Ames Procedural Requirements

APR 8715.1
Effective Date: Sept. 23, 2025
Expiration Date: Sept. 25, 2030

COMPLIANCE IS MANDATORY

Subject: Chapter 28 – Respiratory Protection

Responsible Office: Code QH / Occupational Safety, Health and Medical Service Division

CHANGE LOG

Status [Baseline /Revision /Cancelled]	Document Revision	Date of Change	Description
Revision	2	6/26/2019	Changed format to comply with the AMS requirements and added "Document Change Log" and Preface. Added requirement for QH to provide cartridge change schedules. Changed training for supervisors from required to recommended. Added Supervisor respirator training class for supervisors who do not intend to wear respirators. Removed ARC Stores responsibilities because respirators can be purchased from commercial sources. Updated forms and appendices.
Revision	3	4/27/2021	Updated Authority citations in section P.3 and clerical updates.
Revision	4	4/16/2024	Clarified procedures for respirator use authorization, addition of required information from Appendix D of the OSHA Respiratory Protection Standard for voluntary respirator users, edits for clarity.

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PREFACE

P.1 PURPOSE

a. This chapter serves as the written respiratory protection program required by U. S. Dept. of Labor, Occupational Safety and Health (OSHA) regulations.

P.2 APPLICABILITY

a. This directive applies to all NASA Ames Research Center (ARC) employees, contractors and grantees as specified in their contracts or grants; and to other organizations (i.e., commercial partners, other Federal agencies, international parties, and Ames tenants) as specified and described in written operating agreements.

b. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended, but not required, "will" denotes an expected outcome, and "are/is" denotes descriptive material.

c. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 AUTHORITY

a. 29 CFR 1910, Occupational Safety and Health Standards

b. NPR 1800.1, NASA Occupational Health Program Procedures

c. NPR 8715.1, NASA Safety and Health Programs

P.4 APPLICABLE DOCUMENTS AND FORMS

a. 29 CFR 1910.134 (Respirator Regulations) OSHA

b. 29 CFR 1910.1001 - 1053 (Chemical Specific Regulations) OSHA

c. American National Standards Institute (ANSI) Standard Z88.2, Practices for Respiratory Protection

d. ARC 28 Form Request for Respirator User Authorization

e. NIOSH under 30 CFR Part 11

f. NIOSH under 42 CFR Part 84

g. APR 8715.1 Chapter 26, Confined Space Entry

h. APR 8715.1 Chapter 33, Personal Protective Equipment (PPE)

P.5 MEASUREMENT/VERIFICATION

a. Verification of conformance to requirements in this directive are measured through Center and Responsible Organizational management reviews, self-assessments, and subsequent analysis and reports of conformance to requirements, as well as periodic internal audits.

b. Verification and measurement for compliance to this directive will be tracked through Agency triennial audit.

P.6 CANCELLATION

APR 8715.1 Chapter 28, Respiratory Protection expiration date 03/20/2019.

Eugene Tu
Director

DISTRIBUTION STATEMENT:

APR 8715.1 Ames Health and Safety Manual Chapters shall be made available via procurement website to anyone bidding a job here at Ames. The exceptions are Chapter 7 – Ames Radiation Safety Guide, Chapter 10 – Pressure Systems Safety, Chapter 12 – Explosives Safety and Chapter 23 – Control of Narcotics and Other Controlled Drugs including Alcohol, which shall not to be made public but can be viewed onsite.

CHAPTER 28 RESPIRATORY PROTECTION

28.1 Hazard Control Hierarchy

28.1.1 Engineering and work practice controls are generally regarded as the most effective methods to control exposures to airborne hazardous substances. Federal Occupational Safety and Health Administration (OSHA) considers the use of respirators to be the least satisfactory approach to exposure control.

