BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE OCCUPATIONAL SAFETY AND HEALTH STANDARD 48-137

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Aerospace Medicine

RESPIRATORY PROTECTION PROGRAM

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This standard implements the Department of Labor, Occupational Safety and Health Administration (OSHA) standard Title 29, Code of Federal Regulations (CFR), Part 1910.134, *Respiratory Protection,* current edition. This standard applies to all Air Force (AF) installation commanders, all AF military and civilian personnel (including Air Force Reserve Command (AFRC) and Air National Guard (ANG) units and members). The OSHA standard and this standard comprise a unit, which prescribes the minimum requirements for an effective respiratory protection program. Report conflicts in guidance between this standard, Federal standards, or Air Force directives through major commands (MAJCOM), direct reporting units (DRU), or field operating agencies (FOA) Surgeons to: Air Force Medical Support Agency (AFMSA/SGPE), 110 Luke Avenue, Room 400, Bolling AFB DC 20032-5229. This standard may be supplemented with additional or more stringent criteria. Refer to AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program,* for instructions on processing supplements and variances. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 37-123 (will be AFMAN 33-363), Management of Records and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at **https://webrims.amc.af.mil**. This AFOSH Standard requires collecting and maintaining information protected by the Privacy Act of 1974 authorized by Title 10 U.S.C., Section 8013.

SUMMARY OF CHANGES

This interim change is designed to clarify the use of escape-only respirators. All language, in this standard, regarding the voluntary use of emergency escape masks has been removed. This maintains consistency throughout the standard and meets the intent of 29 CFR 1910.134, *Respiratory Protection*. A margin bar (|) indicates newly revised material.

Chapter 1

INTRODUCTION

1.1. Applicability.

1.1.1. This standard contains the minimum elements required to implement an acceptable installation-level respiratory protection program and should be used as the installation level (or unit if tenant on installation) respiratory protection program. It applies to operations performed by Department of the Air Force 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 Command. This standard does not apply to government-owned, contractor-operated operations. Also, these requirements and procedures do not apply to military-unique respiratory protection devices that are designed for use in nuclear, biological, or chemical warfare environments. See Air Force Manual (AFMAN) 32-4006, *Nuclear, Biological, and Chemical (NBC) Mask Fit and Liquid Hazard Simulant Training.* Military-unique respiratory protection devices shall not be used for protection of workers or emergency responders in non-military unique work environments such as an industrial workplace, or when responding within the National Incident Management System. Military-unique respiratory protection devices, however, may be used in readiness training exercises and during chemical, biological, radiological, nuclear and high yield explosive (CBRNE) events for garrison military operations (i.e., perimeter control, aircraft generation) where respiratory protection is required and the use has been evaluated by Bioenvironmental Engineering (BE).

1.1.2. The specific requirements outlined in this standard are based on 29 CFR 1910.134 requirements at the time of publication. Should additional OSHA requirements be published 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 Title 29, CFR Part 1910, Subpart Z, *Toxic and Hazardous Substances*, Parts 1926.1101-1152 (not all inclusive), and Part 1926.62, *Lead*, shall apply. Additionally, the respiratory protection requirements in Title 10, CFR Part 20, *Standards for Protection Against Radiation*, shall also apply.

1.2. Hazardous Exposures and Human Factors.

1.2.1. Hazardous Exposures. Adverse health effects may be caused by inhalation of hazardous materials at toxic levels. 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 even death. The proper use of approved respirators will protect the wearer from toxic levels of airborne chemicals and hazardous materials.

1.2.2. Human Factors. Air Force employees are less likely to experience injury or illness from chemical, biological, or radiological hazards when they wear approved respirators correctly, and are trained in their use, care, and maintenance. 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.

Chapter 2

RESPONSIBILITIES

2.1. The Deputy Assistant Secretary of the Air Force, Environment, Safety, and Occupational Health (SAF/IEE) approves the Air Force Surgeon General's occupational health protection policy and guidance for the respiratory protection program.

2.2. The Office of the Air Force Surgeon General (USAF/SG) formulates, publishes, reviews, and executes plans, policies, programs, and budgets for the medical support of the occupational and environmental health program.

2.3. Air Force Medical Support Agency (AFMSA), Environmental and Occupational Health Division (SGPE) proposes policy and interprets guidance and policy to ensure the effective implementation of the Air Force respiratory protection program.

2.4. USAF School of Aerospace Medicine (USAFSAM):

2.4.1. Provides respiratory protection training for bioenvironmental engineering personnel through Air Force Specialty Code (AFSC) awarding courses.

2.4.2. Recommends technical changes to this standard, as needed.

2.5. Air Force Institute for Operational Health (AFIOH):

2.5.1. Provides AF-wide consultative services for respiratory protection in industrial or military-unique settings and technical support for interpretations or modifications of this standard.

2.5.2. Provides technical guidance concerning capabilities of military-unique respiratory protection for military operations.

2.5.3. Recommends technical changes to this standard or evaluates discrepancies between this standard and technical orders, as needed.

2.6. Major Command (MAJCOM) Bioenvironmental Engineers:

2.6.1. Advocate for resources within the command for the respiratory protection program.

2.6.2. Resolve questions regarding specific interpretations of this and applicable OSHA standards and, and if necessary, coordinate with AFMSA/SGPE.

2.6.3. Forward a copy of AFTO Form 22, *Technical Order Improvement Report and Reply* for inconsistencies between technical orders and this standard to AFMSA/SGPE.

2.7. Installation and Unit Commanders and Functional Managers establish and conduct an installation respiratory protection program conforming to the requirements of this standard and applicable OSHA standards when respiratory protection is required and used within their organization.

2.8. Workplace Supervisors. Supervisors, in workplaces where respiratory protection is used, have a direct responsibility for protecting their workers, and will:

2.8.1. Maintain this standard in the workplace, and develop, maintain, and enforce a workplace-specific written plan according to the guidance in **Chapter 3** of this standard. Supervisors shall review the workplace-specific written plan and provide a copy to Bioenvironmental Engineering (BE) for approval annually.

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

2.8.3. Notify BE of conflicts between respiratory protection guidance and applicable Technical Orders (TO) and initiate an AFTO Form 22 for resolution.

2.8.4. Provide initial and periodic (annual and as changes occur) respiratory protection training per 29 CFR 1910.134 including training to all personnel in their workplace who use "voluntary use" (filtering facepieces). (Refer to 29 CFR 1910.134, Appendix D for mandatory training requirements for voluntary use respirators.) Document training on AF Form 55, *Employee Safety and Health Record*, or electronic equivalent.

2.8.5. Provide for quality control of respirator breathing air (if used) according to TO 42B-l-22, *Quality Control of Compressed and Liquid Breathing Air*, and furnish sampling results to BE for review. Discontinue the use of compressed breathing air and contact BE if sample results are unsatisfactory and/or personnel complain of taste, odor or irritation from compressed breathing air.

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

2.8.7. Ensure personnel on the respiratory protection program wear the approved respiratory protection for the hazard and for which they have been fit tested and trained.

2.8.8. Advise all respirator wearers that they may safely 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 warrant such relief.

2.8.9. Ensure workers have received the necessary medical evaluations, training, and fit testing before engaging in workplace operations requiring the use of the respirator. Supervisors receive training from BE as specified in **Chapter 8** and should contact BE should they become a supervisor of a new workplace.

