

**ORDER**

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION

AL 3900.29

ALASKAN REGION

September 16, 1991

**SUBJ: RESPIRATOR PROTECTION**

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**1. PURPOSE.**

a. This order establishes policies, procedures, standards and responsibilities to create a Federal Aviation Administration (FAA) Respiratory Protection Program. It includes requirements for compliance with Title 29 Code of Federal Regulations (CFR) 1910.134, Respiratory Protection, Public Law 91 596, Occupational Safety and Health Act, Executive Order 12196, 29 CFR Part 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters, and the American Standards Institute (ANSI) Standard Z88.2 (1980).

b. The purpose of this order is the prevention of occupational diseases caused by breathing air contaminated with harmful vapors, gases and aerosols, including dusts, fibers, fogs, fumes, mists, smokes, and sprays. The primary objective is to, first, prevent atmospheric contamination through implementation of feasible engineering control measures such as enclosure or confinement of operations or using general or local exhaust ventilation, and second, through substitution of less toxic materials.

**2. DISTRIBUTION.** This order is distributed to division level in the regional office except to section level in the Airway Facilities Division, and to all field offices and facilities.

**3. BACKGROUND.**

a. The Respiratory Protection, 29 CFR 1910.134 was promulgated by the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA). The standard was developed as an alternative means of limiting exposures when engineering and work practice controls are ineffective, or while they are being instituted. Respiratory protection also must be provided to minimize potential exposures until work practices, such as substituting less toxic material, are introduced. Additional OSHA requirements, as well as Environmental Protection Agency (EPA), requirements for a respiratory protection program include concern for employee exposure as well as occupational health monitoring for the potential effects of specific air contaminants.

b. Respirator protection is separated from personal protection equipment because of the exposure monitoring and occupational health surveillance requirements of the standard. Respiratory protection also includes requirements for personal protective equipment; consequently, portions of this order were written to support Chapter 8, Personal Protective Equipment of Order 3900.19B, Occupational Safety and Health. Additional respiratory protective requirements are described in 29 CFR 1910.1000, Subpart Z Toxic and Hazardous Substances, other sections of 29 CFR 1910 and 29 CFR 1926, 30 CFR Part 11, 40 CFR Part 61 and 763, and American National Standards Institute (ANSI) Z88.2-1980 and other ANSI standards for respirator selection and other types of hazards.

**4. DEFINITIONS.**

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Distribution:

Initiated By:

- a. Air-purifying respirators (APR) filter and/or absorb dusts, fibers, fogs, fumes, gases, mists, smoke, sprays, and vapors. Except for powered-air purifying respirators (PAPR), APRs operate with a net negative pressure created by inhalation of air through a filter and/or appropriate cartridge or canister filled with absorbent.
- b. Breathing or respirable air contains a tolerable and measured amount of air contaminants and an adequate amount (at least 19.5% by volume) of oxygen.
- c. Supplied-air or atmosphere-supplied respirators (SARs) provide breathing or respirable air with a net positive pressure and operate upon demand, pressure demand, and continuous flow modes through an airline and/or a self contained breathing apparatus (SCBA).
- d. Respirators have two basic elements: a facepiece that covers the mouth/nose (half-face) or whole face (full-face) with appropriate straps and whole head (hood or helmet); and a device or mechanism that either cleans contaminated air or provides breathable/respirable air.
- e. Powered-air purifying respirators (PAPR) are APR devices that both filters and absorbs contaminants and provides a net positive pressure inside the facepiece or hood. They provide an intermediate margin of protection from air contaminants.
- f. Approved respirators are supplied in a variety of types and brands. Respirators used by FAA employees must be approved and certified by the National Institute for Occupational Safety and Health (NOSH) and/or the Mine Safety and Health Administration (MSHA) under provisions of 30 CFR Part 11.
- g. Permissible exposure limits (PEL) have been promulgated as potential 8 hour time-weighted average (TWA) exposures by OSHA for unprotected employees. An OSHA promulgated PEL is equivalent to a threshold limit value (TLV) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). Action levels also have been developed by both OSHA and ACGIH as limits at which health surveillance and exposure monitoring must be implemented. Although not advisable, the PEL can be exceeded up to ceiling levels or within short term exposure limits (STEL) for shorter duration's and for some exposures.
- h. Protective factors are assigned to ensure respirator selection is made to provide adequate respiratory protection within measured and contaminated areas. Respirator protection factors are calculated by dividing the maximum level of protection afforded by the manufacturer's specific type of respirator by the PEL or TLV. The assigned protection factor should be used only as an estimate, and use of respirators providing the next higher assigned protection factor should be considered, if adequate protection is questionable.
- i. Confined spaces are defined by OSHA in 29 CFR 1926.21 as "any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere." The National Institute for Occupational Safety and Health (NOSH) "Criteria for a Recommended Standard....Working in Confined Spaces" dated December 1979, defined a confined space as a space which by design has limited openings for entry and exit; unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy.

## 5. RESPONSIBILITIES.

- a. The Federal Air Surgeon, AMA-1, or Federal Air Surgeon's representative shall:
  - (1) Preserve and protect employee health by ensuring sufficient resources are provided for establishing respiratory protection programs to include occupational health surveillance for all employees in each region and center.
  - (2) Ensure compliance with the standard by establishing policies on reporting and accounting for employee occupational health where respirators are required.

(3) Provide reports on the FAA respiratory protection program as needed and to the designated FAA Occupational Safety and Health Official, AHR-1.

b. Regional and Center Flight Surgeons shall:

(1) Coordinate and consult with the Federal Air Surgeon to annually identify and request resources to establish and maintain an effective regional or center respiratory protection program, to include employee occupational health surveillance where respirators are authorized.

