying respirator, unless the atmosphere supplying respirator cannot be used

because of the lack of a feasible air supply or because of the need for worker mobility. (Use Warning Properties of Industrial Chemicals or other appropriate publications as a reference.) Use air-purifying devices only if:

- 4.2.2.10.1. The air-purifying respirator has a reliable end of service life indicator that will warn the user prior to contaminant breakthrough, or
 - 4.2.2.10.2. Cartridge change schedule is implemented based on cartridge service data including desorption studies (unless cartridges are changed daily); expected concentration; pattern of use; duration of exposure have been established; and the chemical does not have a ceiling limit. If this is the case, BE shall determine that the respirator will provide adequate protection and the change schedule is appropriate.
- 4.2.2.11. If the contaminant is a paint, lacquer or enamel, select an air-purifying respirator with a cartridge (approved for the contaminant) and a paint prefilter, or select an atmosphere supplying respirator. If the workers also perform other operations such as sanding which require them to wear a respirator, they will use either an atmosphere supplying respirator or a NIOSH-approved air-purifying respirator equipped with appropriate cartridges and a HEPA prefilter (or equivalent as certified by NIOSH under 42 CFR 84).
- 4.2.2.12. If the contaminant is an isocyanate (monomer or prepolymer):
- 4.2.2.12.1. Use a supplied air-respirator for spray painting or touch-up with polyurethane paints indoors regardless of the environmental controls or the amount of paint applied. Individuals spray painting under these conditions will also wear coveralls, hoods, gloves, and boot covers. When spray painting is done indoors, in an open area, such as a hangar, all unprotected personnel shall be removed.
 - 4.2.2.12.2. Use a full face piece air-purifying respirator with organic vapor cartridges and HEPA filters (or equivalent as certified by NIOSH under 42 CFR 84) when painting with polyurethane paints ONLY when the painting is performed outside for touch-up or stenciling in small increments. Individuals performing this work will also wear coveralls and gloves. If outside spray painting exceeds touch-up or stenciling quantities, the worker shall wear a supplied air respirator and other personal protective equipment as described above.
 - 4.2.2.12.3. Use a full-face piece, air-purifying respirator with organic vapor cartridges and HEPA filters (or equivalent as certified by NIOSH under 42 CFR 84) when performing roll-on or brush painting applications regardless of the painting location, environmental controls, or amounts applied. Also, coveralls, boot covers, and gloves shall be worn.
 - 4.2.2.12.4. Use a supplied-air respirator when performing foam-in-place operations. Also, coveralls, hoods, gloves, and boot covers shall be worn.
- 4.2.2.13. If the contaminant is a pesticide, select an atmosphere supplying respirator or an air-purifying respirator with cartridges approved for pesticides. (The approval label of the pesticide being applied may prohibit the use of certain respirators).
- 4.2.2.14. If the contaminant is an aerosol, with a particle size (Mean Mass Aerodynamic Diameter [MMAD]) less than 2 micrometers or with an unknown particle size, use a HEPA filter (or equivalent as certified by NIOSH under 42 CFR 84).

4.2.2.15. If the contaminant is an aerosol and has an OEL which is less than 0.05 mg/m^3 , use a HEPA filter (or equivalent as certified by NIOSH under 42 CFR 84).

4.2.2.16. If the contaminant is a fume, use a filter approved for fumes or a HEPA filter (or equivalent as certified by NIOSH under 42 CFR 84).

4.2.2.17. If the contaminant is an aerosol, with a particle size greater than 2 micrometers MMAD, use any filter type dust, fumes, mist or high efficiency respirators.

4.2.2.18. If the operation entails abrasive blasting, select a respirator specifically approved for abrasive blasting. Three types of abrasive blasting respirators exist: loose-fitting face piece operated in the continuous flow mode, tight-fitting face piece operated in the continuous flow mode, and tight-fitting face piece operated in the pressure-demand mode. Abrasive blasting in confined spaces may generate contaminant levels that exceed the capabilities of any respirator. In this case, engineering controls to reduce the hazard ratio below the assigned protection factor are needed. Workers may use a respirator once the hazard ratio is lowered below the assigned protection factor of the respirator.

4.2.2.19. Tuberculosis (TB)

4.2.2.19.1. A respiratory protection program, as described in this standard, will be implemented to the extent required by OSHA. Respiratory protection is required in the following situations:

4.2.2.19.1.1. When workers enter rooms housing individuals with suspected or confirmed infectious TB.

4.2.2.19.1.2. When workers are present during the performance of high hazard procedures (e.g. bronchoscopy, sputum induction) on individuals who have suspected or confirmed infectious TB.

4.2.2.19.1.3. When emergency response or other personnel transport, in a closed vehicle, an individual with suspected or confirmed infectious TB.

4.2.2.19.1.4. For aeromedical evacuation (AE) operations, some specific and unique guidelines have been established because of the confined nature of aircraft and recirculation of air in the aircraft. There are three different patient categories under AE operations. For each category, specific respiratory protection is outlined below. HQ AMC/SGPB can provide additional respiratory protection guidance for AE operations.

4.2.2.19.1.4.1. The first patient category is for patients with diagnosed pulmonary TB having at least two full weeks or more of treatment with appropriate medications. These patients can be safely transported without respiratory protection. For this category of patient, AE crewmembers and front-end crew are not required to wear respirators.

4.2.2.19.1.4.2. The second category is for patients with diagnosed pulmonary TB having less than two full weeks of treatment and patients undiagnosed with TB but with a differential diagnosis of suspected or possible TB. These patients require respiratory protection for the entire duration of the flight to be safely transported in AE aircraft. AE crewmembers providing direct care to these patients are also required to wear respiratory protection while providing treatment. Other AE crew-

members and front-end crew do not need to wear respirators.

4.2.2.19.1.4.3. The third category is for patients with confirmed or suspected multi-drug resistant TB. The patient and all AE crewmembers and front-end crew must wear respiratory protection for the entire duration of the. The front-end crew may wear oxygen masks in lieu of respirators.

4.2.2.19.2. Respiratory protection selected for this purpose must meet Centers for Disease Control and Prevention (CDC) criteria for protection against TB.

4.2.2.19.3. Respirators and filtering face piece devices with N, P, or R series filters at 95, 99, or 99.97% efficiencies, and HEPA filters, are authorized for use in Air Force medical treatment facilities for protection against TB. Powered air-purifying respirators (PAPRs) and atmosphere supplying respirators may also be used when filtering face piece devices and other air purifying respirators will not provide adequate protection.

4.2.2.19.4. The decision to use filtering face piece devices or other level of respiratory protection will be made at each facility, taking into consideration the local incidence of TB and any other facility or patient population factors that could affect TB exposure.

4.2.2.19.5. Qualitative or quantitative fit testing will be performed initially using a method approved in this standard or the method recommended by the respiratory protection device manufacturer, and thereafter at a frequency determined at each facility. The frequency should take into consideration local TB incidence and any other facility or patient population factors that could affect TB exposure. Fit testing will be reaccomplished if the user changes model or size of respiratory protection, has experienced significant weight loss or gain, or has a change in facial structure.

4.2.2.19.6. Upon donning, respirator and filtering face piece device users will perform a fit check in accordance with the manufacturer's instructions.

4.2.2.19.7. Each facility will address the circumstances in which the respirator/filtering face piece device is considered to be contaminated and not reusable. Some factors to consider are physical damage (e.g., crushing, tearing) and soiling during a high risk procedure.

4.2.2.20. When selecting atmosphere supplying respirators, consider the following:

4.2.2.20.1. Hose masks shall not be used.

4.2.2.20.2. SCBAs operated in the pressure demand rather than demand mode should be selected because of the additional protection that the pressure demand mode provides.

4.3. Use. Respirator use is either required or recommended. Unless otherwise specified in this standard, all requirements outlined in this standard apply to all respirator use. Special use circumstances are described below.

4.3.1. Escape purposes . When selecting an escape only respirator, careful consideration shall be given to the escape conditions (i.e., distance to exit, obstacles, etc.), the potential for eye irritation, the time required to don the respirator, and the working properties of the substances. See attachment 6 (selection options for escape respirators) and the "NIOSH Guide to Industrial Respiratory Protection."

4.3.1.1. Consideration shall be given to mandating the wear of any tight-fitting respirator dur-

ing high-risk operations. If such wear is mandatory, or the potential contaminant possesses poor warning properties, a means of detection (such as a test solution, or sensor alarms) shall be present so personnel may be adequately warned of the need to evacuate.

4.3.1.2. During lower-risk operations, consideration shall be given to mandating carrying of the respirator for quick-donning if the need arises. Individuals shall be able to adequately determine the need for the respirator either through the substance's warning properties or provided detection means. If this option is exercised, wearers shall be able to don and seal the respirator within six seconds.

4.3.1.3. Escape-only respirators may be either SCBA or air purifying respirators.

4.3.1.3.1. SCBA is the only approved respirator for escape from an oxygen-deficient atmosphere.

4.3.1.3.2. Air purifying respirators may be used for escape from low concentrations of vapors, acid gases, or particulates. Air purifying escape respirators may be either half-mask or full-face piece NIOSH or MSHA approved gas masks. No air purifying device is appropriate for escape from a potentially oxygen deficient atmosphere. **WARNING.** Military chemical agent masks are not NIOSH or MSHA approved gas masks.

4.3.1.4. The respirator selected shall have an assigned protection factor which is greater than the worst case hazard ratio under emergency escape conditions.

4.3.2. IDLH Conditions. All possible actions, such as increasing ventilation or isolating the source of contaminants, to attain an atmosphere below IDLH should be considered before authorizing personnel to enter known IDLH conditions. Refer to 29 CFR 1910.134, paras g(3) and g(4) for procedures for IDLH atmospheres. Also refer to AFOSH standard 91-25 for additional information for confined space operations.

4.3.3. Other Exposure Routes . Consider other exposure routes (skin absorption or external radiation) when selecting respiratory protection. Worker exposure could be increased by wearing the respirator. For example, if the work activity stay times in an external radiation field are increased by wearing the respirator (it takes longer to do the job), then this might result in more rather than less dose. The additional external radiation exposure or skin absorption exposure of chemical vapor caused by longer stay times might be greater than the internal exposure saved by using a respirator.

4.4. Limitations:

4.4.1. Facial Hair. The only type of respirator an individual with facial hair (as defined in the Glossary) shall be permitted to wear is a supplied-air, positive pressure type or a powered air-purifying respirator. The respirator shall have a hood or shroud, shall be operated in the continuous flow mode, shall not have a tight-fitting face piece, and shall not incorporate an anti-aspiration device which contacts the face or neck. The unit commander, director, or functional manager will decide if a separate system will be purchased for bearded workers.

4.4.2. Communications . Ambient environmental noise and communication needs shall be considered when specific respirators are selected. See [Attachment 7](#).

4.4.3. Eye Irritation . If contaminants cause eye irritation, full-face piece respirators shall be worn.

4.4.4. Vision:

4.4.4.1. When a respirator user must wear corrective lenses, protective spectacle or goggle, face shield, welding helmet, or other eye and face protective device, the item shall be fitted to provide good vision and shall be worn in such a manner as not to interfere with the seal of the respirator.

4.4.4.2. Spectacles with straps or temple bars that pass through the sealing surface of either negative or positive pressure, tight-fitting, full-face piece respirators shall not be used.

4.4.4.3. Gas permeable and soft contact lenses may be worn with respirators.

4.4.4.4. If an individual who must wear corrective lenses uses spectacle inserts with a full-face piece respirator, the spectacle inserts for the respirator will be purchased by the government using a prescription provided by the user.