2.8.10. Follow and enforce the cartridge change-out schedule developed by BE and include the schedule in the workplace-specific written plan.

2.8.11. Notify BE when new employees require fit testing, or current employees have a change affecting their wear of respiratory protection.

2.8.12. Provide copies of workplace-specific written plan to employees to hand-carry to their medical evaluation.

2.9. Individuals. Individuals who wear respiratory protection will:

2.9.1. Complete initial respirator medical evaluation questionnaire and other physical examination requirements as needed prior to performing duties requiring respiratory protection. Provide workplace-specific written program to the provider for the medical evaluation.

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

2.9.3. Guard respirators against damage, do not use unsanitary, damaged or unserviceable respirators, and turn in unserviceable respirators to their supervisor.

2.9.4. Report to their supervisor any change in medical status which may impact their ability to safely wear respiratory protection (e.g., weight changes, facial scarring, dental changes, cosmetic surgery, disfigurement, etc.).

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

2.9.6. Receive initial and periodic training and fit testing (annual, and as changes occur).

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

2.9.8. Maintain the integrity of the National Institute of Occupational, Safety and Health (NIOSH) certification by not mixing respirator parts from different manufacturers.

2.9.9. Ensure that no facial hair comes between the sealing surface of the facepiece and the face or interferes with valve function, if required to wear a tight-fitting facepiece.

2.10. Medical Group Commanders will ensure a physician or other licensed health care professional, as defined in 29 CFR 1910.134 (e), makes the determination that a worker is physically able to wear a respirator.

2.11. Aerospace Medicine Council will establish a medical evaluation protocol for respirator users per 29 CFR 1910.134(e) and Appendix C, Part B, and is the installation level authority on medical surveillance of respirator users, as applicable.

2.12. Bioenvironmental Engineering (BE). Bioenvironmental Engineering is the installation level authority on respiratory protection and conducts all aspects of a installation level program unless otherwise specified by this standard. BE:

2.12.1. Is the office of primary responsibility (OPR) for the installation respiratory protection program.

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

2.12.3. Will ensure procedures are in place for controlling the ordering and issuing of respirators.

2.12.4. Will develop appropriate cartridge change-out schedules based on objective exposure data and ensure they are specified in the workplace-specific written plans.

2.12.5. Will conduct routine and special surveys (when needed) in workplaces where respirators are used.

2.12.6. Will administer or appoint an individual in writing to administer the installation respiratory protection program. The administrator must have attended either the 4BXXX or 43EX AFSC course, or a respiratory protection training course (i.e., OSHA Training Institute or equivalent). This program administrator will:

2.12.6.1. Be appointed and approved by the BE Flight Commander or the non-commissioned officer-in-charge.

2.12.6.2. Maintain or have immediate access to current copies (paper or electronic) of applicable OSHA standards (i.e., 29 CFR 1910, 29 CFR 1926), and the NIOSH Certified Equipment List.

2.12.6.3. Ensure Force Health Management or Occupational Medicine Services personnel use the appropriate respirator medical evaluation questionnaire per 29 CFR 1910.134.

2.12.6.4. Provide guidance to workplace supervisors, as necessary, in the preparation of the workplace-specific written plan and annual training program.

2.12.6.5. Ensure fit testing is conducted according to 29 CFR 1910.134. Conduct fit testing on those individuals who have been medically cleared by a physician or licensed health care provider.

2.12.6.6. Educate and train workplace supervisors, and those individuals appointed to oversee the use, maintenance, and care of common use, or escape-only respirators. Supervisor training will be repeated when a supervisor becomes a supervisor of a different workplace.

2.12.6.7. Conduct and document a respiratory protection program review at least annually according to provisions in this standard. BE will report the findings in writing to the Aerospace Medicine Council (AMC) and the Installation Environmental, Safety and Occupational Health (ESOH) Council.

2.12.6.8. Ensure BE checks the NIOSH *Respirator User Notices* and *NIOSH NPPTL Press Releases* quarterly. (Posted on the NIOSH web site.)

2.12.6.9. Resolve inconsistencies between TOs and this standard using official channels. Use AFTO Form 22, *Technical Order Improvement Report and Reply* to request a change to the TO. BE will send a coordinated copy of the AFTO Form 22 to the MAJCOM BEE.

2.12.6.10. Refer individuals requiring respirator related medical evaluations (initial (respiratory questionnaire), periodic, or for physical/work condition changes) to the Force Health Management, Occupational Medicine Services or equivalent.

2.12.6.11. Advise on the use of respirators designed for use in a chemical, biological, radiological, and nuclear contingency environments (e.g., MCU-2 series, etc.) for military-unique operations to include readiness training exercises and home station defense during CBRNE events.

2.12.6.12. Maintain oversight and responsibility if BE authorizes other organizations or contractors to conduct respirator fit testing. Ensure agreements and procedures are documented and followed.

2.12.6.13. Review workplace-specific written plans annually to ensure respiratory protection procedures are addressed.

2.12.6.14. When possible, determine air contaminant concentration to which the respirator wearer is exposed to effectively establish the degree of exposure, the appropriate respirator to protect the worker, and cartridge change-out schedules. Document as part of the work center's health risk assessment objective data.

2.13. Public Health (PH). Public Health will ensure the correct occupational health examinations are identified for all respirator wearers based on BE workplace surveys, and recommendations made by the Occupational Health Working Group (OHWG).

2.14. Force Health Management (FHM) or Occupational Medicine Services (OMS) will:

2.14.1. Administer respirator medical evaluation questionnaires per 29 CFR 1910.134 to individuals placed on the respiratory protection program. Respirator medical evaluation questionnaires are required prior to initial fit testing and wearing a respirator. Ensure that respirator medical evaluation questionnaires and evaluations are administered confidentially and filed in the medical record of the individual.

2.14.2. Arrange for medical evaluations of respirator users required by this and OSHA standards.

2.14.3. Provide the physician or licensed health care provider conducting medical evaluations for respirator copies of the documents described in **6.2.3.** and will ensure worker's bring the workplace-specific written program from the individual's workplace/shop.

2.14.4. Notify BE of personnel who have been medically cleared by a physician or other licensed health care professional to wear a respirator.

2.15. Physician or Other Licensed Health Care Professional (PLHCP) will:

2.15.1. Review the respirator medical evaluation questionnaires and document as outlined in **Chapter 6.**

2.15.2. Conduct medical evaluations of individuals identified to wear a respirator, as required.

2.15.3. Medically clear individuals to wear a respirator.

2.16. Infection Control Officer (ICO) will:

2.16.1. Determine the occupational activities that may expose or potentially expose medical personnel to airborne infectious diseases.

2.16.2. Recommend to BE, patient care areas that may require a respiratory protection program under this standard based on potential exposures to infectious diseases. Respirator requirements will be based on the recommendations provided by BE and PH. BE and PH will base recommendations on the health risk assessment.

2.17. Ground Safety will refer any suspected problems on respirator usage discovered during their inspections to BE.

2.18. Fire and Emergency Services will:

2.18.1. In coordination with BE, provide training on the use and maintenance of self-contained breathing apparatuses (SCBA). Installations will locally determine who provides these services, BE or Fire and Emergency Services, or other functional area.