(2) Coordinate and collaborate with the Environmental Health Branch Manager (FAA Industrial Hygiene Program Manager) on development of policy, procedures, criteria, and standards for compliance with occupational and environmental health regulations, as well as for the preservation and protection of health.

(3) Coordinate and collaborate with the Regional Safety and Health Manager to establish and maintain an effective regional and center respiratory protection program, and to concur on facility respiratory protection plans and authorize issuance of respirators. No one shall be assigned a task requiring use of a respirator unless found physically able to do the work while wearing the respirator.

(4) Request that the regional Airway Facilities Division Manager designate a division manager who can identify requirements and request funding to implement facility respiratory protection plans.

(5) Ensure compliance with the standard, develop policy, procedures, criteria, and standards for employee occupational health surveillance, authorize issuance and use of respirators, maintain appropriate records, and approve and evaluate the implementation of facility respiratory protection plans.

(6) Evaluate the effectiveness of their respiratory protection program and provide reports of accomplishments for the Federal Air Surgeon as needed or requested.

c. The Environmental Health Branch Manager (FAA Industrial Hygiene Program Manager) located in AMA shall:

(1) Coordinate and consult with the Federal Air Surgeon on establishment and overall management of an agency-wide respiratory protection program.

(2) Coordinate and consult with regional and center flight surgeons on establishing and maintaining effective respiratory protection programs to include employee health surveillance.

(3) Coordinate and collaborate with the FAA Occupational Safety Program Manager on occupational safety requirements for respirators and appropriate personal protective equipment.

(4) Provide guidance and consultation to regional and center safety and health managers on respiratory protection and appropriate personal protective equipment.

(5) Interpret policies, standards, and criteria of the DOLL, OSHA, EPA, and other federal and state agencies, and provide guidance and consultation to offices, services, regions, and centers on all matters related to occupational and environmental health.

(6) Evaluate overall effectiveness of the agency-wide respiratory protection program and provide summaries as needed for reporting regional and center accomplishments in protecting and preserving occupational and environmental health.

d. The FAA Occupational Safety Program Manager (located in ALR) shall:

(1) Coordinate and collaborate with the Environmental Health Manager (FAA Industrial Hygiene Program Manager) on occupational safety requirements for respirators and appropriate personal protective equipment.

(2) Provide guidance and consultation to Regional and Center Safety and Health Managers on selection and use of respirators and other personal protective equipment.

e. Regional and Center Safety and Health Managers shall:

(1) Coordinate and consult with the Environmental Health Branch Manager (FAA Industrial Hygiene Program Manager) and the FAA Occupational Safety Program Manager on matters pertaining to respiratory protection.

(2) Coordinate and assist Regional and Center Flight Surgeons in implementing the Regional or Center Respiratory Protection Program, concur on approval of facility respiratory protection plans, and jointly authorize issuance and use of respirators and appropriate protective equipment.

(3) Request resources and support from the Regional or Center Flight Surgeon to:

(a) Assist implementation of an effective Regional or Center Respiratory Protection Program;

(b) Conduct inspections, testing, and exposure monitoring at least annually and recommend where respirators are required or may be needed, especially for confined spaces and areas that may be immediately dangerous to life and health;

(c) Assist regional or center and facility managers to develop and implement facility respiratory protection plans, identify and schedule training, maintain appropriate records, secure sources for fit testing of respirators, and other requirements of the standard;

(d) Reviewing and evaluating facility respiratory protection plans.

(4) Provide guidance and assistance to sector and division managers in selection of respirators, filters, adsorbents and appropriate personal protective equipment.

f. Regional sector, and facility managers shall:

(1) Prepare a written facility respiratory protection plan to include written procedures for specific operations, guidelines for respirator use, administrative actions, and provisions for compliance with the standard.

(2) Request resources for annual training, purchase of approved and authorized respirators with appropriate personal protective equipment, respirator fit testing, employee participation in regional or center health surveillance programs, and other requirements for implementing the facility plan.

(3) Designate employees who may work in areas requiring respiratory protection and ensure they comply and are familiar with the contents of this and the Regional and Center Respiratory Protection Order.

(4) Supervise inspections, record keeping, employee care and use of respirators, special problems, and other aspects of the facility respiratory protection plan.

g. Designated employees shall:

(1) Become familiar with the contents of directives, comply with all aspects of the facility respiratory protection plan, and alert supervisors when workplace conditions or special problems may effect their use of respirators and appropriate protective equipment.

**6. RESPIRATOR SELECTION AND USE.**

a. Proper selection of approved respirators shall be made in accordance with the guidance on American National Standard Practices for Respiratory Protection Z88.2-1969. All respirators must be checked for positive and negative pressure fit, not to be confused with fit testing, and operability before each use.

b. Respirators should not be offered employees for routine operations, unless environmental and exposure monitoring have indicated OSHA action levels or PELs potentially could be exceeded. Provisions for fit testing, employee health surveillance and compliance with all parts of the standard must be made with issuance of respirators to designated employees, particularly if respirators are maintained for emergencies. Some exceptions to these provisions, such as not requiring fit testing for hood and helmet type respirators designed for emergency evacuations can be made by the regional flight surgeon or the regional safety and health manager. These exceptions also can be made for the varied combinations of APRs and SARs; however, single use or disposable type masks should not be considered as respirators, nor issued for respiratory protection. All exceptions must be included in the written standard operating procedures of the facility respiratory protection plan.

c. A variety of different types, combinations of types, styles and brands of respirators are available. Single uses of disposable masks, for purposes of this order, are not considered as respirators. Pertinent issues on the two basic types, APR and SAR, are listed.