4.4.4.5. If an individual who must wear corrective lenses elects to wear contact lenses with any respirator, the contact lenses will be purchased by the individual.

4.4.5. Respirator Sealing Problems:

4.4.5.1. A head covering which passes between the sealing surface of a tight-fitting respirator face piece and the wearer's face shall not be used.

4.4.5.2. The harness straps of a tight-fitting respirator shall not be positioned or worn over hard hats.

4.4.5.3. The wearing of a hard hat or other protective equipment used by the wearer shall not interfere with the seal of the respirator.

4.4.6. Respirator Use in Low Temperature Environments. Low temperatures may cause detrimental effects on the performance of respirators. The effects of low temperatures shall be considered in the selection and maintenance of respirators and respirable gas supplies. See attachment 8 for more information.

4.4.7. Respirator Use In High Temperature Environments. High temperatures may affect the performance of the respirator, and may add undue physiological stress. The effects of high temperatures shall be considered in respirator selection and for medical approvals. See [Attachment 9](#) for more information.

5. Medical Evaluation

5.1. General Information. Potential respirator wearers will receive a medical evaluation prior to initial fit testing to identify existing medical conditions that would place the worker at increased health risk from the use of the respirator or interfere with the use or wear of a respirator. The OSHA standard (29 CFR 1910.134, para (e) and Appendix C) specifies the minimum mandatory requirements for medical evaluation. In addition, each facility may elect to implement those requirements categorized by OSHA as optional, or any other requirements deemed necessary locally.

5.2. Medical Questionnaire. The recommended approach to the medical evaluation begins with a medical questionnaire. At minimum, the mandatory questions stated in the 29 CFR 1910.134, Appendix C, will be used. In addition to the mandatory questions, OSHA's optional questions and other questions developed locally may be used.

5.2.1. The completed questionnaires will be reviewed by the respiratory protection program consultant physician or other licensed health care professional (PLHCP), as defined in 29 CFR 1910.134, para (b) definitions.

5.3. Follow-up Medical Examination:

5.3.1. Based on worker answers to the medical questionnaire, a follow-up medical examination may be required. The follow-up medical examination is required if the criteria in 29 CFR 1910.134, para (e)(3) are met. Additional criteria may be established locally.

5.3.2. The follow-up medical examination will include any medical tests, consultations, or diagnostic procedures the evaluating PLHCP deems necessary to make a final determination. Note: Pulmonary function studies are often included in respirator certification examinations, however, they are not reliable in predicting who can and cannot wear a respirator. They should not be routinely performed. Thus it is recommended that spirometry, chest x-rays and other tests be done only when clinically indicated.

5.4. Medical Evaluation Process. The questionnaire and follow-up medical examinations (if needed) will be administered according to 29 CFR 1910.134, para (e)(4), (e)(5), (e)(6), and (e)(7).

5.4.1. BE will provide the evaluating PLHCP the information required in 29 CFR 1910.134, para (e)(5)(i). The means to transfer this information from BE to the PLHCP will be determined locally.

5.4.1.1. 29 CFR 1910.134, para (e)(5)(i)(C) requires a statement on the expected physical work effort. To clarify, physical work effort includes those factors other than ambient conditions and other PPE worn that affect how hard someone has to work while wearing a respirator, e.g., climb, lift/carry heavy objects, dig, crawl, etc. For illustrative purposes, this requirement may be met by statements such as, “worker climbs in and out of manholes to a depth of 25 feet;” “worker crawls for a distance of 10 feet in tight confined space carrying 25 pounds;” or “light physical work load – worker uses paint spray gun on small parts at waist level.”

5.4.2. Following review of the questionnaire, follow-up medical exam, if needed, and the information required in para [4.4.1.](#), above, the PLHCP will determine worker ability to use a respirator.

5.4.3. The PLHCP’s written recommendation will include only the information required in 29 CFR 1910.134, para (e)(6).

5.4.3.1. To maintain the confidentiality of the medical questionnaire, the PLHCP’s recommendation will be documented on a separate form or letter (i.e., not on the questionnaire itself).

5.4.3.1.1. If the PLHCP recommends the worker can wear a respirator without restrictions, the written recommendation will be filed in the medical record, a copy sent to BE, who can proceed with fit testing, and a copy given to the worker.

5.4.3.1.2. If the PLHCP recommends respirator use with restrictions, the written recommendation will be filed in the medical record, a copy sent to BE, who can proceed with fit testing, and copies given to the worker, the worker’s supervisor, and, if the worker is civilian, the civilian personnel office.

5.4.3.1.3. If a worker recovers from the medical condition and restrictions can be lifted,

the PLHCP's recommendation will be re-done and be distributed to the worker, the worker's supervisor, civilian personnel (if applicable), and BE (in case a new fit test needs to be accomplished).

5.4.3.1.4. If the PLHCP recommends against respirator use, the written recommendation will be placed in the worker's medical record, with copies given to the worker, the worker's supervisor, and, if the worker is civilian, the civilian personnel office.

5.5. Frequency of medical evaluations. Medical evaluations (including the medical questionnaire, as described in para 5.2., above), do not need to be accomplished annually. After the initial medical evaluation, additional medical evaluations will be performed according to 29 CFR 1910.134, para (e)(7). Additional criteria may be added locally.

5.5.1. The following actions should be considered to facilitate identifying workers who may have developed medical conditions affecting respirator use since initial fit testing.

5.5.1.1. Brief workers and supervisors to notify BE if there are any questions or concerns about a worker's ability to use a respirator due to a medical condition.

5.5.1.2. Brief the medical facility professional staff at least annually to notify, as soon as possible, the PLHCP and BE if a patient who uses a respirator develops a medical condition that could affect ability to use a respirator.

5.5.1.3. When a worker reports to BE for the annual respirator fit test, BE asks if the worker has experienced any difficulty wearing a respirator.

| 6. Fit-Testing.

6.1. General Information. There are differences among approved respirators and one type may fit better or be more comfortable than another. Different sizes of the same model or different models of respirators should be obtained to provide employees a selection of respirators and a good fit. Local purchase of respirators is authorized and will be used when it is necessary to obtain an acceptable face fit.

6.2. Fit Testing Procedures

6.2.1. Before a worker may be required to wear a respirator with a negative or positive pressure tight-fitting face piece, the worker must be fit tested with the same make, model, style, and size of respirator that will be used in the workplace.

6.2.2. Fit testing will be performed according to 29 CFR 1910.134, para (f).

6.2.3. Fit testing will be performed using OSHA accepted qualitative or quantitative protocols and procedures, as described in 29 CFR 1910.134, Appendix A.

6.2.4. Quantitative fit testing will be used for the following situations.

6.2.4.1. When quantitative fit testing is required by a substance-specific OSHA standard.

6.2.4.2. When fit testing a negative pressure air-purifying respirators that must achieve a fit factor of greater than 100 (i.e., full face-piece respirators).

6.2.5. When quantitative fit testing is not required by para 6.2.4., above, qualitative or quantitative fit testing may be used for the following situations.

6.2.5.1. When fit testing a negative pressure air-purifying respirators that must achieve a fit factor of 100 or less (i.e., half face-piece respirators).

6.2.5.2. When fit testing atmosphere-supplying or powered air-purifying respirators.

6.3. Frequency of fit tests.

6.3.1. With the exceptions noted below, a respirator fit-test shall be carried out for each wearer of a tight-fitting respirator at least once every 12 months. The exceptions are:

6.3.1.1. Respiratory protection for TB (see para [4.2.2.19.5.](#)).

6.3.1.2. When increased frequency is required by a substance-specific OSHA standard (e.g., asbestos, lead, every 6 months).

6.3.1.3. A new fit test will be accomplished when a worker experiences a change in physical condition that could affect respirator fit (e.g., weight change of more than 20 pounds, facial scarring, dental changes, cosmetic surgery, disfigurement etc).

6.4. Failure to pass fit test. If a medically cleared worker cannot be fitted with a respirator, consideration should be given to providing the worker with a positive pressure, loose-fitting face piece, helmet, or hood.

6.4.1. If a loose fitting respirator does not provide adequate protection for the workplace exposures, BE will write a letter to the worker to that effect, with copies distributed to the worker's medical record, the worker's supervisor, and, if the worker is civilian, the civilian personnel office. Consideration should be given to transferring the worker to a job or workplace where a lower level of respiratory protection is required.

6.5. Record Keeping .

6.5.1. Records of respirator fit-test results will include the information required in 29 CFR 1910.134, para (m)(2)(i)(A-E).

6.5.1.1. This information will be recorded on/attached to the AF Form 2772, Certificate of Respirator Fit Test, or any other form meeting this purpose that is developed locally.

6.5.1.2. Two copies of the respirator fit-test results will be generated.

6.5.1.2.1. One copy will be given to the respirator wearer's supervisor to be maintained with the wearer's AF Form 55.

6.5.1.2.2. One copy will be placed in Tab F of the workplace casefile. This copy will have the same file retention period as the casefile.

6.6. User Seal Check Procedures. Workers who use tight-fitting respirators will perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Workers will use either the positive and negative pressure check methods listed in 29 CFR 1910.134, Appendix B-1, or the respirator manufacturer's recommended user seal check method.

7. Training

7.1. Supervisors. BE will provide or arrange to provide the initial training of supervisors who have the responsibility of overseeing work activities of one or more persons who must wear respirators. Training will be repeated when a supervisor has a permanent change of station or becomes supervisor

of a different workplace. Documentation of training will be made on AF Form 55, Employee Safety and Health Record, and on AF Form 2767, Occupational Health Training and Protective Equipment Fit Testing Record. The AF Form 2767 shall be included in the appropriate case file. The training will include the following subjects as a minimum:

- 7.1.1. Basic respiratory protection practices.
- 7.1.2. Nature and extent of respiratory hazards to which workers under their supervision may be exposed.
- 7.1.3. Recognition and resolution of respirator use problems.
- 7.1.4. Principles and criteria for selecting respirators used by workers under their supervision.
- 7.1.5. Training of respirator wearers.
- 7.1.6. Fitting and issuance of respirators.
- 7.1.7. Inspection of respirators.
- 7.1.8. Use of respirators, including monitoring of use.
- 7.1.9. Maintenance and storage of respirators.
- 7.1.10. Regulations concerning respirator use, including the preparation of workplace OIs.

7.2. Person Issuing Respirators. Base supply personnel who issue respirators shall receive training on procedures for respirator issue. Similar training must be given to non-base supply personnel such as bench stock monitors who issue respirators. Training shall be conducted annually by the supervisor. Training shall be based on the procedures stated in the base regulation implementing this standard, and shall emphasize the importance of prohibiting the issue of "suitable substitutes" for the respirator or respirator part ordered.

7.3. Respirator Wearer - Initial. BE will provide initial training to respirator wearers. Initial training shall be repeated at an individual's new duty station if a person has a permanent change of station. Documentation of the initial training will be made on AF Forms 55 and 2767. Initial training shall include the following elements:

- 7.3.1. Instruction in the nature of the hazard, whether acute, chronic, or both, and a frank appraisal of what may happen if the respirator is not used.
- 7.3.2. An explanation of why other controls (such as engineering controls) are not being applied or are not adequate and of what effort is being made to reduce or eliminate the need for respirators.
- 7.3.3. An explanation of why a particular type of respirator has been selected for a specific respiratory hazard.
- 7.3.4. An explanation of the operation and the capabilities and limitations of the respirator selected.
- 7.3.5. Instructions on how to recognize and cope with emergency situations.
- 7.3.6. An explanation of how to maintain, clean, and store the respirator. This shall include how a worker knows when to change the filters or cartridges on an air-purifying respirator.
- 7.3.7. Instructions for special use respirators (such as IDLH, etc.).