2.18.2. In coordination with BE, ensure required maintenance for regulating or admission valves, regulators, and alarms for SCBAs is performed by the respirator manufacturer or appointed individuals who are trained and certified by the manufacturer to conduct such maintenance. Installations will

locally determine who provides these services, BE or Fire and Emergency Services, or other functional area.

Chapter 3

RESPIRATORY PROTECTION PROGRAM ELEMENTS

3.1. General Requirements. The installation respiratory protection program shall be conducted in accordance with OSHA's standard 29 CFR 1910.134 and this standard.

3.1.1. The program elements of a respiratory protection program will be shared among workplace supervisors and other functional areas such as BE, FHM, and healthcare providers.

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. Only respirators approved by NIOSH shall be used, except for those respirators addressed in **4.2.4.**

3.1.4. The only respirator authorized for voluntary use in the Air Force is the filtering facepiece device (FFPD) as described in **4.2.2.** A filtering facepiece device is defined by OSHA as a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

3.2. Respiratory Protection Program Elements.

3.2.1. Bioenvironmental engineering shall develop procedures to address the following:

3.2.1.1. Training procedures per 29 CFR 1910.134(k).

3.2.1.2. Fit testing procedures for tight-fitting respirators per 29 CFR 1910.134(f).

3.2.1.3. Program evaluation procedures per 29 CFR 1910.134(l) and as follows:

3.2.1.3.1. The respiratory protection program will be evaluated annually. BE will conduct the review and report the findings in writing to the Aerospace Medicine Council (AMC) and the Installation Environment, Safety and Occupational Health (ESOH) Council.

3.2.1.3.2. The program evaluation will contain the following elements as a minimum: Number of workplaces on the program, number of workplaces with current workplace-specific written plans, number of personnel on the program, number of personnel current on fit testing and training, review of selection protocol, adequacy of fit testing equipment and supplies, adequacy of instructor knowledge and training, respirator procurement process, and record keeping requirements.

3.2.2. BE will maintain a listing of the workplaces that use respiratory protection. The list (master respirator inventory) includes at least the name of the workplace, the workplace identifier, types of respirator used, contaminants of concern, and the processes during which the respirator is used. This may be maintained electronically in the environment, safety and occupational health management information system (ESOH-MIS).

3.2.3. BE will ensure respiratory protection information is provided to workplaces as part of their certified personal protection equipment (PPE) list including details on the respirator type used for specific operations/processes. Respiratory protection requirements will be included on the Occupational

and Environmental Health Exposure Data summary or in the appropriate data fields within the ESOH-MIS.

3.2.4. Workplace Surveys. BE will conduct routine 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) and checking for breathing air outlet incompatibilities with other gas lines; adequacy of work practices; documentation of inspections of shared and emergency use respirators; and documentation of respirator training. The findings of these evaluations may be included in the workplace survey reports.

3.2.5. Medical evaluations will be conducted as outlined in **Chapter 6**.

3.3. Workplace-Specific Program Elements.

3.3.1. Workplace-specific written respiratory protection plans. Supervisors of workplaces in which respiratory protection is used shall develop a written plan as required by 29 CFR 1910.134(c), and the plan shall be approved by BE. Workplace-specific written plans shall be based on BE evaluations and recommendations, reviewed annually by BE, and include:

3.3.1.1. This instruction.

3.3.1.2. 29 CFR 1910.134.

3.3.1.3. Workplace supplemental information:

3.3.1.3.1. Selection criteria. Describe the processes in which respirators are required. See **Chapter 4**.

3.3.1.3.2. Use, maintenance, and care procedures. Describe the criteria that workers use to determine when respirator filters, cassettes, or cartridges must be changed.

3.3.1.3.3. Workplace exposure monitoring and surveillance results. This can be accomplished by maintaining all current BE survey letters that describe the monitoring and surveillance results with the workplace-specific written respiratory protection plan.

3.3.1.3.4. Proper use of respirators in routine and emergency situations.

3.3.1.3.5. Type and weight of the respirators used by employees.

3.3.1.3.6. Duration and frequency of respirator use (including use for rescue and escape).

3.3.1.3.7. Expected physical work effort involved in the process requiring respiratory protection. OSHA's 29 CFR 1910.134 (e)(5)(i)(C) requires a statement on the expected physical work effort. See also 29 CFR 1910.134 Appendix C, Part B.

3.3.1.3.8. Additional protective clothing and equipment to be worn while wearing the respirator.

3.3.1.3.9. Temperature and humidity extremes that may be encountered.

3.3.1.3.10. Training procedures for required respirators (see 29 CFR 1910.134(k)(1-6)).

3.3.2. Surveillance of Respirator Use. Supervisors shall ensure that approved respirators in their workplace are used, and are used correctly and in good condition.

3.3.3. Determination of Degree of Exposure. Many things affect the concentration of a substance in a work area atmosphere such as changes in operations, processes, chemicals/materials, or workplace environment. It is the supervisor's duty to inform BE of workplace changes so monitoring may be accomplished.

3.4. Purchasing of Respirators.

3.4.1. Purchase respirators through the Standard Base Supply System (SBSS). The Stock class for respirators is 4240. Organizations that use respirators are responsible for purchasing approved respirators and parts for the respirator's operation and maintenance.

3.4.2. Special levels of respirators may be established in base supply as specified in AFMAN 23-110, *USAF Supply Manual*, Vol 2, Part 13, *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.

3.4.3. BE will maintain an adequate selection of respirators so all workers can be fitted; however, attempt to keep the number of respirator brands to a minimum.

3.5. 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 that 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.

3.6. Inventory Control of New Respirators and Spare Parts.

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

3.6.2. 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.

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

3.6.4. Ensure an ample supply of spare parts are 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.

3.6.5. Spare parts for respirator repair will be installed according to the manufacturer's instructions so as not to invalidate the NIOSH certification. The manufacturer of the given respirator and spare parts shall be the same. Using a different manufacturer's part invalidates the NIOSH certification, and is not authorized.

3.7. Environmental Considerations. Used respirator cartridges, canisters or filters shall be disposed of according to applicable federal, state, and local environmental regulations. Consult installation environmental management (CEV or EM) for the state or local disposal guidelines. Paint booth filters are sometimes classified as hazardous waste; if this is the case, used respirator cartridges, canisters, or filters from related processes may be disposed of with this waste.

Chapter 4

RESPIRATOR SELECTION, USE AND LIMITATIONS

4.1. General Considerations.

4.1.1. Selection of Respirators. Respirators will be selected per 29 CFR 1910.134 (d) and the NIOSH Certified Equipment List. Rationale for selection will be documented by process in the work-place-specific written plan.

4.1.1.1. If a more stringent standard such as a substance-specific OSHA standard exists for the contaminants, follow those guidelines and requirements for respirator selection.

4.1.1.2. Select respirators with an assigned protection factor (APF) greater than the value of the hazard ratio, as listed in **Attachment 2**. (**Note:** Use the Occupational Safety and Health Administration assigned protection factors once they are published.)

4.1.2. Worker Activity. Each worker's activity and location in an inhalational 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.

4.1.3. 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.

4.1.4. 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, entry of workers to perform maintenance duties, and rescue operations.