(1) Air purifying respirators (APR) have severe limitations; however, they generally provide a protection factor of 10 times the TLV. An ASR can not be worn in confined spaces or in atmospheres immediately dangerous to life or health. Inhaled air flow through the path of least resistance under the net negative pressure inside the ASR; consequently, they must be:

(a) Fit tested in atmospheres at least equivalent to the respirator protection factor when provided with head straps to maintain the head to facepiece seal;

(b) Worn only in tested atmospheres, before each entry, where both sufficient oxygen, at least 19.5 percent, and levels of air contaminants are monitored to ensure adequate protection factors;

(c) Provide for protection from air contaminants which have demonstrated properties such as odor, or with alarms that the individual can recognize when respiratory protection may be inadequate;

(d) Issued as full-face APRs when a higher protection factor, 25 times the TLV, or eye and face protection is needed;

(e) Issued as hood or helmet type, when fit testing may not be required, and full-face PAPR when a protection factor of 50 times the TLV is needed; and

(f) Worn with the same manufacturer's approved parts, including appropriate filters, canister or cartridge containing absorbent and filter (See Appendix 1).

(g) APRs can not be used for protection against the following: acrolein, aniline, arsine, bromine, carbon monoxide, dimethylaniline, dimethyl sulfate, hydrogen cyanide, hydrogen fluoride, hydrogen selenide, hydrogen sulfide, methanol, methyl bromide, methyl chloride, methylene bisphenyl isocyanate, nickel carbonyl, nitro compounds (nitrobenzene, nitrogen oxides, nitroglycerin, nitromethane), ozone, phosgene, phosphine, phosphorus trichloride, stibine, sulfur chloride, toluene diisocyanate, vinyls chloride, and other contaminants as specified by respirator manufacturers.

(2) Supplied Air Respirators (SAR)

(a) The levels of both air contaminants and oxygen must be checked each time an APR or PAPR is worn. Where SAR's are used, the air quality must meet at least the requirements for Grade D breathing air as described in the Compressed Gas Association Commodity Specification G-7.1-1966. Compressed oxygen shall not be used in supplied air respirators or in open circuit self contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air line respirators, and where used, it must meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen.

(b) A SAR provides a higher degree of protection or protection factor than a ASR, but its use requires more extensive training. An ASR only can be used in untested workplaces where types and levels of air contaminants are not known, in confined spaces, in atmospheres that are immediately dangerous to life or health (IDLH) including oxygen deficient (less than 19.5% by volume) atmospheres, and for limited exposures to air contaminants that do not have adequate and individually identifiable warning properties. Use of some SARs, particularly a self-contained underwater breathing apparatus (SCUBA) also require certifications of training, and compliance with other regulations such as compressed gas cylinders, 29 CFR 1910.430 and Department of Transportation, Shipping Container Specifications in 49 CFR 178.

(c) Provisions for training, testing, evaluation, entry, monitoring and rescue must be made, and OSHA requirements must be strictly followed before employees are permitted to enter confined spaces.

**6. FACILITY RESPIRATORY PROTECTION PLANS**

a. Each facility where respirators are used must have a written respiratory protection plan (See sample in Appendix 2) to address at least each of the following:

(1) A written policy statement in support of the agency's commitment to provide work, and a safe and healthful workplace, to first implement feasible engineering and work practice controls, to ensure that employees have an effective and continuous program of respiratory protection, and to designate the manager responsible for the facility plan;

(2) Recognition and resolution of special problems as they affect respirator use;

(3) Annual training and record keeping;

(4) Respirator selection, from NOSH/MSHA approved and certified models, on the basis of hazards to which employees potentially are exposed;

(5) Respirator fit testing at least annually and as needed for potential exposures to the specific hazard or for other changes that may be experienced by the employee;

(6) Initial issuance of all respirators that is based on a hazard assessment, potential exposure monitoring, medical examination, and joint authorization of the regional flight surgeon and safety and health manager;

(7) At least annual health surveillance of employees and monitoring of potential exposure levels of workplace conditions to evaluate the effectiveness of the respiratory protection;

(8) Written standard operating procedures also governing respirator selection, issuance, use, and other requirements of the facility plan;

(9) Regular cleaning and disinfecting of respirators;

(10) Routine inspections of respirators by employees during each cleaning, and at least monthly inspections of respirators designated for emergencies by the manager who is responsible for the facility respiratory protection plan or the supervisor who maintains logs and information from the inspections;

(11) Storage of respirators in convenient, clean and sanitary locations;

(12) Procedures for proper respirator donning, doffing and use.

(13) Regular evaluation of the continued effectiveness of the program (See sample checklist in Appendix 2).

## 7. SPECIAL PROBLEMS

a. The following are special problems which may be encountered in wearing and the use of respiratory protection equipment.

(1) Facial hair, including beards, sideburns, moustaches, or even a 48 hour growth of stubble, can not be permitted on employees required to wear fit tested respirators. Facial hair between the wearer's skin and the sealing surfaces of the respirator will prevent a good seal. This is especially critical with APRs using a net negative pressure. Designated employees who are unable to control facial hair can not be issued respirators requiring fit testing.

(2) Eating, drinking, and chewing, especially tobacco products must be prohibited when wearing respirators.

(3) Communications not required in the performance of duties and while wearing respirators which rely on a tight facepiece seal, also can not be permitted. Talking and unnecessary movements of the head tend to cause leaks in APRs.