7.3.8. Instructions on how to inspect, put on, check the fit, and properly wear the respirator.

7.3.9. The need to inform their supervisor of any problems experienced by themselves and their co-workers while wearing respirators.

7.3.10. An opportunity for each respirator wearer to handle the respirator, learn how to don and wear it properly, check its seals, wear it in a safe atmosphere, and wear it in a test atmosphere.

7.3.11. Regulations concerning respirator use.

7.4. Respirator Wearer - Annual. BE will provide annual instruction and retraining to respirator wearers. Retraining shall include appropriate provisions of the initial training (a-i above) and other provisions deemed necessary by BE as stated in the base regulation implementing this standard. Documentation of the annual training will be made on AF Form 55; alternatively, an equivalent computerized training program may be used for documentation.

7.5. Respirator Maintainer. BE shall train respirator maintainers in the following areas, as a minimum:

7.5.1. Inspection for defects, cleaning and disinfection, repairs, and maintenance of respirators. This training shall be specific for the types of respirators the person will maintain.

7.5.2. Storage of respirators.

7.5.3. Respirator cartridge or filter change procedures, if needed.

7.5.4. Importance of maintaining NIOSH/MSHA certification of respirators (e.g., replacement parts).

7.6. Emergency and Rescue Teams. Teams that are established for the purpose of responding to emergencies or rescues, such as the fire department, shall be properly trained in the use of respirators. The base regulation implementing this standard shall outline how this training will be accomplished.

7.7. Training Lesson Plans. An example lesson plan for training done by BE is provided at attachment 10. Use of this lesson plan is not mandatory, and the plan may be modified to meet local training requirements.

8. Care, Inspection, and Maintenance of Respirators

8.1. General Discussion. Each individual issued a respirator is responsible for its primary maintenance and care. Where respirators are used collectively or kept ready for emergencies by a shop or operating activity, the supervisor of the activity is responsible for establishing a respirator maintenance and cleaning program as specified in 29 CFR 1910.134(f)(1-5). This program shall include care, inspection, and maintenance of respirators.

8.2. Care:

8.2.1. Cleaning and Sanitizing. Respirators issued to an individual shall be cleaned and sanitized at the end of each day in which the respirator is used. Each respirator shall be cleaned and sanitized before being worn by a different individual. Emergency use respirators shall be cleaned and sanitized after being used. Attachment 12 provides a suggested procedure for cleaning and sanitizing.

8.2.2. Storage. Respirators shall be stored in a manner that will protect them against chemical agents and physical agents such as vibration, shock, sunlight, heat, extreme cold, excessive mois-

ture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. Respirators shall not be stored in such places as lockers and tool boxes unless they are protected from contamination, distortion, and damage. Emergency and rescue respirators that are placed in work areas shall be quickly accessible at all times, and the storage cabinet or container in which they are stored shall be clearly marked.

8.2.3. Respirable Air and Oxygen for SCBA and Supplied Air Respirators. Compressed gaseous air, compressed gaseous oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity and tested according to TO 42B-1-22 and [Attachment 13](#).

8.3. Inspection:

8.3.1. The user shall inspect the respirator immediately before each use to ensure that it is in proper working condition. After cleaning and sanitizing, each respirator shall be inspected to determine if it is in proper working condition, needs replacement of parts, needs repairs, or should be discarded. Each respirator stored for emergency or rescue use shall be inspected at least monthly. The record of inspection of emergency or rescue respirators shall be maintained on AF Form 1071, Inspection/Maintenance Record. Respirators which do not meet applicable inspection criteria shall be immediately removed from service and repaired or replaced.

8.3.2. Respirator inspection shall include a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies, hoses, filters, cartridges, canisters, service life indicator, electrical components, and shelf life dates; and for the proper functioning of regulators, alarms, and other warning systems. Each rubber or other elastomeric part shall be inspected for pliability and signs of deterioration. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturer's instructions. AF Form 1071 shall be maintained for each SCBA, air-line respirator, and other respirators stated in the base directive required by this standard. Instructions on how to complete AF Form 1071 is shown at [Attachment 14](#).

8.3.3. The following shall be considered when inspecting compressors used with supplied-air systems.

8.3.3.1. Compressors shall be located in a position to avoid entry of contaminated air into the system. If necessary, suitable in-line air-purifying sorbent beds and filters shall be installed to ensure breathing air quality.

8.3.3.2. The system shall have a receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in event of compressor failure, and alarms to indicate compressor failure or overheating shall be installed in the system. Alarms shall be visible and audible to the respirator wearer.

8.3.3.3. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm or both. If only a high-temperature alarm is used, the air from the compressor shall be tested for carbon monoxide according to attachment 13 and TO 42B-1-22. Alarms shall be visible and audible to the respirator wearer. BE will ensure all alarm testing required by TO 42B-1-22 is accomplished.

8.3.3.4. Air-line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of supplied-air respirators with other gases or oxygen.

8.3.3.5. Air-line hoses shall be no longer than specified in the manufacturer's literature. Hose

lengths longer than 300 feet are prohibited.

8.3.3.6. An inspection of the air line, compressor and respirator shall be conducted to ensure the NIOSH or MSHA certification is valid. The inspection shall include ensuring all three components match the air pressure and other requirements specified in the manufacturer's literature.

8.3.4. The following shall be considered when inspecting ambient or free-air pumps used with supplied-air systems:

8.3.4.1. The pumps shall be located in a position to avoid entry of contaminated air into the system.

8.3.4.2. Air-line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of supplied-air respirators with other gases or oxygen.

8.3.4.3. An inspection of the air line, compressor and respirator shall be conducted to ensure the NIOSH or MSHA certification is valid. The inspection shall include ensuring all three components match the air pressure and other requirements specified in the manufacturer's literature.

8.4. Maintenance:

8.4.1. Replacement of parts or repairs shall be done only by personnel trained in proper respirator maintenance and assembly. Replacement parts shall be used only as designated for specific respirators. Reducing or admission valves, regulators, and alarms shall be adjusted or repaired by the respirator manufacturer or a technician trained by the manufacturer. Instrumentation for valve, regulator, and alarm adjustments and tests should be calibrated to a standard traceable to the National Bureau of Standards (NBS). This calibration shall be done at intervals not to exceed three years.

8.4.2. The cartridge, filter, or canister of an air-purifying respirator shall be changed:

8.4.2.1. Whenever the worker detects an increase in breathing resistance;

8.4.2.2. Whenever the worker smells or tastes the contaminant, or detects the irritant properties of the contaminant;

8.4.2.3. Whenever the end of service life indicator is triggered;

8.4.2.4. As required by applicable substance-specific OSHA standards (for instance, formaldehyde); or

8.4.2.5. As directed by BE.

8.4.3. If the cartridges or filters on an air-purifying respirator are not replaceable, the respirator shall be replaced when one of the conditions in paragraphs [8.4.2.1.](#) through 8.4.2.5 above is met.

9. Program Administration

9.1. Purchasing:

9.1.1. All respirators used in Air Force workplaces shall be purchased (provided) by the government. Respirators supplied by workers shall not be used.

9.1.2. Respirator purchasing should be controlled by BE respirator program administrator. Provisions for local purchase of respirators (if needed) should be included in the base regulation required by this standard.

9.1.3. Respirators should be purchased using the Paperless Ordering Placement System (POPS). POPS allows the requester to order all respirators and their spare parts based upon specifically assigned National Stock Numbers (NSNs). The Stock class for respirators is 4240. Knowledge of POPS and how it works should be a combined effort between the program administrator, base supply, and the workplace supervisor.

9.1.4. Special levels of respirators may be established in base supply as specified in AFMAN 23-110, Vol 2, Part 13, Basic, Standard Base Supply Customer's Procedures, by BE and issued to the wearer immediately after fit-testing. BE is the approval authority for establishing special levels and initiates the AF Form 1996, Adjusted Stock Level, as needed.

9.1.5. An effort should be made to keep the number of different respirator brands to a minimum. However, there should be an adequate selection available so all workers can be fitted.

9.2. Inventory Control of New Respirators and Spare Parts:

9.2.1. Inventory control should be a shared responsibility among BE, base supply, and supervisors who oversee respirator use on the job.

9.2.2. One option to help in respirator inventory control is to assign a local Issue Exception (IEX) Code (such as R or Z) to all respirators and spare parts. This assists BE in tracking issuance of respirators. Note: IEX Codes 7, 8, and 9 shall not be used for this purpose.

9.2.3. Inventory control not only prevents untrained personnel from receiving respirators, but will also ensure that there are enough respirators for trained personnel.

9.2.4. There should be an ample supply of spare parts on hand so that a designated person can perform proper replacement or repair. Spare parts have their own NSN so the exact ones can be ordered.

9.2.5. Spare parts for respirator repair will be installed according to the manufacturer's instruction so as not to invalidate the NIOSH or MSHA certification. The manufacturer of the given respirator and spare parts shall be the same. Using a different manufacturer's part invalidates the NIOSH or MSHA certification.

9.3. Guidance for Supervisors:

9.3.1. Surveillance of Respirator Use . The use of respirators on a routine or non routine basis shall be monitored to ensure that the correct respirators are used; the respirators are worn properly; and the respirators are in good condition.

9.3.2. Determination of Degree of Exposure . Periodic monitoring of the air contaminant concentration to which the respirator wearer is exposed is the only effective way to determine the degree of exposure. Many things such as changes in operation or process, air movement, temperature, or humidity affect the concentration of a substance in a work area atmosphere. It is the supervisor's duty to inform BE of workplace changes so periodic monitoring may be accomplished.

9.3.3. Workplace OIs . Each workplace in which respiratory protection is used shall develop an OI, which shall be approved by BE. The OI shall:

9.3.3.1. Be based on BE evaluations and recommendations.

9.3.3.2. Describe the situations or operations in which respirators are required or recommended.

9.3.3.3. Include respirator inspection, cleaning, storage, and maintenance procedures.

9.3.3.4. Include the criteria which workers use to determine when respirator filters, cassettes, or cartridges must be changed.

9.3.3.5. Address annual training requirements. A copy of the lesson plan used for training shall be included in the OI.

9.3.3.6. Include the required frequency of fit-testing. The method the supervisor uses to ensure all personnel are fit-tested shall be described.

9.4. Respirator Defects and Recall Notices. When BE receives a respirator recall notice or notice of defect from a manufacturer or NIOSH, BE will notify all users of the respirator which is defective or being recalled. If a respirator user or base supply receives this notice directly, a copy of this notice will be sent to BE as soon as possible.

9.5. Procedures for Program Evaluation. The respiratory protection program will be evaluated annually. BE will conduct the review and report the findings in writing to the Aeromedical Council and the Combined Occupational Safety and Health Council. The program review will contain the following elements as a minimum:

9.5.1. Scope. The number of personnel in each respirator category, (i.e., half-face, full-face, air-purifying, supplied-air) will be documented.

9.5.2. Rationale. Areas where respirators are worn should have current air sampling data to support the decision to mandate the wear of respirators. If respirators are worn as an interim control measure, the status of the permanent corrective action should be documented. The use category (required or recommended) shall be indicated along with the number of personnel in this category, and air sampling levels.

9.5.3. OIs . The status of the base level program and each workplace OI will be documented. BE will review and certify the adequacy of each shop OI on an annual basis.