4.1.5. 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.

4.1.6. Immediately Dangerous to Life or Health (IDLH) Conditions. Evaluate all possible actions, such as increasing ventilation or isolating the source of contaminants, to attain an atmosphere that is not IDLH before authorizing personnel to enter areas known to have IDLH conditions. Refer to 29 CFR 1910.134 g(3) and g(4) for procedures for IDLH atmospheres. Also refer to AFOSH Standard 91-25 for additional information for confined space operations.

4.1.7. Other Exposure Routes. Consider other exposure routes (e.g., skin absorption or external radiation) when selecting respiratory protection. Wearing the respirator could increase worker exposure by longer stay times in a hazardous environment such as exposures to external radiation.

4.1.8. Document respirator selection on AF Form 2773, *Respirator Selection Worksheet* or in the ESOH-MIS.

4.2. Respirator Use. Respirator use is either required or voluntary. Unless otherwise specified in this standard, all requirements outlined in this standard apply to all respirator use. Special use circumstances are described in **4.2.3.** and **4.2.4.**

4.2.1. Required. Respirator use shall be required:

4.2.1.1. When other means of control do not reduce exposure below the occupational exposure limit (OEL);

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

4.2.1.3. 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;

4.2.1.4. As an interim measure while permanent controls are awaiting funding, or being designed or installed;

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

4.2.1.6. In emergency situations. See **4.2.3.** for requirements for escape-only respirators.

4.2.2. Voluntary. Voluntary use respirators will not be worn by government employees in Air Force industrial workplaces except for filtering facepieces as described in **4.2.2.1.** and when authorized by BE. BE will authorize voluntary use after verifying the use does not create a hazard to the employee. Voluntary use of respirators must be conducted IAW 29 CFR 1910.134 and Appendix D.

4.2.2.1. Filtering facepieces.

4.2.2.1.1. Employees must request an evaluation of their individual work conditions by BE if they are not already on the respiratory protection program prior to wearing a voluntary use respirator.

4.2.2.1.2. Filtering facepieces (i.e., N-95, N-99, etc.) 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 industrial workplace and must be approved and authorized by BE. They cannot be worn for any industrial task that requires the wear of a respirator for protection against hazards specified by BE other than exposures to airborne infectious diseases as addressed in **Chapter 5**.

4.2.2.1.3. Personnel who wear voluntary use filtering facepieces must receive initial and annual training from their supervisors on the appropriate use of the device, including its limitations per 29 CFR 1910.134 (c)(2) and Appendix D.

4.2.2.2. DELETED

4.2.2.2.1. Emergency escape masks are not to be confused with escape-only respirators (See **4.2.3.** for Escape-Only Respirators). Emergency escape masks are not currently NIOSH-approved respirators, and are intended to allow people to safely escape from an incident where their work area has been contaminated by chemical or biological agents such as in a CBRNE event.

4.2.2.2.2. Personnel who voluntarily wear an emergency escape mask not required by their employers, must still meet the requirements of the voluntary-use provisions per 29 CFR 1910.134 (c)(2) and Appendix D. However, these individuals do not need to be on the respiratory protection program for the emergency escape mask.

4.2.2.2.3. Personnel who voluntarily wear an emergency escape mask must be thoroughly trained in the proper use of the mask, including the conditions that limit the use of the escape mask. Initial training must be conducted per 29 CFR 1910.134 (c)(2) and Appendix D, and should include the opportunity to actually wear the escape mask. Training may be repeated annually.

4.2.2.2.4. Each installation will locally determine who will provide the training e.g., supervisors or facility managers.

4.2.2.2.5. Each installation will establish and implement elements of a written program ensuring use of respirator does not present a health hazard to its user

4.2.2.2.6. Each installation will establish and implement procedures for the proper use of these escape masks. Escape hoods/masks must be used **only** for escape and not for sustained operations.

4.2.3. Escape-Only Respirators. 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, the warning properties of the substances and the operating environment. See **Attachment 3** (*Selection Options for Escape-Only Respirators*) and the "NIOSH Guide to Industrial Respiratory Protection."

4.2.3.1. If there is a high risk of an incident requiring emergency escape, respiratory protection should be required at all times for personnel in the area.

4.2.3.2. During lower-risk operations, consider mandating that the escape-only respirator be carried for quick-donning should the need arise. 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.

4.2.3.3. Escape-only respirators may be either SCBAs or air-purifying respirators.

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

4.2.3.3.2. Air-purifying respirators may be used for escape from low concentration of vapors, acid gases, or particulates. Air-purifying escape-only respirators may be either half or full facepiece but must be NIOSH-certified for escape from the atmosphere where it will be used. No air-purifying device is appropriate for escape from a potentially oxygen-deficient atmosphere.

4.2.3.4. Trainers will be determined at the local level; however, training materials will be provided and approved by BE. Training will include the proper use and limitations of escape-only respirators. Provide personnel with an opportunity to actually wear the escape-only respirator. Conduct initial training, and then repeat at least annually. Instruct personnel to don the respirator properly, leave the area immediately, and where and when they may doff their escape respirators and receive any decontamination as needed. Where escape-only respirators are provided, personnel need to know the location of, and how to access the respirators.

4.2.4. Military-unique operations in CBRNE environments. Military-unique operations will continue in a CBRNE environment based on the commander's operational risk assessment; wear of respirators

will be based on the health risk assessment provided by BE. These military-unique operations may include activities that must continue and/or situations requiring wear of an escape-only respirator during a CBRNE event. Military-unique respiratory protection devices (e.g., MCU-2 Series, JSGPM, JSCESM) may be used for the protection of Air Force personnel during military-unique operations. Requirements for military-unique respirators are addressed in AFMAN 32-4006.

4.2.4.1. DELETED

4.2.4.2. DELETED

4.3. Respirator Limitations. In addition to the following, refer to the requirements in 29 CFR 1910.134:

4.3.1. Communications. Ambient environmental noise and communication needs shall be considered when specific respirators are selected. See **Attachment 4**.

4.3.2. Eye Irritation. If contaminants cause eye irritation, full facepiece respirators or chemical protective goggles with half facepiece respirators shall be worn.

4.3.3. 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 5**.

4.3.4. 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 6**.

4.4. Spectacle Inserts. Refer to AFI 44-117 for determination of benefits and authorizations for spectacle inserts for use with respirators.

Chapter 5

RESPIRATORS FOR EXPOSURES TO AIRBORNE INFECTIOUS DISEASES

5.1. Respirator Selection.

5.1.1. Respiratory protection for exposures to airborne infectious diseases with high morbidity or mortality (e.g., Tuberculosis (TB) or Severe Acute Respiratory Syndrome (SARS)) is based on the risk of an occupational exposure. Accomplish a health risk assessment of the potential for exposure to an infectious disease prior to determining who is required to wear respiratory protection. Determine respiratory protection requirements based on the facility-specific risk assessment that considers the hierarchy of controls to address the hazard, local threat, population served, and services provided, in accordance with OSHA standards, Centers for Disease Control and Prevention (CDC) guidelines and recommendations, and Air Force Instructions.