(4) Eye glasses with temple bars or straps that pass between the sealing surfaces of a facepiece will prevent a good seal. These types of glasses can not be worn with full face respirators without the manufacturer's installed spectacle kit. Corrective lens should be mounted by the manufacturer. To ensure good vision, comfort, and proper sealing of the facepiece, corrective lenses should be permanently mounted; however, detachable kits are approved by some manufacturers. Eye glasses and goggles also can interfere with half face type respirators. When interference occurs, a full face respirator with special corrective lenses should be provided

(5) Contact lenses should not be worn, under any conditions, inside respirators which rely on a facepiece seal and supplied air. Incoming air directed toward the eye can cause discomfort from dirt, lint, or other debris lodging between the contact lenses and the pupil. Full facepiece respirators with special corrective lens should be provided.

(6) Facial deformities, such as scars, deep skin creases, prominent cheekbones, severe acne, and the lack of teeth or dentures, can prevent a respirator from sealing properly. Employees with severe facial deformities can not be fit tested. Employees also must be retested for respirator fit following a tooth extraction which could interfere with the facepiece seal.

(7) Temperature extremes inhibit the use of respirators. In low temperatures, respirator lenses can become fogged. Some fogging can be prevented by coating the inner surface of the lens with an anti-fogging product. Satisfactory vision can be provided down to -30 degrees Fahrenheit by supplying a full facepiece with a nose cup that directs the warm, moist exhaled air through the exhalation valve without its contacting the lens. Airline respirators should provide dry, respirable air in cold temperatures. Problems from heat stress are increased in hot and moist workplaces. Heat stress also becomes more of a problem when use of protective clothing is required. Under temperature extremes, a supplied air respirator can be equipped with a vortex tube to either warm or cool the air supply as needed, if such a device has been approved for use with the

respirator. Air supply systems also are available which heat or cool the air supplied to the respirator facepiece or air hood.

(8) Employees with severe pulmonary obstructive and/or restrictive disorders should not be assigned work requiring the use of respirators, particularly APRs. Maximum voluntary ventilation test results, spirometric values, less than 70 to 80 percent of the predicted ratio, Timed Forced Expiratory Volume (1 second), divided by the Forced Vital Capacity (FEV1.0/FEV X 100); indicate the employee should be referred to a medical specialist before issuance of a respirator. Age, sex, height, temperatures, altitude, and other employee health and workplace factors must be evaluated by a physician with the issuance and use of respirators.

## **8. TRAINING AND RECORD KEEPING**

a. Initial and annual training, with documentation of its successful completion are requirements for respirator use and are essential elements of facility respiratory protection plans. Both employees and supervisors must be aware of different types of respirators, their advantages and limitations, potential hazards for which the respirators were selected. Designated employees must receive initial and annual training to include instructions, practice, and demonstrations in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. More extensive annual training is required for designated employees required to enter confined spaces, atmospheres that may be immediately dangerous to life or health, or areas where air contaminant levels have not been checked and monitored. Courses in the use of SARs also must be taught by the manufacturer's certified instructors.

## **9. RESPIRATOR FIT TESTING**

a. The proper fitting of respiratory protective equipment requires the performance of a suitable fit test. The test is needed to determine a proper match between the facepiece of the respirator and the face of the wearer. Only approved respirators, except those specifically exempt by NOSH, will be issued to employees without initial and annual fit testing. Initial and annual fit testing of SARs should be conducted by the distributor or manufacturer's authorized representative. Fit testing may be needed more often than required for potential exposure to some air contaminants, for entry into confined spaces and for work in atmospheres that may be immediately dangerous to life or health.

b. Requirements for type and time constraints of fit testing vary between different air contaminants and maximum potential concentrations, as well as special problems that may be encountered. Several types, brands and sizes of approved respirators must be made available for employee selection in order to assure best fit.

(1) Quantitative fit testing is conducted to determine the proper fit of the respirator under simulated wearing conditions. It is intended to provide the best test method of fitting the respirator to the individual using sensitive methods of detection for leakage.

(a) Quantitative respirator fit tests involve exposing the respirator wearer to a test atmosphere containing an easily detectable, nontoxic aerosol, vapor or gas as the test agent. The level outside the facepiece (test atmosphere inside the chamber) must be at least equivalent to the maximum allowable concentration. This is calculated by multiplying the respirator protection factor times the highest level (IDLH), ceiling level, short term exposure limit, or permissible exposure limit) potentially encountered in the workplace. Respiratory protection factors, based on threshold limit values, are provided by the manufacturer for each type of respirator.

(b) Instrumentation which samples the test atmosphere and the air inside the facepiece of the respirator is used to measure quantitatively the leakage into the respirator. There are a number of test atmospheres, test agents, and exercises to perform the test. Because of the cost involved, employers may find it necessary to contract out for quantitative fit testing.

(2) Qualitative fit testing involves a test subject's responding (either voluntarily or involuntarily) to a chemical challenge outside the respirator facepiece. Three of the most popular methods include an irritant smoke test, an odorous vapor test, or a taste test. These tests are fast, easily performed, and use inexpensive equipment. Because these tests are based on the respirator wearer's subjective response to a test chemical, test duplication and accuracy may vary.

(a) When performing a quantitative or qualitative fit test, the wearer should carry out a series of exercises that simulate work movements.

(b) Exercises and passages of material to be read are provided in the American National Standards Institute Z88.2-1980 Standard.

(3) Sealing tests for routine donning of respirators must be performed each time the respirator is used. This may be conducted as instructed by the manufacturer or by using a negative and positive pressure sealing test. The sealing tests can not be substituted for the initial and periodic fit testing.