9.5.4. Workplace Surveys. BE will conduct routine periodic surveys and special surveys (when needed) in workplaces where respirators are used. Specific items (minimum) to be included in the evaluations include: adequacy of the respirator for workplace exposures; adequacy of maintenance and storage practices (shared, emergency use, and individual respirators); adequacy of filters used for each hazard; adequacy of air supply and breathing air (review of air testing results as appropriate); documentation of inspection of shared and emergency use respirators; and documentation of respirator training. The findings of these evaluations may be included in the workplace survey reports.

9.5.5. BE Self-Inspection. A periodic self-inspection of the BE role in the respiratory protection program is mandatory. Items in the self-inspection program should include as a minimum: review of selection protocol, adequacy of fit-testing equipment and supplies, adequacy of instruc-

tor knowledge training, respirator procurement process, and record keeping requirements. Further elements in the BE self-inspection program (if needed) should be included in the base regulation.

9.5.6. Program Documentation . BE shall identify every respirator worn on base. Each respirator shall be classified as either “required” or “recommended.” The operations and hazards which drive the use of respirators, quantification of exposures, and workplace specific respiratory protection requirements shall be clearly identified in workplace survey reports.

9.5.6.1. A comprehensive discussion of requirements will address the items in paras **9.5.6.1.1.** - 9.5.6.1.7.7 in workplace survey reports. Once these are provided to the workplace in writing, it is not mandatory to repeat this level of detail in subsequent periodic survey reports, except where specific details have changed. Subsequent periodic survey reports will include, at minimum, the items in paras **9.5.6.2.** – 9.5.6.2.3.

9.5.6.1.1. Description of the elements of the respiratory protection program and the actions which the workplace supervisor and employees will be required to perform according to this standard and the base directive, such as:

9.5.6.1.1.1. Developing shop operating instructions.

9.5.6.1.1.2. Receiving medical evaluations.

9.5.6.1.1.3. Use, maintenance, and care of respirators.

9.5.6.1.2. Identification of process(es) for which the respirators are worn.

9.5.6.1.3. Identification of hazardous materials which are used in the process(es).

9.5.6.1.4. Description of the frequency and duration of the operations.

9.5.6.1.5. Identification of the type, NIOSH approval number, and manufacturer of the respirators worn. (Comment on the appropriateness of the respirator.)

9.5.6.1.6. Clear indication of whether the use of the respirator is required or recommended.

9.5.6.1.7. If a supplied air respirator or SCBA is used, address the following:

9.5.6.1.7.1. Identification of the compressor particulars, e.g., manufacturer, serial number, and compressor type (oil lubricated or oil-less).

9.5.6.1.7.2. Delivery pressure and breathing air class.

9.5.6.1.7.3. Hose length.

9.5.6.1.7.4. Identification of types of alarms, e.g., carbon monoxide and high temperature.

9.5.6.1.7.5. Identification of whether filters are present. If so, note the condition of them during evaluation as well as preventive maintenance requirements.

9.5.6.1.7.6. Compressed breathing air use limits and the need for routine sampling.

9.5.6.1.7.7. For air pumps, indication of where the air intake is located. Comment on the probability of inadvertent contaminant uptake, if appropriate.

9.5.6.2. General review of operation(s) which warranted the use of respiratory protection.

Document whether or not anything has changed, and state whether or not the evaluation is still valid.

9.5.6.2.1. Status of worker training.

9.5.6.2.2. Status of respirator maintenance, care, and storage.

9.5.6.2.3. Adequacy of the respiratory protection, e.g., degree of protection provided, are the workers actually wearing the respirators, etc.

9.6. Environmental Considerations. Used respirator cartridges, canisters or filters shall be disposed of according to applicable federal, state, and local environmental regulations. The state or local regulatory authority should be consulted for disposal guidelines. Paint booth filters are sometimes considered hazardous waste; if this is the case, used respirator cartridges, canisters, or filters may be disposed of with this waste.

9.7. Operating Instructions. A sample OI which may be used by BE is provided at [Attachment 15](#). These OIs should be modified to meet the needs of the particular BE, to include specific local procedures for complying with this standard.

9.8. Forms Prescribed. AF Form 1071, **Inspection/Maintenance Record**, AF Form 2772, **Certificate of Respirator Fit Test**, AF Form 2773, **Respirator Selection Worksheet**.

CHARLES H. ROADMAN II, Lt General, USAF, MC
Surgeon General

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

Air Force Instruction (AFI). AFI 91-301. ("*Air Force Occupational and Environmental Safety, Fire Protection and Health (AFOSH) Program.*")

Air Force Occupational Safety and Health (AFOSH) Standards:

AFOSH Standard 91-25, "*Confined Spaces*"

AFOSH Standard 91-31, "*Personal Protective Equipment*"

AFOSH Standard 48-8, "*Controlling Exposures to Hazardous Materials*"

AFOSH Standard 161-17, "*Standardized Occupational Health Program*"

AFOSH Standard 161-21, "*Hazard Communication*"

Air Force Policy Directive (AFPD). AFPD 48-1, "*Aerospace Medical Program.*"

American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*. (Available from ACGIH, 6500 Glenway Ave., Bldg. D-7, Cincinnati, OH 45211-4438;)

American National Standards Institute (ANSI) Z88.2-1991, *Standard Practices for Respiratory Protection* (Draft). (Not required by user)

Compressed Gas Association, Inc Publication ANSI/CGA G-7.1, "*Commodity Specification for Air.*"

Federal Standard (FED-STD) 313, "*Federal Standard, Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Governmental Activities.*"(Not required by user)

National Fire Protection Association (NFPA) 70, "*National Electrical Code (NEC).*"(Not required by user)

National Institute for Occupational Safety and Health (NIOSH): (Not required by user)

Certified Equipment List (most recent edition).

Pocket Guide to Chemical Hazards (most recent edition).

Publication Number 87-116, "*NIOSH Guide to Industrial Respiratory Protection.*"

Nuclear Regulatory Commission (NRC): (Not required by user)

10 CFR 20, "*Standards for Protection Against Radiation.*"

NRC Guide 8.15, "*Acceptable Programs for Respiratory Protection.*"

Occupational Safety and Health Administration (OSHA) Standard,

29 CFR 1910, "*Occupational Safety and Health Standards.*"

29 CFR 1926.1101 "*Asbestos.*"

29 CFR 1926.62 "*Lead.*"

Technical Order (TO) 42B-1-22, "*Quality Control of Compressed and Liquid Breathing Air.*"

Warning Properties of Industrial Chemicals, Oregon Lung Association, 319 S.W. Washington, Suite 520, Portland, Oregon 97204, telephone number (503) 224-5145. (Not required by user)

Abbreviations and Acronyms

ACGIH—American Conference of Governmental Industrial Hygienists

AE—Aeromedical Evacuation

AFB—Air Force Base

AFMOA—Air Force Medical Operations Agency

AFOSH—Air Force Occupational Safety and Health

AFPD—Air Force Policy Document

AFR—Air Force Regulation

AFSC—Air Force Specialty Code

ANSI—American National Standards Institute

APF—Assigned Protection Factor

BEE—Bioenvironmental Engineer

BE—Bioenvironmental Engineering

CFR—Code of Federal Regulations

CGA—Compressed Gas Association, Inc

DAF—Department of the Air Force

DRU—Direct Reporting Unit

FOA—Field Operating Agency

GOCO—Government Owned Contractor Operated

HEPA—High Efficiency Particulate Air

IAA—Isoamyl Acetate

IDLH—Immediately Dangerous to Life and Health

IEX—Issue Exception

LEL—Lower Explosive Limit

MAJCOM—Major Air Command

MMAD—Mass Median Aerodynamic Diameter

MSHA—Mine Safety and Health Administration

NBS—National Bureau of Standards

NEC—National Electric Code

NFPA—National Fire Protection Association

NIOSH—National Institute for Occupational Safety and Health

NRC—Nuclear Regulatory Commission

NSN—National Stock Number

OEL—Occupational Exposure Limit

OI—Operating Instruction

OIC—Officer In Charge

OSHA—Occupational Safety and Health Administration

PES—Physical Exam Section

PLHCP—Physician or Other Licensed Health Care Professional

POPS—Paperless Ordering Placement System

PPM—Parts Per Million

PSIG—Pounds per square Inch Gauge

RMO—Resource Management Office

RPP—Respiratory Protection Program

SAF—Secretary of the Air Force

SCBA—Self Contained Breathing Apparatus

TLV—Threshold Limit Value

TO—Technical Order

TWA—Time Weighted Average

Terms

shall—Indicates a mandatory requirement.

will—Indicates a mandatory requirement which expresses a declaration of intent, probability or determination.

should—Indicates a preferred method of accomplishment.

may—Indicates an acceptable or satisfactory method of accomplishment.

aerodynamic diameter.—Diameter of a unit density sphere having the same terminal settling velocity as the particle in question.

aerosol—Liquid droplet or solid particle dispersed in air that are small enough to remain dispersed.

air-purifying respirator—A respirator which removes contaminants from the ambient air.

ambient air pump—An electrical or pneumatically driven positive displacement pump which takes ambient air and provides it to a respirator at pressures of less than 25 pounds per square inch gauge (psig). This is also known as a "free-air" pump.

approved respirator—An approved device designed to provide the wearer with respiratory protection

against inhalation of harmful atmospheres. Also, the following conditions shall be met:

The respirator shall be tested and listed by the National Institute for Occupational Safety and Health (NIOSH) or the Mine Safety and Health Administration (MSHA). Refer to the latest NIOSH Certified Equipment List for approved respirators.

If a tight-fitting respirator is used, the respirator shall have a design which allows the following tests to be performed:

Positive and negative pressure tests.

Fit-test.

assigned protection factor (APF)—Minimum level of respiratory protection provided by a properly functioning respirator or a class of respirators used in a specific workplace by properly fitted and trained users.

atmosphere supplying respirator—A respirator which provides air from a source other than the surrounding atmosphere.

compliance factor—The sum of the hazard ratios for each chemical when two or more chemicals which act upon the same organ system are present. The calculation is described in the latest edition of Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices published by the American Conference of Governmental Industrial Hygienists.

continuous flow mode—A mode of respirator operation which provides a continuous flow of respirable gas.

demand mode—A mode of respirator operation which admits respirable gas to the face piece only when a negative pressure is created by inhalation.

dust—Solid particulates generated by some mechanical process such as handling, crushing, grinding, or detonation.

Emergency-response respirator—Respiratory protection which is reserved and maintained solely for emergency or disaster response (e.g., spill response and containment).

employer—A commander, director, or functional manager.

end of service life indicator—A system which warns the user of the approach of the end of adequate protection provided by the respirator. It is normally used when an air-purifying respirator is worn for protection a gas or vapor with poor warning properties.

escape-only respirator—Intended only for use during emergency egress from an atmosphere which is or may become immediately dangerous to life or health.

facial hair—Any hair on the face of an individual which interferes with a normal face-to-respirator seal. This includes beards, sideburns, mustache, goatees, stubble, or more than one day's facial hair growth.

fiber—Solid particles with a length several times greater than their diameter.

filtering face piece device—A respirator which has a face piece made entirely of filtering or adsorbing material. These respirators do not have changeable filters or cartridges. The device does not have an inhalation valve, and it may or may not have an exhalation valve.

fit factor—Ratio of the ambient concentration of an airborne substance outside the respirator to the

concentration of the substance inside the respirator cavity. It is indicative of the degree to which the respirator fits the wearer.

fume—Solid aerosols formed by condensation of a gas or vapor, generally after volatilization from molten metals. Fumes generally have a smaller particle size than dusts, and are usually formed from welding or thermally cutting metal.

gas—A substance which is gaseous at ordinary temperatures and pressures.

gas mask—A NIOSH or MSHA approved respiratory protection device. This respirator consists of a full face piece and a chin, front, or back mounted canister. This definition specifically excludes military-unique respiratory devices.

hazard ratio—A number obtained by dividing the environmental concentration of a contaminant by its occupational exposure limit.

hazardous chemical—Any material which is a physical hazard or health hazard as defined in Federal Standard 313.

high efficiency particulate air (HEPA) filter—A filter which is 99.97 percent efficient for particles with an aerodynamic diameter of 0.3 micrometers.

immediately dangerous to life or health (IDLH)—Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a contaminated area.

immediate severe health effects—Exist when any acute clinical sign of a serious, exposure-related reaction is manifested within 72 hours after exposure.

mass median aerodynamic diameter (MMAD)—The middle point of an aerodynamic particle size distribution. At this point, half of the mass includes particles with a diameter less than the MMAD, and the other half contains particles with diameters greater than the MMAD.

medical clearance—Two part process for medically certifying personnel for respirator use. It includes medical evaluation and fit-testing.

military-unique respiratory protection device— A respiratory protection device which is not approved by NIOSH or MSHA and is designed for use in nuclear, chemical, or biological contingency environments.

mist—Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersion such as by splashing, foaming and atomizing.

maximum use concentration—The lowest of the following:

The occupational exposure limit multiplied by the assigned protection factor.