5.1.1.1. The OSHA standard 29 CFR 1910.139, *Respiratory Protection for M. tuberculosis* was rescinded in 2003. This action only affected respirators used for protection against tuberculosis, which is now covered by 1910.134. Employees occupationally exposed to any other airborne infectious diseases (SARS, measles, etc.) requiring respiratory protection were already required to be in compliance with 1910.134.

5.1.1.2. Respiratory protection selected for protection against occupational exposure to airborne infectious diseases must meet OSHA requirements and be NIOSH approved.

5.1.1.3. Respirators and filtering facepiece 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 (MTF) for protection against airborne infectious diseases such as TB or SARS. Powered air-purifying respirators (PAPRs) and atmosphere-supplying respirators may also be used when filtering facepiece devices and other air-purifying respirators will not provide adequate protection.

5.1.1.4. Respirators are not routinely needed (by staff or visitors) in other parts of hospitals or other health care facilities where there is no direct contact with patients with airborne infectious diseases.

5.2. Donning, Doffing and Disposal.

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

5.2.2. Each facility will address the circumstances in which the respirator/filtering facepiece device is considered to be contaminated and not reusable. Some factors to consider are physical damage (e.g., crushing, tearing), soiling during a high-risk procedure, and contamination. Once worn in the presence of a patient, the respirator should be considered potentially contaminated with infectious material; avoid touching the outside of the device, remove and discard the disposable respirator upon leaving the patients room, and follow with proper hand hygiene.

5.2.3. Properly dispose of contaminated respirators since the filtering material and respirator surfaces may provide an environment where viable microorganisms may be sustained for a period of time and present a contact hazard.

5.3. Aeromedical Evacuation.

5.3.1. Respiratory protection for aeromedical evacuation (AE) personnel caring for patients with airborne infectious diseases with high morbidity or mortality must be determined based on a health risk assessment considering the AE operations, the type of aircraft, and recirculation of air and airflow.

5.3.2. Workplace-specific written plans must include the program elements outlined in this standard and 29 CFR 1910.134.

5.3.3. Aircrew and flight deck crew members. Respiratory protection for aircrew and flight deck crew members during aeromedical evacuation operations will be determined based on health risk assessment and potential for exposures to airborne infectious diseases. Respiratory protection requirements will need to be determined prior to the AE operation so that individuals can be properly enrolled in the respiratory protection program per this standard.

Chapter 6

MEDICAL EVALUATION

6.1. General Information. Potential respirator wearers will complete a respirator medical evaluation questionnaire and may receive a physical examination prior to initial fit testing to identify existing medical conditions that would place the worker at an increased health risk from the use of a respirator or interfere with the use or wear of a respirator. The OSHA standard (29 CFR 1910.134 (e) and Appendix C) specifies the minimum mandatory requirements for medical evaluations.

6.2. Respirator Questionnaires and Medical Evaluations.

6.2.1. The medical evaluation is the respirator medical evaluation questionnaire, and is only an initial requirement. There is no requirement to re-accomplish respirator medical evaluation questionnaires annually. At a 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. The current respiratory questionnaire must be filed in the individual's medical record.

6.2.2. All health care providers conducting medical evaluations and reviewing completed respirator medical evaluation questionnaires for the respiratory protection program will be a physician or other licensed health care professional (PLHCP), as defined in 29 CFR 1910.134 (b).

6.2.3. FHM (or OMS) will provide the evaluating PLHCP a copy of 29 CFR 1910.134(e)(5)(i)(A-E) and at least **Chapter 6** of this AFOSH Standard. They will ensure a copy of the workplace-specific written program from the worker's workplace/shop is available for the medical evaluation, this should be provided by the worker when they turn in their completed respiratory questionnaire. The PLHCP must review the physical work effort statement within the workplace-specific written program.

6.2.4. Following review of the respirator medical evaluation questionnaire, follow-up medical evaluation, if needed, and the information required in **6.2.3.**, the PLHCP will determine the worker's ability to use a respirator.

6.2.5. The PLHCP's written recommendation will include only the information required in 29 CFR 1910.134 (e)(6). To maintain the confidentiality of the respirator medical evaluation questionnaire, the PLHCP's recommendation will be documented on a separate form or letter not on or attached to the questionnaire itself.

6.2.5.1. When the PLHCP recommends the worker can wear a respirator without restrictions, the written recommendation will be filed in the medical record and a copy given to the worker and the worker's supervisor; BE will be formally notified (i.e., written recommendation or notification) to proceed with fit testing.

6.2.5.2. When the PLHCP recommends respirator use with restrictions, the written recommendation will be filed in the medical record. Copies will be given to the worker, and the worker's supervisor, or, if the worker is civilian, the civilian personnel office, and BE will be formally notified to proceed with fit testing.

6.2.5.3. When a worker recovers from the medical condition and the restrictions can be lifted, the PLHCP's recommendation will be re-done and annotated in the individual's medical record, and

distributed to the worker, the worker's supervisor or civilian personnel office (if applicable), and BE will be notified (in case a new fit test needs to be accomplished).

6.2.5.4. When 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. BE will be formally notified.

6.3. Follow-up Medical Evaluations.

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

6.3.2. Pulmonary function studies are often included in respirator certification evaluations, 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 are only conducted when clinically indicated.

6.3.3. There are no annual or periodic requirements for medical reevaluations. Refer to 29 CFR 1910.134 (e)(7) for the minimum criteria for medical reevaluations.

6.3.4. The Occupational Health Working Group (OHWG) should consider the following actions to facilitate identifying workers who may have developed medical conditions affecting respirator use since initial fit testing.

6.3.4.1. During workplace visits, BE personnel should 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.

6.3.4.2. The OHWG will 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 their ability to use a respirator.

6.3.4.3. When a worker reports to BE for the annual respirator fit test, BE formally (e.g., with written verification that is locally developed) asks if the worker has experienced any difficulty wearing a respirator.

6.3.4.4. When establishing occupational health physical examination requirements for each work area, the OHWG should determine the necessary medical history and examination elements appropriate to detect changes that could impact wear of respiratory protection.

Chapter 7

FIT TESTING

7.1. General Information. There are differences among approved respirators and one type may fit better or be more comfortable than another. Obtain different sizes of the same model or different models of respirators to provide employees a selection of respirators and a good fit. *Assuming appropriate funds are available*, local purchase of respirators is authorized and will be used when it is necessary to obtain an acceptable face fit. *Ensure such purchases conform with acquisition rules by coordinating with a local, warranted contracting officer*.

7.2. Fit Testing Procedures.

7.2.1. Before a worker may be required to wear a respirator with a tight-fitting facepiece, the worker must be fit tested with the same make, model, style, and size of respirator that will be used in the workplace. Current fit tests from other installations may be used if the worker will be using the same make, model and style of respirator.

7.2.2. Fit testing will be performed according to 29 CFR 1910.134.

7.3. Fit Test Failures.

7.3.1. If a medically cleared worker cannot attain an adequate fit with a tight-fitting respirator, consider providing the worker with a positive pressure, loose-fitting facepiece, helmet, or hood.

7.3.2. 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 be filed in the worker's medical record, the worker's supervisor, and, if the worker is civilian, the civilian personnel office.

7.4. Record Keeping.

7.4.1. Records of respirator fit test results will include the information required in 29 CFR 1910.134 (m)(2)(i)(A-E). This information will be recorded on an AF Form 2772, *Certificate of Respirator Fit Test*, or in the ESOH-MIS.