(a) In seal testing the self-contained breathing apparatus, combination SAR/SCBA, and supplied air respirators, the end of the breathing tube is blocked to temporarily not allow passage of air. For negative pressure APR, the inlet openings for the respirator cartridges or filters are temporarily covered with the palms of the hands to block passage of air. With the respirator donned and air passages blocked, the wearer gently inhales and holds their breath for at least 10 seconds. If the facepiece collapses slightly and no inward leakage of air into the facepiece is detected, it can be reasonably assumed that the respirator has been properly donned.

(b) In seal testing the self-contained breathing apparatus, combination SAR/SCBA, supplied air respirators, and negative pressure APR, the exhalation valve is closed or blocked to allow passage of air. The wearer is instructed to gently exhale for at least 10 seconds. The respirator has been properly donned if a slight positive pressure can be built up inside the facepiece without detecting an outward leakage of air between the sealing surface of the facepiece and the face.

(c) Some types of respirators have different requirements for performing these negative and positive pressure tests. The manufacturer's recommended procedures must be followed as part of donning these respirators.

## **10. CONFINED SPACES.**

a. The higher potential risks caused by a qualified person entering a confined space requires greater caution by both employees and supervisors. Conditions potentially encountered are used to divide confined spaces into different classes.

(1) Class "A" where conditions are immediately dangerous to life or health (IDLH). These include but are not limited to oxygen deficiency, explosive or flammable atmospheres, and/or concentrations of toxic substances.

(2) Class "B" where conditions could potentially cause injury and illness, if preventive measures are not used, but not immediately dangerous to life and health.

(3) Class "C" where a potential hazard would not require any special modification of the work procedure.

b. Confined spaces include but are not limited to storage tanks, pits, vats, degreasers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and unventilated shafts, trailers and basement rooms. The Check List of Considerations for Entry, Working In, and Exiting Confined Spaces is included in the Appendices.

**11. CLEANING AND DISINFECTING.**

a. Each employee will be trained in the proper cleaning and disinfecting of their respirator. Respirators must be cleaned and disinfected after each use, if issued to more than one employee. They must be cleaned after each use and periodically disinfected if issued to one employee. Cleaning and disinfecting must be accomplished by immersing the respirator and its disconnected parts in a manufacturer's recommended mild detergent/disinfectant. The respirator, valves, straps, and parts should be brushed or thoroughly cleaned and rinsed in separate containers. Employees should inspect the respirator and parts as they are dried and stored.

b. If issued to a single employee, the cleaning and disinfecting of respirators must be periodically inspected by the supervisor. The inspection must be conducted at least weekly if one respirator is potentially used by more than one employee.

**12. INSPECTION AND REPAIR.**

a. All respirators must be inspected in accordance with the manufacturer's instructions. Employees should be trained and encouraged to inspect their respirator, and to alert their supervisor to potential malfunctions. If properly performed, inspections will identify damaged or malfunctioning respirators before they are used and employees are potentially exposed to the air contaminant.

b. Continued usage of respiratory protective equipment will require repair and replacement of component parts of the equipment. Such repairs and parts replacement must be done either by the manufacturer or the manufacturer's representative, or by supervisors or employees trained by the manufacturer. Substitution of any respirator parts of a different brand or different connecting parts not authorized by the manufacturer, could decrease or cause total loss of worker protection. Such substitution of parts or modifications will invalidate the approval of the respirator, and lead to a violation of applicable regulations.

c. Maintenance of SCBA, demand, and pressure-demand equipment is more difficult than for other supplied air and APR because of the complexity of the valve and regulator assembly. All repairs or adjustments to respirators and equipment of this type must be performed by the manufacturer or by a manufacturer's authorized repair facility.

## APPENDIX 1. AIR PURIFYING RESPIRATOR

## CARTRIDGE AND CANISTER IDENTIFICATION

1. Cartridge and canister identification. One of the most common problems in canister/cartridge selection for respiratory protection includes assuming activated charcoal will absorb all organic compounds as well as carbon monoxide. Selecting activated charcoal and assuming the airborne contaminant is a vapor, could give the worker a false sense of security. Consequently, requirements such as testing, monitoring, and wearing APRs for contaminants that cannot be detected by the wearer are needed.

a. The primary means of identifying canisters from the same respirator manufacturer shall be by properly worded labels. The secondary means of identifying the same canisters shall be by a color code. Supervisors must insure appropriate absorbents and filters are purchased and used, and that the labels and colors are properly maintained at all times thereafter until replaced. On each canister shall appear, in bold letters, the following: Canister for \_\_\_\_\_ (Name for atmospheric contaminant) or Type N Gas Mask Canister. In addition, essentially the following wording shall appear beneath the appropriate phrase on the canister label: "For respiratory protection in atmospheres containing \_\_\_\_\_ percent by volume or \_\_\_\_\_." (Name of atmospheric containment).

b. Canisters having a special high-efficient filter for protection against radionuclides and other highly toxic particulates shall be labeled with a statement of the type and degree of protection afforded by the filter. The label shall be affixed to the neck end of, or to the gray stripe which is around and near the top of, the canister. The degree of protection shall be marked as the percent of penetration of the canister by a 0.3 micron-diameter dioctyl phthalate (DOP) smoke at a flow rate of 85 liters per minute.

c. Each gas mask canister shall be painted a distinctive color or combination of colors indicated in the Table I-1 of 29 CFR 1910.134 and shown in figure 1 of this appendix. All colors used shall be such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coating used shall offer a high degree of resistance to chipping, scaling, peeling, blistering, fading, and the effects of the ordinary atmospheres to which they may be exposed under normal conditions of storage and use. Appropriately colored pressure sensitive tape may be used for the stripes.