The “immediately dangerous to life and health” concentration.

The maximum contaminant concentration for the given filter or cartridge (if specified).

negative pressure respirator—A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

occupational exposure limit (OEL)—The maximum concentration of a specified substance to which an

employee may be routinely exposed without personal protection. OELs are established in AFOSH Standard 48-8. For a given chemical, it is the most stringent of the limits found in the following documents:

Applicable OSHA standards (29 CFR 1910, Subpart Z, Toxic and Hazardous Substances and 29 CFR 1926, Safety and Health Regulations for Construction).

AFOSH Standards.

The latest edition of Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Note: If another definition is presented in AFOSH Standard 48-8, that definition shall be used.

oxygen deficient atmosphere—An atmosphere containing less than 19.5 percent oxygen by volume.

poor warning properties—Exist for those substances that do not exhibit detectable and persistent odor, taste, or irritation effects at concentrations at or below the occupational exposure limit.

positive pressure respirator—A respirator in which the air pressure inside the respiratory inlet cover is positive in relation to the air pressure of the outside atmosphere during exhalation and inhalation.

powered air-purifying respirator—An air-purifying respirator which uses a blower to force the ambient atmosphere through air purifying elements to the inlet covering.

pressure demand mode—A mode of respirator operation which admits respirable gas when inhalation reduces the positive pressure inside the face piece.

qualitative fit-test—A pass/fail fit-test that relies on the subject sensory response to detect the challenge agent.

quantitative fit-test—A fit-test that uses an instrument to measure the challenge agent inside and outside the respirator.

respirator maintainer.—A person who maintains common use respirators (i.e. used by more than one person).

respiratory inlet covering—That portion of a respirator which connects the wearer's respiratory tract to an air-purifying device or air source, or both. It may be a face piece, helmet, hood, suit, or mouth piece.

supplied-air respirator—An atmosphere supplying respirator which uses air which is delivered under pressure through a hose.

tight-fitting respirator—A respiratory inlet covering that is designed to form a complete seal with the face.

touch-up painting—Minor operations that normally do not exceed five minutes of spray time per hour. (Additional information can be found in TO 42A-1-1, paragraph 3-1c.) This does not include:

Brush application (due to the low potential for aerosolization and volatilization).

Use of highly toxic materials. (Use of these materials may warrant special consideration by BE. Examples include isocyanates, carcinogens, and chromates.

Enclosed workspace painting. (This may require special evaluation by BE.) Examples include wheel-wells and engine intakes.

Aircraft touch-up operations. (See TO 42A-1-1.)

vapors—Vapors are the gaseous forms of substances which are normally in the liquid or solid state at normal temperatures and pressures.

Attachment 2

SAMPLE BASE LEVEL RESPIRATORY PROTECTION PROGRAM REGULATION

Notes:

A2.1. The following sample provides a menu for selecting appropriate comments for your base program.

A2.2. [] means to fill in the space to meet local requirements

DEPARTMENT OF THE AIR FORCE

[Organization]

[xxx AFB, xx Zip Code]

[Date]

OCCUPATIONAL HEALTH

Respiratory Protection Program

This regulation implements 29 CFR 1910.134, Respiratory Protection, and AFOSH Standard 48-1 at [xxx AFB]. This regulation is required to be maintained by all organizations in which personnel wear respirators for protection against inhalation of harmful atmospheres or for emergency escape or rescue.

1. Definitions. Add any local unique definitions not listed in AFOSH Standard 48-1, i.e., specific types of emergency escape respirators.

2. Responsibilities. Responsibilities are described in AFOSH Standard 48-1. Additional local responsibilities regarding implementation of the base respiratory protection program are addressed here. The following are examples of items which may be included in this section; other items may be included.

2.1. **Supervisors** shall call BE at extension [] as needed for information and guidance regarding respiratory protection matters. In case of emergency after duty hours, a BE representative may be reached through the hospital emergency room, extension [].

2.2. **Base supply** shall:

2.2.1. Control the issue of respirators as described in this regulation.

2.2.2. Ensure BE has approved respiratory protection requests before issuing respirators.

2.2.3. ENSURE A "SUITABLE SUBSTITUTE" FOR A PARTICULAR RESPIRATOR OR RESPIRATOR PART IS NOT ISSUED.

2.3. Consideration for additional responsibilities for Public Health, Physical Examinations Section, and the Flight Medicine Office.

3. **Selection, Use, and Limitations.** BE should spell out unique local requirements for respirator selection, concentrating on high risk occupations where respirator use is mandated, i.e., fuel cell work, tank entries, and other confined space entries.

4. **Training.** In this section, BE will detail how training will be accomplished at the local level. Consideration should be given to topics such as: scheduled supervisory training, record keeping requirements of annual refresher training, training of emergency response and rescue teams, and any other unique local requirements such as emergency escape training.

5. **Fit-Testing:** Local fit-testing requirements and scheduling procedures should be included here. Listed below are items which may be included; other items may be included.

5.1. The workplace supervisor shall contact BE at extension [] to schedule fit-testing at least 2 weeks prior to the fit-testing. The supervisor is responsible for identifying personnel who need initial and periodic fit-testing.

5.2. All fit-testing, including quantitative fit-testing, shall be performed by BE.

5.3. All qualitative fit-testing shall be performed by BE, and quantitative fit-testing shall be performed by a contractor. BE shall assist base contracting (or the hospital RMO) in developing the contract specifications.

6. **Care, Inspection, and Maintenance of Respirators.** Any local requirements deemed necessary should be included in this section, i.e., the fire department and other agencies conducting breathing air sampling shall send BE a copy of the sampling results no later than 2 weeks after the results are received.

7. **Medical Surveillance.** Local requirements may be added as needed in addition to the requirements of this standard.

8. **Administrative Procedures:**

8.1. Local administrative requirements regarding the purchase, control, or issuance of respirators should be addressed in this section. For example, at some bases BE actually issues the respirator to the wearer following fit-testing. Other bases may have supply issue respirators only after receiving approval from

BE. In addition, at some bases BE controls the levels of certain respirators to be kept in base supply. Control over local purchase of respirators by BE should be spelled out in this section. If issue exception (IEX) codes are used to control respirators, the procedure should be described either here or in a base-level supply regulation.

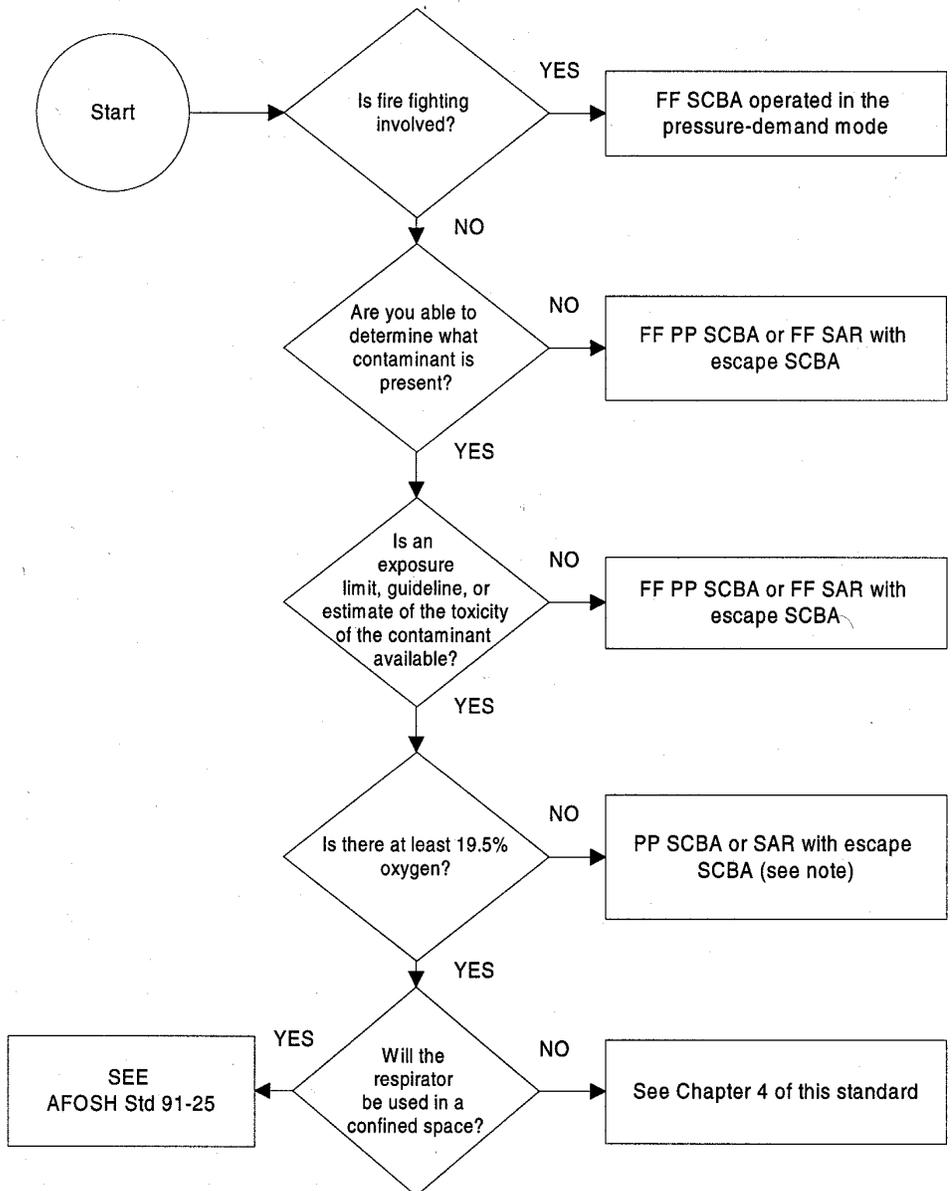
8.2. Any special local procedures for contractor support, etc., should be discussed in this section.

9. Procedures for Program Evaluation. Time frames may be established in this section of the base regulation. For example, [the annual BE respiratory protection program evaluation will be presented at the June meeting of the Aerospace Medicine Council], and [annual review of the shop level OIs will occur during the annual industrial hygiene surveys according to AFD 48-1, Aerospace Medicine Program]. Any local self-inspection or review of OIs should be included in this section. Other administrative requirements may be included here, such as having supervisors annually or every 6 months provide BE with a list of workers who use respiratory protection.