7.4.2. Respirator fit test results will be:

7.4.2.1. Given to the respirator wearer's supervisor to be maintained with the wearer's AF Form 55; or

7.4.2.2. Retained in the approved ESOH-MIS.

7.5. 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 donned. 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.

Chapter 8

TRAINING

8.1. Initial Training. BE will provide or arrange for the initial training of supervisors who have the responsibility of overseeing work activities of one or more persons who must wear respirators and respirator wearers. Training will include the requirements of 29 CFR 1910.134 (k).

8.2. Periodic Training. Trained workplace supervisors will provide annual instruction and retraining to respirator wearers or it will be conducted by BE during the annual fit testing. BE will provide retraining when notified by the supervisor of changes in the workplace or the type of respirator which render previous training obsolete. BE will also provide retraining when notified of or observed inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skills.

8.3. Documentation. Documentation of training may be made on AF Form 55, AF Form 2767, *Occupational Health Training and Protective Equipment Fit Testing Record,* AF Form 1151, *Training Attendance and Rating,* in the AF ESOH-MIS or in the Core Automated Maintenance System (CAMS). If forms are used to document this training, the information shall also be included in the AF ESOH-MIS.

8.4. Supervisors. BE shall discuss respiratory protection requirements with supervisors during routine occupational health surveillance. Supervisor training will be repeated when a supervisor has a permanent change of station or becomes a supervisor of a different workplace.

8.5. Personnel Issuing Respirators. All personnel who issue respirators will be briefed annually by their supervisor on the following:

8.5.1. The issue of "suitable substitutes" for respirators or respirator parts is prohibited.

8.5.2. Bench stocked respirators must be maintained per manufacturer's instructions.

8.6. Respirator Maintainers. BE shall train respirator maintainers initially, and as needed as determined by local BE, in the following areas, as a minimum:

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

8.6.2. Respirator storage.

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

8.6.4. Importance of maintaining NIOSH certification of respirators (e.g., replacement parts).

8.6.5. Document training on AF Form 2767 and in the AF ESOH-MIS.

8.7. Emergency and Rescue Teams. Teams that are established for the purpose of responding to emergencies or rescues, such as fire and emergency services personnel, shall be properly trained in the use of respirators. Each team will develop a workplace-specific written plan to address respiratory training requirements.

Chapter 9

CARE, INSPECTION, AND MAINTENANCE

9.1. 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 workplace 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. This program shall include care, inspection, and maintenance of respirators.

9.2. Respirators.

9.2.1. Care.

9.2.1.1. Cleaning and Disinfecting. In addition to the requirements in 29 CFR 1910.134, respirators issued to an individual shall be cleaned and disinfected, at a minimum, using a respirator wipe at the end of each day in which the respirator is used. Each respirator shall be thoroughly cleaned and disinfected before being worn by a different individual. Emergency use respirators shall be thoroughly cleaned and disinfected after being used. Refer to 29 CFR 1910.134, Appendix B-2.

9.2.1.2. Storage. Refer to 29 CFR 1910.134.

9.2.1.3. Respirable Air and Oxygen for SCBA and Air-line 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.

9.2.2. Inspection.

9.2.2.1. Inspect respirators per 29 CFR 1910.134. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturer's instructions.

9.2.2.2. The user shall inspect the respirator immediately before each use and during cleaning to ensure that it is in proper working condition. Inspect emergency or escape-only respirators prior to carrying it into the workplace. After cleaning and disinfecting, inspect each respirator to determine if it is in proper working condition, needs replacement of parts or repairs, or needs to be discarded. Each respirator stored for emergency or rescue use shall be inspected at least monthly. Refer to 29 CFR 1910.134 (h)(3).

9.2.2.3. The record of inspection of emergency or rescue respirators shall be maintained on AF Form 1071, *Inspection/Maintenance Record*. Respirators that do not meet applicable inspection criteria shall be immediately removed from service and repaired or replaced.

9.2.3. Maintenance.

9.2.3.1. The maintenance and repair of respirators will be accomplished per 29 CFR 1910.134(h).

9.2.3.2. Cartridges, filters, or canisters of air-purifying respirators shall be changed before the end of their service life per the cartridge, filter, or canister change-out schedule developed by BE. See **Attachment 7** for guidance on developing change-out schedules or consult AFIOH.

9.2.3.3. *If*, at any time a worker detects an increase in breathing resistance, smells or tastes the contaminant, or detects the irritant properties of the contaminant the worker should immediately leave the area and replace the cartridge, filter or canister.

9.2.3.4. If the cartridges or filters on an air-purifying respirator are not replaceable, the respirator shall be replaced when one of the conditions in **9.2.3.2.** are met.

9.3. Breathing Air Quality and Use and Testing of Breathing Air Containers. Breathing air quality and use, testing, and breathing air containers shall comply with 29 CFR 1910.134(i). Additionally, Air Force TO 42B-1-22, Quality Control of Compressed and Liquid Breathing Air shall be applied, as required.

9.4. Ambient or Free-Air Pumps and Compressors. The workplace supervisor is responsible for inspecting ambient or free-air pumps and compressors used with air-line (supplied-air) systems:

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

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

9.4.3. An inspection of the air-line, compressor and respirator shall be conducted to ensure all three components match the air pressure and other requirements specified by the manufacturers.

9.5. Information Collections, Records, and Forms.

9.5.1. Information Collections. No information collections are created by this publication.

9.5.2. Records. No records are created by this publication.

9.5.3. Forms Prescribed.

9.5.3.1. Forms or IMTs Adopted. AFTO Form 22, **Technical Order Improvement Report and Reply**, AF Form 55, **Employee Safety and Health Record**, AF Form 1996, **Adjusted Stock Level**, and AF Form 1151, **Training Attendance and Rating.**

9.5.3.2. IMTs Prescribed. AF Form 2767, **Occupational Health Training and Protective Equipment Fit Testing Record**, AF Form 2772, **Certificate of Respirator Fit Test**, AF Form 2773, **Respirator Selection Worksheet**, AF Form 1071, **Inspection/Maintenance Record**, and **Occupational Health Workplace Exposure Data Form** (generated from AF ESOH-MIS (Command Core System or Defense Occupational and Environmental Health Readiness System-Industrial Hygiene).

GEORGE PEACH TAYLOR, JR., Lt General, USAF
MC, CFS Surgeon General

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*

American Industrial Hygiene Association, *The Occupational Environment—Its Evaluation and Control,* 1997

ANSI, Z88.2-1992, *American National Standard for Respiratory Protection*

NEC, *National Electric Code Handbook* (NFPA 70), Articles 501 and 504, 2002

NIOSH, 87-116, *NIOSH Guide to Industrial Respiratory Protection*

NIOSH, *Certified Equipment List*

NIOSH, *Pocket Guide to Chemical Hazards*

NIOSH, *Respirator User Notices*

Title 29 CFR, Part 1910, *Occupational Safety and Health Standards*

Title 29 CFR, Part 1926.62, *Lead*

Title 29 CFR, Part 1926.1101, *Asbestos*

OSHA, Standard Interpretations for 29 CFR 1910.134, dated July 30, 2004; subject-*Tuberculosis and Respiratory Protection*.