Figure 1. TABLE 1-1

ATMOSPHERIC CONDITIONS	COLORS ASSIGNED
Acid gases	White
Hydrocyanic acid gas	White with 1/2 inch green strip completely around the canister near the bottom.
Chlorine gas	White with 1/2 inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black.
Ammonia gas	Green.
Acid gases and ammonia gas	Green with 1/2 inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue.
Acid gases and organic vapors	Yellow.
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 1/2 inch blue stripe completely around the canister near the bottom.
Acid gasses, organic vapors, and ammonia gasses.	Brown
Radioactive materials, except tritium and noble gases	Purple (Magenta).
Particulates (dusts, fumes, mists, fogs, or smoke) in combination with any of the above gases or vapors	Canister color for contaminant, as designated above, with 1/2 inch gray stripe completely around the canister near the top.
All of the above atmospheric contaminants	Red with 1/2 inch gray stripe completely around the canister near the top.

Gray shall not be assigned as the main color for a canister designed to remove acids or vapors.

NOTE. Orange shall be used as a complete body, or stripe color to represent gases not included in this table. The user will need to refer to the canister label to determine the degree of protection the canister will afford.

## CHECK LIST OF CONSIDERATIONS FOR ENTRY WORKING IN, AND EXITING CONFINED SPACES

ITEM	CLASS A	CLASS B	CLASS C•
1. Permit	X	X	X
2. Atmosphere Testing	X	X	X
3. Monitoring	X	O	O
4. Medical Surveillance	X	X	O
5. Training of Personnel	X	X	X
6. Labeling and Posting	X	X	X
7. Preparation			
Isolate/Logout/Tag	X	X	O
Purge and Ventilate	X	X	O
Cleaning Processes	O	O	O
Requirements for Special Equipment/Tools	X	X	O
8. Written Procedures			
Initial Plan	X	X	X
Standby	X	X	
Communications/Observation	X	X	X
Rescue	X	X	X
Work	X	X	X
9. Safety Equipment and Clothing			
Head Protection	O	O	O
Hearing Protection	O	O	O
Hand Protection	O	O	O
Foot Protection	O	O	O
Body Protection	O	O	O
Respirator Protection	X	X	O
Safety Belts	X	X	X
Life Lines, Harness	X	O	
10. Rescue Equipment	X	X	X
11. Record Keeping/Exposure	X	X	

X - indicates required

O - indicates determination by Qualified Person

## APPENDIX 2. SAMPLE FAA FACILITY RESPIRATORY PROTECTION PLAN

## 1. POLICY STATEMENT•

a. In the control of those occupational diseases caused by breathing air contaminants with gases, vapors, or aerosols (dusts, mists, fumes, smoke, fogs, sprays, etc.), the primary purpose of this plan is to limit potentially harmful exposures. This is accomplished as far as feasible, by implementing engineering control measures (i.e., general and local exhaust ventilation, enclosure or isolation, and substitution of less hazardous processes or materials) and work practices to include administrative controls.

b. Respiratory protection has been implemented to assure additional protection is provided by using protection factors of respirators as guidelines. This has been supplemented with monitoring potential 8-hour TWA exposure levels and medical monitoring for all employees required to wear respirators.

## 2. SCOPE

a. The practices and procedures described here constitute the FAA program under which respirators are effectively used inside the work area. Potential exposures outside the work areas should be interpreted as airborne pollutants rather than contaminants. Considerations of how extensive the outside incident could effect the public and EPA requirements for respiratory protection become effective.

## 3. RESPONSIBILITIES

a. \_\_\_\_\_(Name of Regional Flight Surgeon) will ensure standards of this program meet or exceed those described in 29 CFR 1910.134, Respiratory Protection.

b. \_\_\_\_\_(Name of Regional Safety and Health Manager)• and \_\_\_\_\_(Facility Manager) is responsible for the overall implementation, coordination and administration. Their duties are:

- (1) Administering the overall program within the facility;
- (2) Provision for appropriate and approved respirators;
- (3) Implementation of training and instruction programs;
- (4) Ensuring respirators, filters and other appropriate personal protective equipment are available and dispensed as needed;
- (5) Scheduling and providing for respirator fit testing, storage, cleaning, disinfecting, repair and maintenance, and other aspects of the program;
- (6) Ensuring that employees wear respirators as required; and
- (7) Inspection and record keeping for the program.

c. \_\_\_\_\_(Name of Facility Collateral Duty Safety and Health Manager)• has been given additional training and is responsible for the following:

- (1) Reporting directly to the manager described in a. above;
- (2) Daily collecting, cleaning and drying respirators;
- (3) Disinfecting the respirators as needed;

(4) Daily inspecting each respirator, replacing worn or non-functioning parts, ensuring each employee gets the same respirator back in an operable and acceptable condition;

(5) Advises the manager when respirators, filters and additional equipment may be inoperable or should be replaced; and

(6) Assists the manager in record keeping and documenting care and use of respirators.

d. ALL EMPLOYEES ARE RESPONSIBLE FOR:

(1) Using the respirator in accordance with training and instruction at all times;

(2) Cleaning, disinfecting, inspecting, and storing the respirator as instructed;

(3) Requesting replacement parts, filters, and appropriate equipment as indicated during use of the respirator;

(4) Immediately reporting any malfunction of the respirator to the supervisor;

(5) Request a fit test be reconducted upon loss of gain of 20 or more pounds, tooth extraction, or other incidents that may affect the face to respirator seal;

(6) Abstain from chewing, drinking, excess communication, eating, use of tobacco products, and other actions which may cause breaking the respirator to face seal; and

(7) Report for work by shaving and removing excess facial hair or other personal aspects that could limit the effectiveness of the respiratory protection.