Attachment 3

RESPIRATOR SELECTION FLOW CHART

Figure A3.1. Respirator Selection Flow Chart.



Abbreviations:
 FF - Full-facepiece
 SAR - Supplied air respirator
 PP - Positive pressure
 SCBA - Self contained breathing apparatus

NOTE: A full-facepiece may be necessary if contaminants are present

Attachment 4**INSTRUCTIONS FOR COMPLETING AF FORM 2773, RESPIRATOR SELECTION WORKSHEET**

The primary purpose of this form is to document the appropriate type of respiratory protection to be used. The information on this form is used in the decision-making process. BE compiles the information, and it may not be necessary to fill in every square.

A4.1. Date. Enter the date that the form was completed.

A4.2. Identification Data. Plastic cards or computer generated data may be used in lieu of the following handwritten entries:

A4.2.1. Workplace Identifier (WI) . Enter code for the WI (see AFOSH Standard 161-17).

A4.2.2. Base, Organization, Workplace, and Building Number/Location . Self- explanatory.

A4.3. Part I. Contaminant Classification. Information for each contaminant of concern shall be listed on the form.

A4.3.1. Operation/Task . Specify the name of the operation or task being evaluated.

A4.3.2. Operation/Task Location. Identify the location.

A4.3.3. Contaminant Name . Indicate the name of the contaminant of concern.

A4.3.4. Physical Form. Indicate if the contaminant is a gas, vapor, dust, mist, fume, fiber, or other physical form. If other, specify the form.

A4.3.5. Occupational Exposure Limit. Indicate the applicable limit(s). Also, indicate the source of the limit and the type. For instance, if the limit is a ceiling limit from the ACGIH TLV booklet, write ACGIH/ceiling.

A4.3.6. Lower Explosive Limit (LEL) Concentration. Indicate the LEL concentration. The NIOSH Pocket Guide to Chemical Hazards (or other appropriate reference) may be used to determine this. This level is normally given in percent by volume. If desired, the concentration in parts per million (ppm) may also be listed on the form. For example, 1% would be 10,000 ppm.

A4.3.7. IDLH Level. Enter the IDLH concentration. The NIOSH Pocket Guide to Chemical Hazards (or other appropriate reference) may be used to determine this.

A4.3.8. Carcinogen. Indicate if the contaminant is a carcinogen. If it is, indicate the reference and type. For instance, if the ACGIH lists the zinc chromate at a confirmed human carcinogen (A1), write "ACGIH/A1" on the form.

A4.3.9. Sensitizer. Indicate if the contaminant is capable of sensitizing individuals. If so, indicate the reference.

A4.3.10. Skin Absorption. Indicate if skin absorption is possible. The preferred reference is the ACGIH Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (latest edition).

A4.3.11. Concentration. Indicate the concentration of the contaminant in ppm or milligrams per cubic meter (mg/m³). Also, indicate the type (eight-hour time weighted average (TWA), 15-minute sample, instantaneous reading, etc.).

A4.3.12. Hazard Ratio. The hazard ratio is the concentration divided by the appropriate occupational exposure limit.

A4.3.13. Target Organs and Organ Systems. Indicate the target organs and organ systems of the contaminant. The NIOSH Pocket Guide to Chemical Hazards (or other appropriate reference) should be used to determine this.

A4.4. Part II. Warning Properties. This section should be completed only if air-purifying respirators are being considered.

A4.4.1. Odor Threshold. If available, indicate the odor threshold of the contaminant in ppm or mg/m³.

A4.4.2. Eye Irritation. Indicate if the contaminant can cause eye irritation. If available, indicate the concentration above which irritation will occur.

A4.4.3. Sorbent Efficiency. If available, indicate the sorbent efficiency of filters for the contaminant of concern.

A4.5. Part III. Special considerations.

A4.5.1. Compliance Factor. Calculate the compliance factor (sum of the hazard ratios) if two or more contaminants affect the same target organs or organ systems. Do not mix occupational exposure limits. For instance, calculate the hazard ratio for the short-term occupational exposure limits separately from the eight-hour time-weighted averages.

A4.5.2. Isocyanates. Indicate if compounds containing isocyanates are used in the workplace.

A4.5.3. Other Standards or Regulations. Indicate if there are standards or regulations (other than this standard and 29 CFR 1910.134) which may apply. If so, list the regulation.

A4.5.4. Oxygen Content. Indicate the percentage of oxygen in the work area. (Only necessary to measure if it is believed that oxygen-deficiency could be a problem.)

A4.5.5. Distance to Hazard. Indicate the distance in feet from the "uncontaminated" area to the hazard. This distance is important when considering atmosphere supplying respirators.

A4.5.6. Activities/Work Rate . Indicate the type of activities that will be conducted while wearing the respirator. Estimate the work rate (i.e., light, moderate, heavy).

A4.5.7. Temperature Extremes/Humidity . Indicate if very high or low temperatures will be encountered by personnel who wear the respirator. Also, indicate if high humidity will be encountered.

A4.5.8. Period of Time Respirator Worn . Indicate how long the respirator will be worn (e.g., 3 hours/day, 2 days/week).

A4.5.9. Communication. Indicate if there are special communication considerations.

A4.5.10. Vision. Indicate if there are special vision considerations.

A4.5.11. Other Personal Protective Equipment . Indicate if other protective equipment must be worn. If so, list it here.

A4.5.12. Confined Space . Indicate if the area is a confined space. If so, AFOSH Standard 91-25 shall be consulted.

A4.6. Part IV. Respirator Selection.

A4.6.1. Consider all of the information gathered in Parts I, II and III of this form. Determine the appropriate respiratory protection. Check either atmosphere supplying or air-purifying, and indicate the type, mode of operation, and face piece. If an air-purifying respirator is chosen, indicate the filter, cartridge, or canister required.

A4.6.2. Indicate any comments or remarks which may be appropriate. For instance, substance specific OSHA standards may have certain respiratory protection requirements.

A4.7. The form shall be prepared or reviewed by the person administering the program. If the Chief, BE prepares the form, a reviewer is not necessary.

Attachment 5

ASSIGNED PROTECTION FACTORS

Table A5.1. Negative Pressure Respirators.

NEGATIVE PRESSURE AIR PURIFYING RESPIRATORS	Assigned protection factor
Any air-purifying quarter-mask respirator equipped with any particulate filter.	5
Any air-purifying half-mask respirator equipped with any particulate filter or appropriate gas or vapor cartridges or canisters.	10
Any air-purifying half-mask respirator equipped with appropriate gas or vapor cartridges or canisters in combination with any type of particulate filter.	10
Any air-purifying full-face piece respirator equipped with appropriate gas or vapor cartridges or canisters in combination with any type of particulate filter (except HEPA or equivalent as certified by NIOSH under 42 CFR 84).	10
Any air-purifying full-face piece respirator equipped with HEPA filters (or equivalent as certified by NIOSH under 42 CFR 84).	10/50 ¹
Any air-purifying full-face piece respirator equipped with appropriate gas or vapor cartridges or canisters.	10/50 ¹
Any air-purifying full-face piece respirator equipped with appropriate gas or vapor cartridges or canister in combination with a HEPA filter (or equivalent as certified by NIOSH under 42 CFR 84).	10/50 ¹

NEGATIVE PRESSURE ATMOSPHERE SUPPLYING RESPIRATORS	Assigned protection factor
Any atmosphere supplying respirator used with gases and vapors and providing protection from radio nuclides, whether half- or full-face piece, when operated in a demand mode. ²	5
Any self-contained breathing apparatus or supplied-air respirator equipped with a half-mask and operated in a demand (negative pressure) mode ²	10
Any self-contained breathing apparatus or supplied-air respirator equipped with a full face piece and operated in a demand (negative pressure) mode ²	50

¹ 10 if qualitatively fit-tested, 50 if quantitatively fit-tested.

² Demand SCBA shall not be used for emergency situations such as fire fighting.

NOTES:

A. Assigned protection factors are not applicable for escape respirators. For combination respirators, e.g., air-line respirators equipped with an air-purifying filter, the mode of operation in use will dictate the assigned protection factor to be applied.

B. Filtering face piece respirators shall not be used when the concentration of a contaminant exceeds the occupational exposure limit. Therefore, protection factors have not been assigned to these respirators.

Table A5.2. Positive Pressure Respirators.

POWERED AIR-PURIFYING RESPIRATORS	Assigned protection factor
Any powered air-purifying respirator equipped with a loose-fitting hood or helmet or loose-fitting face piece and any type of particulate filter and (or) appropriate gas or vapor cartridges or canisters.	100 @
Any powered air-purifying respirator equipped with a half-mask or full face piece and any type of particulate filter and (or) appropriate gas or vapor cartridges or canisters.	50

@ Note: Check and follow all substance-specific OSHA standards for assigned protection factors

ATMOSPHERE SUPPLYING	Assigned protection factor
Any supplied-air respirator equipped with a loose-fitting hood or helmet or loose-fitting face piece and operated in the continuous flow mode.	25
Any supplied-air respirator equipped with a half-mask and operated in a pressure demand or continuous flow mode.	50
Any supplied-air respirator equipped with a full face piece and operated in continuous flow mode.	50
Any supplied-air respirator equipped with a full face piece and operated in pressure demand mode.	1000

SELF-CONTAINED BREATHING APPARATUS (SCBA)	Assigned protection factor
Any self-contained breathing apparatus equipped with a full face piece and operated in pressure demand or other positive pressure mode.	10,000
Any supplied-air respirator equipped with a full face piece operated in a pressure demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in a pressure demand or other positive pressure mode.	10,000

Note: SCBA's or supplied-air respirators with an auxiliary SCBA operated in pressure demand or other positive pressure modes are used in situations where the atmosphere is IDLH, where concentrations are very much greater than the occupational exposure limit (e.g., greater than 1000 times the occupational exposure limit), or where the concentrations of the contaminants are unknown.

Attachment 6

SELECTION OPTIONS FOR ESCAPE RESPIRATORS

Table A6.1. Selection Options for Escape Respirators.

ESCAPE CONDITIONS	TYPE OF RESPIRATOR
Short distance to exit, no obstacles (no oxygen deficiency)	Any escape gas mask ¹ (canister respirator) or gas mask (canister respirator)
	Any escape SCBA having a suitable service life ²
	Any acceptable device for entry into emergency situations
Long distance to exit or obstacles along the way (no oxygen deficiency)	Any gas mask
	Any escape SCBA having a suitable service life ²
	Any self-contained self-rescuer having a suitable service life
Potential oxygen deficiency	Any escape SCBA having a suitable service life ²
	Any self-contained self-rescuer having a suitable service life

¹ An escape gas mask is a respirator designed for use during escape only from IDLH or non-IDLH atmospheres. It may consist of a half-mask face piece or mouthpiece, appropriate air-purifying element for the contaminant, and associated connections. Maximum use concentrations for these types of respirators are designated by the manufacturer.

² Escape SCBA can have rated service lives of 3 to 60 minutes.

Attachment 7

VERBAL COMMUNICATION CONSIDERATIONS

Verbal communication in a noisy industrial environment can be difficult. It is important to ensure that respirator wearers can comfortably communicate when necessary because a worker who is speaking very loudly or yelling may cause a face piece seal leak, and the worker may be tempted to temporarily dislodge the device to communicate. Both situations are undesirable. There are several options which may be employed to aid communications when wearing respirators:

A7.1. Speaking Diaphragms. A speaking diaphragm consists of a resonating surface and cavity which vibrates during speech, thereby amplifying the wearer's voice outside of the respirator. Several points must be considered when using speaking diaphragms:

A7.1.1. There are key components in maintaining the airtight integrity of the face piece requiring care when installing and handling.