AFPD 48-1, *Aerospace Medical Program*

AFPD 90-8*, Environment, Safety and Occupational Health Program*

AFI 33-360V1, *Air Force Content Management Program--Publications*

AFI 44-117, *Ophthalmic Services*

AFI 48-101, *Aerospace Medical Operations*

AFI 48-145*, Occupational and Environmental Health Program*

AFI 90-821, *Hazard Communication*

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection and Health Program*

AFMAN 32-4006, *Nuclear, Biological, and Chemical (NBC) Mask Fit and Liquid Hazard Simulant Training*

AFMAN 37-123, *Management of Records*

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

AFOSH Standard 91-25, *Confined Spaces*

AFOSH Standard 91-501, *Air Force Consolidated Occupational Safety Standard*

T.O. 42B-1-22, *Quality Control of Compressed and Liquid Breathing Air*

Abbreviations and Acronyms

AE—aeromedical evacuation

AFIOH—Air Force Institute for Operational Health

AFMSA—Air Force Medical Support Agency

AFOSH—Air Force Occupational Safety and Health

AFPD—Air Force Policy Directive

AFSC—Air Force Specialty Code

ANSI—American National Standards Institute

APF—assigned protection factor

BEE—Bioenvironmental Engineer

BE—bioenvironmental engineering

CAMS—core automated maintenance system

CFR—Code of Federal Regulations

CBRN—chemical, biological, radiological, and nuclear

CBRNE—chemical, biological, radiological, nuclear and high-yield explosives

DRU—direct reporting unit

ESOH-MIS—environment, safety, and occupational health management information system

FOA—field operating agency

HEPA—high efficiency particulate air

IDLH—immediately dangerous to life and health

IEX—issue exception

MAJCOM—major command

NEC—national electric code

NFPA—National Fire Protection Association

NIOSH—National Institute for Occupational Safety and Health

NSN—national stock number

OEL—occupational exposure limit

OSHA—Occupational Safety and Health Administration

PAPR—powered air-purifying respirator

PLHCP—Physician or Other Licensed Health Care Professional

PSIG—pounds per square inch gauge

RDS—Records Disposition Schedule

SAF—Secretary of the Air Force

SARS—severe acute respiratory syndrome

SCBA—self-contained breathing apparatus

TO—technical order

Terms

Shall—Indicates a mandatory requirement.

Will—Indicates a mandatory requirement that expresses a declaration of intent, probability or determination.

Should—Indicates a preferred method of accomplishment.

May—Indicates an acceptable or satisfactory method of accomplishment.

Aerosol—Liquid droplet or solid particle dispersed in air that is small enough to remain dispersed or suspended.

Air-line Respirator—An atmosphere-supplying respirator in which the respirable gas is not designed to be carried by the wearer, and which uses air delivered under pressure through a hose (formally called *Supplied Air Respirators*).

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. The respirator shall be tested and listed by the National Institute for Occupational Safety and Health (NIOSH). 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: (1) Positive and negative pressure tests, and (2) 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.

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

Employer—A commander, director, or functional manager.

ESOH-MIS—An AF approved automated system to store and maintain all information associated with environment, safety, and occupational health surveillance data and work area/shop requirements.

Gas—A substance that is gaseous at ordinary temperatures and pressures.

Military-unique Respiratory Protection Device—A respiratory protection device which is not approved by NIOSH for industrial uses but is designed for use in nuclear, chemical, or biological agent contingency environments.

Maximum Use Concentration—The lowest of the following: (1) The occupational exposure limit multiplied by the assigned protection factor; (2) The “immediately dangerous to life and health”

concentration; and (3) The maximum contaminant concentration for the given filter or cartridge (if specified).

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: (1) Applicable OSHA standards (29 CFR 1910, Subpart Z, Toxic and Hazardous Substances and 29 CFR 1926, Safety and Health Regulations for Construction); (2) AFOSH Standards; and (3) The latest edition of American Conference of Governmental Industrial Hygienists, *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.

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

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

NOTE: See 29 CFR 1910.134 for additional definitions.

Attachment 2

ASSIGNED PROTECTION FACTORS

Table A2.1. Assigned Protection Factors (adopted from ANSI Z88.2-1 1992).

Type of respirator	Respiratory inlet covering	
	Half mask[1]	Full facepiece
Air purifying respirator	10	100
Atmosphere supplying SCBA (demand)[2]	10	100
Airline (demand)	10	100

	Respiratory inlet covering			
Type of respirator	**Half mask**	**Full face**	**Helmet/ Hood**	**Loose-fitting facepiece**
Powered air purifying	50	1000[3]	1000[3]	25
Atmosphere supplying airline				
pressure demand	50	1000	-	-
continuous flow	50	1000	1000	25
Self-contained breathing apparatus				
Pressure demand open/closed circuit	-	10,000	-	-

[1] Includes ¼ mask, disposable half masks, and half masks with elastomeric facepieces.

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

[3] Protection factors listed are for high-efficiency filters and sorbents (cartridges and canisters). With dust filters, an assigned protection factor of 100 is to be used due to the limitations of the filter.

Table A2.1. - Assigned Protection Factors used with the permission of the American Industrial Hygiene Association. © 1992. All Rights Reserved.

NOTES:

Assigned protection factors are not applicable for escape-only 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.

Attachment 3

SELECTION OPTIONS FOR ESCAPE-ONLY RESPIRATORS

Table A3.1. Selection Options for Industrial Use Escape-Only Respirators.

ESCAPE CONDITIONS	TYPE OF RESPIRATOR[1]
Short distance to exit, no obstacles (no oxygen deficiency)	Any escape-only respirator[2] (canister respirator) or half mask or facepiece (canister respirator)
	Any escape SCBA having a suitable service life[3]
	Any acceptable device for entry into emergency situations
Long distance to exit or obstacles along the way (no oxygen deficiency)	Any air purifying respirator
	Any escape SCBA having a suitable service life[3]
	Any self-contained self-rescuer having a suitable service life
Potential oxygen deficiency	Any escape SCBA having a suitable service life[3]
	Any self-contained self-rescuer having a suitable service life

[1] Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

[2] Escape-only respirators are designed for use during escape from IDLH or non-IDLH atmospheres. It may consist of a half-mask facepiece or mouthpiece, appropriate air-purifying element for the contaminant, and associated connections. The manufacturer designates maximum use concentrations for these types of respirators.

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

Attachment 4

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 facepiece seal leak, and the worker may be tempted to temporarily dislodge the device to communicate. Both situations are undesirable. There are several options that may be employed to aid communications when wearing respirators:

A4.1. Speaking Diaphragms.

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

A4.1.1. There are key components in maintaining the airtight integrity of the facepiece requiring care when installing and handling.

A4.1.2. 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.

A4.1.3. Not all facepiece respirators are available with speaking diaphragm. Check with the equipment manufacturer for availability.

A4.2. Built-in Microphones. Some respirator manufacturers make available small microphones that 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:

A4.2.1. Any component that is attached to or through the respiratory inlet covering may affect its function. In cases where the manufacturer provides components, strict adherence to the installation instructions and leak test procedures is necessary to ensure that the airtight integrity is maintained.

A4.2.2. 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.

A4.3. Hand or Coded Signals. A predetermined set of signals may be useful in communicating.