#### 4. RESPIRATOR SELECTION

a. Respirators are selected by the facility manager, with the approval of the Regional Safety and Health Manager in coordination with the Regional Flight Surgeon. This choice is based on the physical and toxicological properties of the air contaminant, and on the concentrations that may be present during normal operations. The quality of fit and the nature of the work being done also affect the choice of respirators. The capability of the respirators chosen is determined from Federal government agency approvals, manufacturer's tests, and FAA managers experience with the respirators.

#### 5. DISTRIBUTION

a. Respirators are issued to individuals whenever possible. Each respirator which is individually assigned is identified in a way that does not interfere with its performance. Employees are expected to identify their respirator and to be capable of understanding the requirements of this program. More extensive requirements must be strictly followed for respirators not personally issued or that are available for emergencies.

#### 6. INSPECTION AND MAINTENANCE

a. Respirators are properly maintained to retain their original effectiveness by at least monthly inspection, repair, and proper cleaning and storage. An additional log on cleaning and disinfecting is maintained for all respirators, not individually issued, that are stored for emergency purposes.

(1) Inspection

(1) All respirators are inspected routinely by the user before and after cleaning to check the condition of face piece, head bands, straps, valves and hoses, as well as canisters, filters and cartridge fit.

(2) The Facility Manager or the employee supervisor inspects all respirators at least once per month.

(3) Respirators maintained for emergency use are tagged noting the date of inspection, cleaning, levels and duration of cartridge use, when the filters/cartridges should be changed, etc., and the initials of the person doing the inspection. This log will be maintained in the facility manager's office.

(4) All respirator fits are checked each day for positive and negative pressure leaks, before the worker reattaches canisters or uses a respirator.

(b) Maintenance

(1) Respirators which do not pass inspections are replaced or repaired immediately. Repair of the respirator by the user is limited to changing canisters, cartridges, filters, and head straps. All other replacements or repairs are to be performed by the employee's supervisor or the manufacturer's authorized representative. No attempt is to be made to replace components or make adjustments, modifications, or repair beyond the manufacturer's recommendations.

## 7. CLEANING

a. Individually assigned respirators are cleaned and disinfected as frequently as necessary to ensure that proper protection is provided for the wearer. Respirators not individually assigned and those for emergency use are cleaned and disinfected after each use. Cartridges and filters should be replaced after each use, or records of their use must be maintained. This will be indicated in the log maintained for inspecting respirators. Procedure for leaving the contaminated area are as follows:

(1) Employees must wash their gloves and other personal protective equipment upon leaving the work area;

(2) The gloves are removed in a wet area where the respirator is removed and wet wiped if temporarily removed;

(3) The worker then washes hands and arms with soap before using the toilet, eating, or temporarily leaving the area;

(4) Filters, cartridges, or canisters are removed before completely washing and/or disinfecting the respirator;

(5) Respirators are completely washed and/or disinfected by immersing the respirator in detergent/disinfectant and scrubbing with brushes capable of reaching all surfaces removing dirt and other material. Valves and other parts are removed as necessary for cleaning. They are inspected as they are rinsed with clean water, allowed to dry and reassembled in a clean area.

## 8. STORAGE

a. After inspection, cleaning, and necessary repairs, respirators are stored to protect against dust, sunlight, extreme heat and cold, excess moisture, or damaging chemicals. They are stored in a manner to limit deformation and in an accessible location, such that they can be donned before needed. Appropriate labeling is used to indicate conditions and type of respirators in frequently used.

## 9. TRAINING

a. Every worker who may have to use a respirator is annually trained in the proper use of the respirator. Both the employee responsible for cleaning/disinfecting respirators and his supervisor must receive additional training. At a minimum, this training includes;

- (1) Description of respirators,
- (2) Intended use and limitations of the respirator,
- (3) proper wearing, adjustment, and testing for fit,
- (4) Cleaning and storage methods, and
- (5) Inspection and maintenance procedures.

b. The training is repeated as necessary, at least annually, to ensure that workers remain familiar with the proper use of respiratory protection. The training program is evaluated at least annually by the program coordinator to determine its continued effectiveness. Employees, who have not received the minimal training within the past calendar year, can not be permitted to work in designated areas where respirators are required.

## 10. MEDICAL AND HEALTH SURVEILLANCE

a. All employees and other personnel, who may be required to enter areas where respirators are used, initially must be examined by locally qualified physician. This must be a condition of employment or requirements of contracts that will require use of respirators. Conditions of employment and assignment to work in areas which may require respiratory protection must be described and agreed upon by the prospective employee. Willful neglect of personal hygiene or disregard for policies and procedures should be grounds for reprimand and/or removal. The physician must determine and certify employee fitness for employment, employee's ability to perform assigned duties and employee's ability to use which types of respirators. At a minimum, this should be based on medical histories, pulmonary function testing and other tests and evaluations as determined by the physician. Selection of physicians will be the responsibility of the Regional or Center Flight Surgeon.

b. All employees also must participate in annual health surveillance programs to include biological and exposure monitoring, as well as retesting and reexamination by the physician. The physician's initial and continuing determinations should be discussed with the Industrial Hygiene Program Manager (AAM-720) to evaluate the effectiveness of the program. Provisions and requirements for testing and examinations vary according to specific potential hazards for which respirators may be needed.

## 11. RECORDS

a. The following records are maintained by the facility manager.

- (1) The number and types of respirators in use.
- (2) A record of employee training programs.
- (3) Inspection and maintenance reports.
- (4) Medical certification that the employee is capable of wearing a respirator and performing the work.
- (5) Monitoring results and reports of potential exposures.