A7.1.2. Use of a respirator having a speaking diaphragm during welding, cutting, burning, or grinding operations is of special concern, as flying sparks may burn a hole in the diaphragm, thereby creating a leak. Some manufacturers have compensated for these applications by providing shrouds to cover the diaphragm or by using metal diaphragms.

A7.1.3. Not all face piece respirators are available with speaking diaphragm. Check with the equipment manufacturer for availability.

A7.2. Built-in Microphones . Some respirator manufacturers make available small microphones which are mounted inside or connected to the respiratory inlet covering. The microphone may be connected to a radio, telephone, loudspeaker, or other means of electronic transmittal. Two considerations are:

A7.2.1. Any component which is attached to or through the respiratory inlet covering may affect its function. In cases where components are provided by the manufacturer, strict adherence to the installation instructions and leak test procedures is necessary to ensure that the airtight integrity is maintained.

A7.2.2. Voice actuated communication systems may cause continuous sound pickup of the blower, when used with powered air purifying respirators, or air flow noise, when used with supplied-air devices.

A7.3. Hand or Coded Signals. A predetermined set of signals may be useful in communicating.

A7.4. Cranial, Throat, or Ear Microphones. Cranial and throat microphones are held in place with a harness against the wearer's head and larynx, respectively. Ear microphones are worn in the same manner as a transistor radio earphone and function as both a microphone and speaker. Use of these devices does not require making penetrations or attachments to the respirator, and does not impact the NIOSH certification status. They may be used with radios, telephones, loudspeakers, or other means of electronic transmittal, similar to face piece microphones. Considerations when using these devices are:

A7.4.1. Cranial microphones shall never be placed under the head harness of face piece respirators since their dislodgment may loosen the respirator straps.

A7.4.2. When connecting wires are passed underneath the bibs or neck seals of supplied-air hoods or helmets, they shall be attached to the worker's body to avoid disturbing the bib positioning.

A7.5. Use of Telephone Handsets . Since a person exhales while speaking, the exhalation valve in a face piece respirator is partially open. This is a perfect location to place a handset or hand-held microphone to obtain the clearest voice transmission. An alternative is to hold the handset or microphone to the wearer's throat while speaking.

A7.6. Safety Considerations. Electronic devices shall be selected and used with caution in explosive atmospheres or Class I hazardous locations identified in Article 50 of the National Electric Code (NEC). When required, ensure all such devices comply with requirements for permissibility and intrinsically safe systems according to Article 504 of the NEC. The effect of radiofrequency emissions should be considered when utilizing such devices in the vicinity of sensitive electronic equipment.

Attachment 8**LOW TEMPERATURE ENVIRONMENT CONSIDERATIONS**

A8.1. A low temperature environment may cause fogging of the lens in a respiratory inlet covering and freezing or improper sealing of the valves. Coating the inside surface of the lens may inhibit fogging at low atmospheric temperatures approaching 0 degrees Celsius (32 degrees F). Full face pieces are available with nose cups that direct the warm and moist exhaled air through the exhalation valve without contacting the lens. Face pieces with nose cups may provide satisfactory vision at temperatures as low as -32 degrees C (-25 degrees F).

A8.2. It is important to note that SCBA equipped with a full face piece and certified for use below 32 degrees F shall be equipped with a nose cup or other suitable accessory or coating to maintain the device's NIOSH certification when it is used in environments below 32 degrees F.

A8.3. Additionally, there are several other important considerations that users should be aware of when using SCBA in a low temperature environment. Users should thoroughly review the manufacturer's instructions and, if necessary, consult with the manufacturer to become thoroughly familiar with the precautions and recommendations for use of a specific SCBA in cold weather conditions.

A8.4. Such general considerations include (in addition to moisture content requirements for air).

A8.4.1. The checking of all connections that may be affected when exposed to low temperatures.

A8.4.2. The proper storage of elastomeric components such as face pieces and breathing tubes that may be prone to distortion if improperly stored in cold weather; such distortion of components as face pieces could prevent the user from attaining an adequate fit.

A8.4.3. The availability of accessories and other components that are specially designed to withstand cold temperatures. This includes special elastomeric gaskets and diaphragms that are designed to retain their elasticity at low temperatures.

A8.5. At very low atmospheric temperatures, the valves of a respirator may freeze open or closed due to the presence of moisture.

A8.6. Some supplied-air respirators are approved with a device called a vortex tube to warm the air supplied to the respiratory inlet covering of the respirator.

Attachment 9**HIGH TEMPERATURE ENVIRONMENT CONSIDERATIONS**

A9.1. Working in a high temperature environment while wearing a respirator creates additional stress on the wearer. The additional stress should be minimized by using a respirator which has a low weight, offers a low resistance to breathing, possesses a minimal dead air space, and, if feasible, provides a tempering of inlet air.

A9.2. Dead air volume is the volume of previously exhaled air (which is available to be inhaled) remaining in a respiratory inlet covering. Reducing the amount of dead air volume in a respirator reduces the level of carbon dioxide (CO₂) in the inhaled air, which is a major source of respirator usage related stress. This can be accomplished through the use of powered air purifying respirators, continuous flow supplied-air respirators, use of a half face piece respirator in lieu of a full face piece, and use of a nose cup in full face piece devices (regardless of the mode of operation).

A9.3. Supplied-air respirators are recommended for use in a high temperature environment. Supplied-air respirators approved with a vortex tube will substantially reduce the temperature of the air supplied to the respirator. If air purifying respirators are to be used, a half face piece respirator, where it offers adequate protection, is preferable to the full face piece.

A9.4. Elastomeric components of respirators stored in high temperature environments may deteriorate at an accelerated rate and the face piece may become permanently distorted. Special care shall be used to prevent face piece distortion. Inspection frequency should be established considering the effects of high temperatures.

Attachment 10**SAMPLE RESPIRATORY PROTECTION TRAINING LESSON PLAN****A10.1. Before Class:**

A10.1.1. Obtain AF Forms 2767 for each shop represented in class.

A10.1.2. Make sure students are clean shaven.

A10.1.3. If quantitative fit-testing, ensure students have not smoked within last 30 minutes. You must take their word, do not dispute it. Smoking is prohibited within 30 minutes of the test because exhaled smoke particles may result in artificially low fit factors.

A10.1.4. Verify type of respirator needed for each student/worker.

A10.1.5. Ensure you have a "Show and Tell" respirator for each type used by the students.

A10.1.6. Have each student sign-in on AF Form 2767.

A10.2. Class Time.

A10.2.1. Standards. Inform the class about the purpose of the various standards involved with respiratory protection:

A10.2.1.1. AFOSH Standard 48-1

A10.2.1.2. AFOSH Standard 48-8

A10.2.1.3. AFOSH Standard 161-17

A10.2.1.4. 29 CFR 1910.134

A10.2.1.5. 29 CFR 1910.10XX (OSHA substance-specific standards); 29 CFR 1926.XXXX

A10.2.1.6. BASE REGULATION 48-XX

A10.2.1.7. ANSI Z-88.2

A10.2.2. Program Information :

A10.2.2.1. Explain the reasons respirators are being used. The following shall be included and shall be specific for the hazard to which the person is potentially exposed:

A10.2.2.1.1. Nature of the hazard, whether acute, chronic, or both.

A10.2.2.1.2. Include a frank appraisal of what will happen if a respirator is not used.

A10.2.2.2. Explain why engineering or administrative controls are not used or are not adequate. What is being done to reduce or eliminate the need for respirators?

A10.2.2.3. Explain why a particular respirator is being used for a particular respiratory hazard.

A10.2.2.4. Explain only NIOSH and MSHA approved respirators are worn and only the same model of respirator used during fit testing can be worn.

A10.2.2.5. Explain the general operation, the capabilities, and the limitations of their particular respirator. If an air-purifying respirator is used:

A10.2.2.5.1. Include type of cartridges, filters, or canisters used, and what the various color codes represent.

A10.2.2.5.2. Explain when the cartridge or filters should be changed.

A10.2.2.6. Explain how to recognize and cope with any potential emergency situations.

A10.2.3. Wearing the Respirator:

A10.2.3.1. Demonstrate the proper way to don the respirator.

A10.2.3.2. Demonstrate the proper way to perform a positive and negative pressure check. Emphasize **THIS MUST BE DONE EVERY TIME THE RESPIRATOR IS PUT ON**. Explain what to do in case the wearer finds a leak during the positive or negative pressure checks.

A10.2.4. Fit-Testing. Perform fit-testing according to the protocols in AFOSH Standard 48-1, [Attachment 11](#) and 12.

A10.2.5. Inspection:

A10.2.5.1. Show the different parts of the respirator and explain their function.

A10.2.5.2. Explain how to inspect the different parts of the respirator.

A10.2.6. Cleaning . Demonstrate the proper way to clean the respirator; for example, use warm soapy water; do not use alcohol, harsh detergents, or solvents; etc.

A10.2.7. Storage . Explain how to store respirator when not in use, i.e., in plastic bag, clean, dry, away from contaminants.

Attachment 11**INSTRUCTIONS FOR COMPLETING AF FORM 2772, CERTIFICATE OF RESPIRATOR FIT-TEST**

The purpose of this form is to provide the respirator wearer and the supervisor a record of the initial fit-test. It indicates the correct brand, type, size of respirator, and type of cartridge, filter, or canister to be used in the workplace. Use one form for each respirator fitted.

A11.1. Certificate Number. Enter a unique sequential number from a locally derived system (for example 92-0012, for the 12th individual fitted in 1992).

A11.2. NAME. Self Explanatory.

A11.3. DATE. Self Explanatory.

A11.4. AFSC/Job Title. Enter the appropriate AFSC (for example, 431X2) and job title (for example, corrosion control specialist).

A11.5. Installation. Enter the name of the installation where the individual works.

A11.6. Type of Fit-Test. Check either qualitative or quantitative. If quantitative is checked, specify the system used (for example, Portacount Plus).

A11.7. Make, Model, NIOSH/MSHA Approval Number, Size of Respirator. Enter the make, model, NSN if applicable, and size of respirator found to give the best fit, or found to have the highest protection factor (quantitative only). For example, "MSA Comfo II Medium". Indicate in the next section the appropriate respirator type, i.e. half-face, full-face, SCBA, or other. If "other" is checked, note the type of respirator in the remarks section below. Enter the overall Protection Factor in the space indicated for quantitative fit tests only.

A11.8. Type of Cartridge, Filter, Canister to be Used. Enter the appropriate type to be used in the workplace (for example, organic vapor cartridge with paint prefilter) along with the NIOSH/MSHA approval number.

A11.9. Tasks/Operations Approved for Respirator Use. Specify the tasks or operations approved for the fitted respirator. Ensure the cartridge, filter, canister to be used is compatible with the approved tasks, operations. For example: "applying paints, primers excluding polyurethanes" or "sanding and preparation work" or "pesticide mixing and application" or "asbestos inspection, abatement work".

A11.10. Training Administered. Use this section as a reminder to cover these training elements in the initial fitting regimen. This list is not all inclusive. Supplement the list locally as needed.

A11.11. Remarks . Add local comments as deemed necessary by BE. If desired, include the NSN of the cartridges or filters listed in the above sections in this section.

A11.12. Typed/Printed Name, Title, AFSC and Signature of the program administrator or Bioenvironmental Engineer. Self-Explanatory.

A11.13. File Retention. Give copy one of this form to the individual to file with their AF Form 55. Forward copy two to BE for filing in Tab F of the appropriate case file.