A4.4. 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 facepiece microphones. Considerations when using these devices are:

A4.4.1. Cranial microphones shall never be placed under the head harness of facepiece respirators since their dislodgment may loosen the respirator straps.

A4.4.2. 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.

A4.5. Use of Telephone Handsets. Since a person exhales while speaking, the exhalation valve in a facepiece 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.

A4.6. Safety Considerations. Electronic devices shall be selected and used with caution in explosive atmospheres or Class I hazardous locations identified in Article 501 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. Consider the effects of radio frequency emissions when utilizing such devices in the vicinity of sensitive electronic equipment.

Attachment 5

LOW TEMPERATURE ENVIRONMENT CONSIDERATIONS

A5.1. 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 (C) (32 degrees Fahrenheit (F)). Full facepieces are available with nose cups that direct the warm and moist exhaled air through the exhalation valve without contacting the lens. Facepieces with nose cups may provide satisfactory vision at temperatures as low as -32 degrees C (-25 degrees F).

A5.2. It is important to note that SCBA equipped with a full facepiece 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.

A5.3. 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.

A5.4. Such general considerations include (in addition to moisture content requirements for air).

A5.4.1. The checking of all connections that may be affected when exposed to low temperatures.

A5.4.2. The proper storage of elastomeric components such as facepieces and breathing tubes that may be prone to distortion if improperly stored in cold weather; such distortion of components as facepieces could prevent the user from attaining an adequate fit.

A5.4.3. 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.

A5.5. At very low atmospheric temperatures, the valves of a respirator may freeze open or closed due to the presence of moisture.

A5.6. Some air-line respirators are approved with a device called a vortex tube to warm the air supplied to the respiratory inlet covering of the respirator.

Attachment 6

HIGH TEMPERATURE ENVIRONMENT CONSIDERATIONS

A6.1. Working in a high temperature environment while wearing a respirator creates additional stress on the wearer. Using a respirator that 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 should minimize the additional stress.

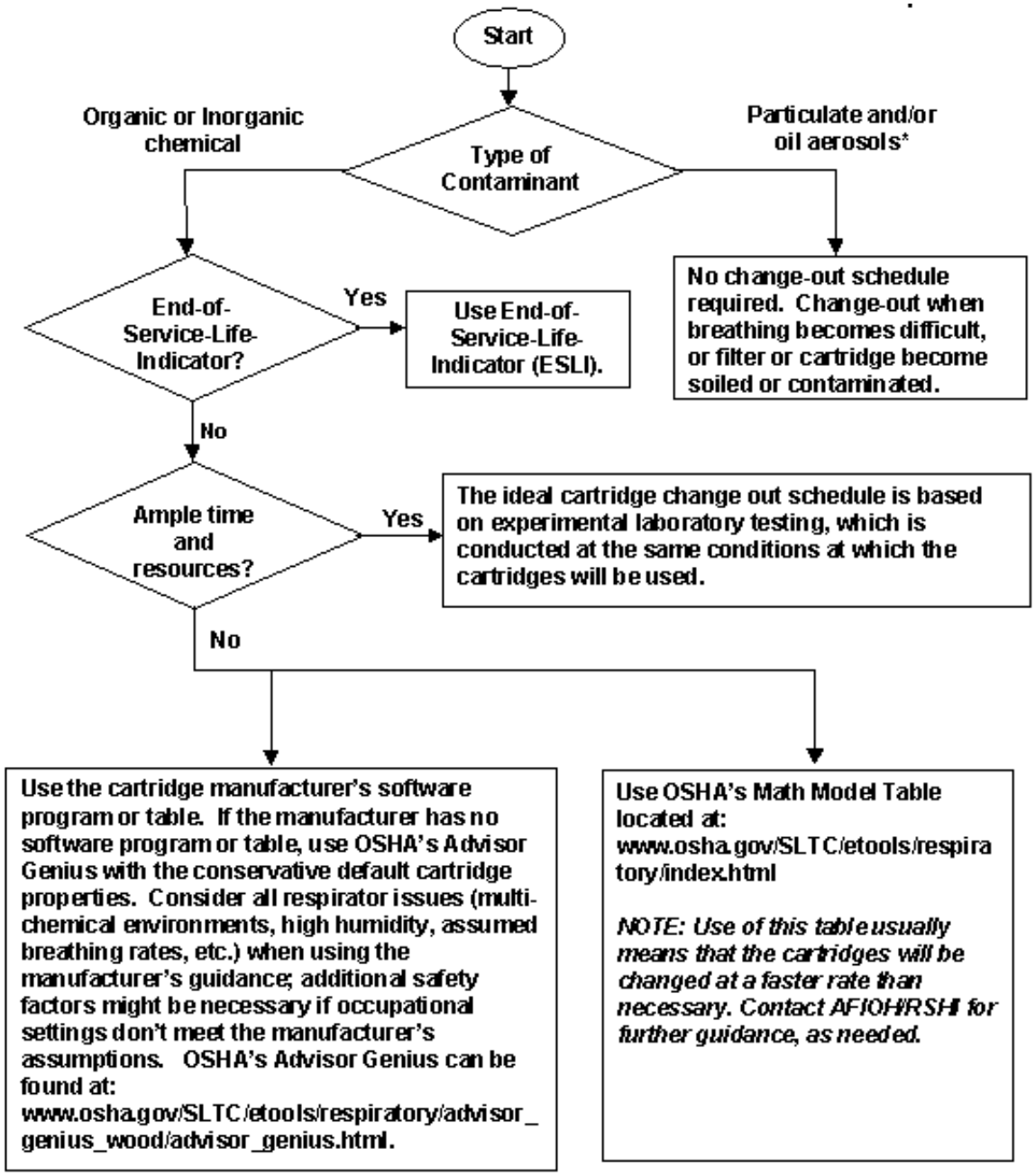
A6.2. Dead air volume is the volume of previously exhaled air (which is available to be inhaled) remaining in a respiratory inlet covering. Reducing the amount of dead air volume in a respirator reduces the level of carbon dioxide (CO^2) in the inhaled air, which is a major source of respirator usage related stress. This can be accomplished through the use of powered air-purifying respirators, continuous flow air-line respirators, use of a half facepiece respirator in lieu of a full facepiece, and use of a nose cup in full facepiece devices (regardless of the mode of operation).

A6.3. Air-line respirators are recommended for use in a high temperature environment. Air-line 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 facepiece respirator, where it offers adequate protection, is preferable to the full facepiece.

A6.4. Elastomeric components of respirators stored in high temperature environments may deteriorate at an accelerated rate and the facepiece may become permanently distorted. Special care shall be used to prevent facepiece distortion. Inspection frequency should be established considering the effects of high temperatures.

Attachment 7

ESTIMATING CARTRIDGE SERVICE LIFE FLOWCHART



**Note: Oil aerosols are typically friction reducing oils and require R- or P-series filters. R-series filters must be changed out after each 8-hour shift. Oils are hydrocarbon liquids with high boiling points, high molecular weights, and low vapor pressure. Oil aerosols can consist of mineral, vegetable, animal and synthetic substances that are slippery, combustible, and soluble in organic solvents such as ether but not soluble in water. Oil aerosols tend to degrade filter efficiency.*