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- (6) Documentation of personnel actions related to respirators.
- (7) Purchases of respirators and other protective equipment.
- (8) Other records as may be required by local and state agencies.

Signed: Regional Flight Surgeon

Regional Safety and Health Manager

Facility Manager

## APPENDIX 3. TYPICAL RESPIRATOR PROTECTION PROGRAM CHECKLIST.

## A. PROGRAM ADMINISTRATION

1. Is there a written policy which acknowledges an FAA manager's responsibility for providing a safe and healthful workplace, and assigns program responsibility, accountability, and authority?
2. Is program responsibility vested in one individual who is knowledgeable and who can coordinate all aspects of the program at the job sites?
3. Can feasible engineering controls and work practices eliminate the need for respirators?
4. Are there written procedures/statements covering the various aspects of the respiratory protection program, including:

Respirator, filter and appropriate equipment selection;

Purchase of approved equipment interchangeable only from the same manufacturer;

Medical aspects of respirator usage included, at least annual physician authorization based on medical history, physical examination, test results, work limitations while respirators are used, and other physician instructions for health surveillance;

Issuance of respirators and equipment;

Fitting and appropriate fit testing and documentation of results of fit testing;

Training and training requirements for supervisors, supervisors who conduct and document inspections, employee responsible for cleaning/disinfecting respirators, and employees;

Maintenance, storage, and repair of respirators and equipment;

Inspection and documentation of inspections by both supervisors and employees;

Limitations of respirator use under special conditions and provisions for supervision of work under those conditions;

Work is under surveillance, with the documentation of potential exposure monitoring, and record keeping for each employee, workplace conditions and respirator uses.

## B. PROGRAM OPERATION

1. Respiratory protection equipment selection

Are work area conditions and worker exposure properly surveyed?

Are respirators selected on the basis of hazards and concentrations to which the worker may be exposed, and weighing the advantages and disadvantages of different types and brands of respirators?

Are the selections made by individuals based on knowledge of the many brands and sizes available with regards to potential exposure and higher protection factors?

2. Are only approved respirators purchased and used. Do they provide adequate protection for each specific hazard, and concentration or concentrations of combined contaminants?

3. Where practical, have respirators been issued to the users for their exclusive use and if not, are they cleaned and disinfected by one responsible employee who reissues the respirator, and are there records covering issuance?

4. Has a medical evaluation of prospective users been made to determine the physical and psychological ability to wear the selected respiratory protective equipment?

5. Have the respirators been properly fit using the following guidelines?

Are the users given the opportunity to try on several brands, (no less than two), and sizes, (no less than three), of respirators to determine whether the respirator they will subsequently be wearing is the best fitting one?

Is the fit testing at appropriate intervals?

Are those users who require corrective lenses, who have lost or gained weight, who have had dental extractions or corrections, or who have special problems been properly fitted?

Are users prohibited from wearing contact lenses when using respirators?

Is the facepiece-to-face seal tested in a test atmosphere?

Are workers prohibited from entering contaminated work areas when they have facial hair or individual characteristics which prohibit the use of tight-fitting facepieces?

6. Respirator use in the work area

Are positive and negative pressure fit checks performed before each entry into the work area?

Is eating, drinking, chewing, use of tobacco products, etc. strictly prohibited at all times in the work area?

Are respirators worn correctly (i.e., head covering over the respirator straps, etc.) at all times in the area?

Are workers keeping respirators on all the time while in the work area?

Are communications kept to a minimum while wearing the respirator? Are workers decontaminating exposed surfaces of the respirator upon exiting the work area?

7. Maintenance of respiratory protection equipment

a. Cleaning and Disinfecting

Are respirators adequately cleaned and disinfected after each use, when used by different workers?

Are proper methods of cleaning and disinfecting utilized?

Are adequate cleaning and disinfecting operations properly supervised and documented?

b. Storage

Are respirators stored where they can be accessed prior to entry into a contaminated area?

Are respirators stored in an appropriate manner so that ample filters, absorbents, and/or other equipment are readily accessible?

Are respirators stored in a locker or other permanent and appropriately labeled place, and manner so as to protect them from dust, sunlight, heat, excessive cold, and/or moisture, preventing damage or deformity?

Is temporary storage (less than 1 work day) permitted in tool boxes or other temporary conveyances only if protected as described above?

c. Inspection

Are all inspections documented?

Are qualified supervisors and workers appropriately trained in inspection techniques?

Are all respirators and associated equipment kept operable (batteries checked, charged, etc.) and in adequate amounts at all times?

Do the records show respiratory protective equipment designated for "emergency use" has been inspected and completely checked at least monthly, and checked at least weekly when used by more than one employee for "occasional use" such as for painting, grinding, etc.

d. Repair

Are replacement parts only supplied by the same manufacturer used in repair of respirators and associated equipment?

Are repairs made only by representatives authorized by the manufacturer?

8. SPECIAL USE CONDITIONS

Have adequate provisions and procedures been made for designated workers to use all respiratory and personal protective equipment in atmospheres immediately dangerous to life or health?

Have adequate provisions and procedures been made for designated workers to enter confined spaces?

TRAINING

Has all training been approved by the administrator of the program and successful completion been documented by the supervisor?

Are users trained in the basis for selection of respirators?

Have all supervisors and users successfully passed biennial training in the proper use, cleaning and inspection requirements before using respirators?

Have all designated users of respiratory and personal protection equipment in confined spaces and conditions immediately dangerous to life and health successfully completed annual training?

Is the training provided by a nationally recognized organization or taught by a competent instructor?

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Were certificates awarded and based on competency-based evaluations that were conducted before and after training?