Attachment 12**RESPIRATOR CLEANING PROCEDURES**

A12.1. The following procedure is recommended for cleaning and disinfecting respirators:

A12.1.1. Remove any filters, cartridges, or canisters.

A12.1.2. Wash face piece and breathing tube in a cleaner-disinfectant solution. Use a soft brush to facilitate dirt removal.

A12.1.3. Use commercially prepared cleaner-disinfectant solutions (follow manufacturer's instructions) or wash respirators in a liquid detergent solution, then dip in one of the following disinfectant solutions:

A12.1.3.1. Hypochlorite solution (50 ppm chlorine) for 2 minutes.

A12.1.3.2. Aqueous iodine solution (50 ppm) for 2 minutes.

A12.1.3.3. Quaternary ammonium solution (200 ppm of quaternary ammonium compounds in water with less than 500 ppm total hardness) for 2 minutes.

A12.1.4. Rinse completely in clean, warm, water which is less than or equal to 120 degrees F.

A12.1.5. Air dry in a clean area.

A12.1.6. Clean other respirator parts as recommended by the manufacturer.

A12.1.7. Inspect valves, head straps, and other parts; replace defective parts with new ones.

A12.1.8. Insert new filters, cartridges, or canisters periodically as specified by the manufacturer; make sure seal is tight.

A12.1.9. Place in plastic bag or other closed container for storage.

A12.2. Hypochlorite and iodine solutions or iodine compounds can damage respirator parts by aging rubber and corroding metal parts if immersion times are extended. Quaternary ammonium compounds can cause dermatitis if not completely rinsed from the respirator. Solvents except as prescribed in paragraph A12.3.2. below, temperatures above 120 degrees F, and vigorous mechanical agitation should not be used.

A12.3. Respirators contaminated with organic phosphate pesticides should be decontaminated as follows:

A12.3.1. If contamination is light, normal cleaning procedures should provide satisfactory decontamination.

A12.3.2. Organic phosphate pesticides should be removed by an alkaline soap wash and 50 percent isopropyl or ethyl alcohol rinse, followed by normal cleaning procedure.

Attachment 13**BREATHING AIR TESTING REQUIREMENTS**

A13.1. Compressed gaseous air shall meet at least the requirements of the specification for Type I - Grade D breathing air, and liquid air shall meet at least the requirements for Type II - Grade B breathing air as described in the current version of the Compressed Gas Association (CGA) Commodity Specification for Air, ANSI/CGA G-7.1).

A13.2. Compressed gaseous air may contain low concentrations of oil introduced from equipment during processing or normal operation. If high pressure oxygen passes through an oil or grease coated orifice, an explosion or fire may occur. Therefore, compressed gaseous oxygen shall not be used in supplied-air respirators or in open circuit type self-contained breathing apparatus that have previously used compressed air. Oxygen concentrations greater than 23.5 percent shall be used only in equipment designed for oxygen service or distribution.

A13.3. The dew point of air used to recharge self-contained breathing apparatus shall be minus 65 degrees F or lower (less than 25 ppm water vapor). The driest air obtainable (dew point of minus 100 degrees F or lower) should be used for recharging SCBA cylinders to be used in environments with ambient temperatures below minus 25 degrees F.

A13.4. Breathing air may be supplied to supplied air respirators from ambient or free air pumps. The intake for these pumps shall be located in a uncontaminated location. There are no testing requirements for air supplied by these air pumps.

A13.5. Breathing air may be supplied to supplied-air respirators from cylinders or air compressors.

A13.5.1. Cylinders shall be tested and maintained as specified by applicable Department of Transportation (DOT) specifications for shipping containers (Title 49, Code of Federal Regulations, Part 173, General Requirements for Shipments and Packaging, and Part 178, Shipping Container Specifications).

A13.5.2. A compressor shall be constructed to avoid entry of contaminated air. For all air compressors, including portable types, the air intake location shall be carefully selected and monitored closely to ensure continued quality of air supply to the compressor. The system shall be equipped as necessary with a suitable in-line air-purifying sorbent bed and filter to further assure breathing air quality. Maintenance and replacement/refurbishment of compressor and associated air purifying or filter media shall be performed periodically, by trained personnel following manufacturer's recommendations and instructions.

A13.5.3. As part of acceptance testing, and prior to initial use, representative sampling of the compressor air output shall be performed to ensure that it complies with the requirements in paragraphs A13.1 and A13.2 above. To ensure a continued high quality air supply and to account for any distribution system contaminant input, a representative sample should be taken at distribution supply points. Samples should be collected on a periodic basis, as directed by BE. Specific tests required are given in TO 42B-1-22.

A13.5.4. The dew point of breathing air used with supplied-air respirators should be lower than the lowest ambient temperature to which any regulator or control valve on the respirator or air supplied system will be exposed.

A13.5.5. Breathing air couplings shall be incompatible with outlets for nonrespirable plant air or other gas systems to prevent inadvertent servicing of supplied-air respirators with nonrespirable gases. Breathing air outlets shall be labeled.

A13.5.6. Breathing gas containers shall be marked in accordance with ANSI Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z48.1/CGA C-4-1978 (CGA Pamphlet C-4). Further details on sources of compressed air and its safe use will be found in CGA Pamphlet G-7, 1988, Compressed Air for Human Respiration.

A13.5.7. For purchased breathing respirable air, follow the inspection criteria in TO 42B-1-22.

Attachment 14**INSTRUCTION FOR COMPLETING AF FORM 1071, INSPECTION AND MAINTENANCE RECORD**

This form is used to maintain an inspection and maintenance history of a SCBA, air-line, or other respirator. The using activity maintains this form in the workplace making it available for review, when requested.

A14.1. Description. Enter a description of the respirator system, (for example Scott Air-Pak 2.2, Positive Pressure SCBA, Serial Number, A4Q91, TC-13F-30, equipped with 45 SCF air tank model 5-447-1).

A14.2. Location. State where the respirator system is normally located (for example, fuel cell hangar, bay 3 wall locker, etc.).

A14.3. Manufacturer. Self-Explanatory.

A14.4. Catalog and(or) Model Number. Enter the model number of the governing system, based on the NIOSH approval number.

A14.5. Date Installed or Received . Enter the date the system was installed (i.e. air-line system) or received.

A14.6. I.D. Number. Enter the locally assigned identification number (for example, the equipment custodian's or maintenance number).

A14.7. Technical Data Reference. Enter the TOs or manufacturer's data reference regarding inspection or maintenance criteria, (for example for the Scott Air Pak, 2.2 enter: Scott Aviation Pamphlet 89246-01 1/91).

A14.8. CY. Enter Calendar Year, i.e. 1991.

A14.9. Date Performed. For SCBA, air-line, emergency escape or other respirators a monthly inspection (every 30 days) is required. The individual conducting the inspection enters their initials in the space corresponding to the day and month the inspection was completed. Use the first line on the reverse of the form to spell-out the individual's name, for example: JLB, John L. Baker.

A14.10. Discrepancies, Inspections, or Special Actions. Enter problems found during the inspection or special actions taken, for example: "head straps losing elasticity, ordered new set."

A14.11. Date Discovered. Enter date the problem was found (corresponding with entry 10), for example 10 June 92.

A14.12. Date Corrected or Completed . Enter date the problem or inspection was corrected or completed. For example, if the head straps were received on 12 Sept. 92, enter that date.

Attachment 15**SAMPLE OPERATING INSTRUCTION**

DEPARTMENT OF THE AIR FORCE

SGPB OPERATING INSTRUCTION

XXX MEDICAL GROUP HOSPITAL (XXXX)

EAGLE AFB, USA 99999-9999

[Date]

**Aerospace Medicine
RESPIRATORY PROTECTION PROGRAM**

This OI establishes procedures for performing the BE responsibilities under the base Respiratory Protection Program (RPP). This OI provides control methods for approval of respirators, tracking respirators after approval, monitoring RPP requirements during industrial hygiene surveys, fit-testing, training, and record keeping.

A15.1. References:

A15.1.1. AFOSH Standard 48-1, Respiratory Protection Program.

A15.1.2. OSHA Standards:

A15.1.2.1. 29 CFR 1910.134, Respiratory Protection

A15.1.2.2. 29 CFR 1910.10XX, OSHA Specific Substance Standards; 29 CFR 1926.XXXX.

NOTE: Throughout this OI, all references are to AFOSH Standard 48-1 unless otherwise noted.

A15.2. Responsibilities:**A15.2.1. Chief, Bioenvironmental Engineering:**

A15.2.1.1. Will administer the base RPP or will appoint an individual to administer the RPP. As a minimum, the program administrator must meet one of the requirements according to paragraph 2.

A15.2.1.2. If an administrator is appointed, the OIC will provide guidance to the program administrator as needed.

A15.2.2. The person administering the RPP:

A15.2.2.1. Has all the responsibilities listed in paragraph 2.

A15.2.2.2. Provides "train the trainer" instruction to other BE personnel.

A15.2.3. All BE personnel:

A15.2.3.1. Provide assistance to the RPP administrator in conducting training and fit-testing.

A15.2.3.2. Review workplace OIs and work practices during BE surveys according to paragraph 9.

A15.2.3.3. Inform the person administering the RPP of all workplaces using respiratory protection.

A15.3. Procedures:

A15.3.1. **Selection of Respirators.** All respirators will be selected by using the information in paragraph 4. After the type of respirator has been determined, BE will forward a letter to the work center supervisor informing them to notify the Physical Exams Section (PES) to arrange for a medical examination and to contact BE to arrange for initial respirator training and fit-testing.

A15.3.2. **Scheduling of Training.** When BE is notified by a supervisor requesting initial training, BE will schedule the individuals into the next available class time. Bioenvironmental Engineering should also inform the supervisor that the trainees who will be fit-tested must meet the following criterion upon arrival to class:

A15.3.2.1. Be clean shaven (no more than 24 hour growth).

A15.3.2.2. Refrain from smoking at least 30 minutes prior to class start time if quantitative fit-testing is performed. Qualitative fit-testing results may be artificially low if the worker smokes within 30 minutes of the test because of particles in the worker's exhaled breath.

Note: If the employee does not meet these requirements, the worker will be trained but not fit-tested. Fit-testing must be rescheduled.

A15.3.3. **Training.** Before the class starts, the instructor will verify all students meet the requirements listed above. All students will sign in on the proper AF Form 2767. This section of the class is to familiarize the students with the particular respirator they will be using, the proper wear, and the maintenance of them. The instructor must cover all the areas required by paragraph 7. A recommended lesson plan is included as attachment 10. Each training class is normally comprised of many different users. The instructor must conform the class to meet the particular needs of those users. The instructor must cover all types of respirators utilized by each of the students.

A15.3.4. **Fit-Testing.** After the classroom instruction, either a qualitative or quantitative fit-testing can be conducted depending upon the type of contaminate being controlled. Should qualitative fit-testing be the method of choice, follow one of the testing protocols found in [Attachment 11](#). If quantitative is the method of choice, follow one of the protocols found in [Attachment 12](#).

A15.3.5. **Care, Maintenance, and Inspection.** Once it has been determine the actual respirator a worker will be wearing, they must receive training on the proper care and maintenance of that respirator according to paragraph 8. NOTE: Students should be allowed to practice cleaning the respirators they were tested with.

A15.3.6. **Documentation.** Once the student has finished all the segments, they will receive a completed AF Form 2772 according to attachment 14. Training shall also be documented on the AF Form 55. The instructor should verify all information on AF Form 2767 and AF Form 2772 is correct, if so they the student may be released.

A15.4. **Supervisor Training.** Supervisor's training will be conducted according to paragraph 7.