28.2 Responsibilities

28.2.1 **Supervisors** shall:

a. Provide the National Institute for Occupational Safety and Health (NIOSH)-certified respirators which are applicable and suitable for the purpose intended.

b. Ensure that required respirator users are trained, fit tested, and have received medical exams annually.

c. Assist employees in completing Section I of the ARC 28 Form, Request for Respirator User Authorization.

d. If respirator users are not certified to use respirators (not trained, fit tested or medically evaluated within the last year), remove their respirators from service.

e. Ensure all respirator users adhere to utilization and maintenance requirements as described in this chapter.

f. Not permit tight-fitting respirators to be worn by employees who have:

(1) Any facial hair that comes between the sealing surface of the facepiece and the face, or that interferes with valve function

(2) Any other condition that interferes with the face-to-facepiece seal or valve function.

g. Maintain compressed breathing-air systems as described in 28.8 Breathing-Air Quality and Supplied-Air Systems.

h. Provide facilities and supplies needed for proper respirator storage, use, and cleaning.

28.2.2 **Employees** shall:

a. Obtain an annual medical exam, fit testing, and complete training.

b. Complete Sections I and V of the ARC 28 Form, Request for Respirator User Authorization.

c. Use only those respirators for which the employee has been specifically authorized, trained, and fitted including respirators' manufacturer, model, and size.

d. Clean and disinfect respirators after each use as specified in 28.7.2 Cleaning Procedures.

e. Perform positive and negative pressure user seal checks before each respirator use.

f. Store respirators as specified in 28.7.4 Respirator Storage.

g. Inform the supervisor of any changes in operation or airborne hazards present.

h. Maintain the respirator and repair it when necessary.

i. Track the duration of respirator cartridge use and change out cartridges with new ones at a minimum frequency as the change schedule duration specifies.

j. Return the respirator upon request.

k. Prior to using a tight-fitting respirator, maintain a clean-shaven face in such a manner that facial hair is not present between the sealing section of the facepiece and the employee's face.

28.2.3 **Occupational Safety, Health and Medical Service Division (Code QH)** shall:

a. Oversee the NASA ARC Respiratory Protection Program and conduct the annual evaluations of program effectiveness.

b. Appoint a NASA ARC Respiratory Protection Administrator to oversee the Respiratory Protection Program.

c. When notified by the supervisor or employee of work operations producing airborne contaminants, select the appropriate respirator for the activity.

d. Provide regularly scheduled respirator fit-testing, cartridge change schedule, and training as necessary.

e. Maintain files that document measures taken to assure respiratory protection. The files must include, at a minimum:

(1) Current Respiratory Protection Program written procedures.

(2) Records of work conditions evaluated for the respiratory selection, fit testing, training, medical evaluations and certificates issued.

(3) Copies of medical clearance testing (Health Unit Only).

28.2.4 **NASA Ames Health Unit** shall:

a. Make medical examinations available for NASA ARC Civil Servant employees who wear respirators as required by the OSHA Respiratory Protection Standard.

b. Provide NASA ARC Civil Servant employees medical examinations as requested by their supervisors.

c. Maintain medical files on individuals who receive respirator medical examinations.

d. Complete Section II of ARC Form 28, Request for Respirator User Authorization.

e. Provide a follow-up exam if a person answers "yes" to any of the questions numbered 1 through 8 on the medical questionnaire and shall include medical consultation or diagnostic procedures deemed necessary by the physician or licensed health care professional.

28.2.5 **Contracting Officer's Representatives** (CORs) shall enforce the requirements for the NASA ARC Respiratory Protection Program as defined in this chapter, for contractors who use respirators.

28.3 Respirator Selection

28.3.1 Respirator Categories

28.3.1.1 Respirators are designed to protect only against specific types of substances, in certain concentrations, and must be matched to the user, job, and contaminant. Categories of respirators include:

a. Air-Purifying Respirators (APR) (e.g., Half mask, full facepiece, Powered Air-Purifying Respirator [PAPR] and Hood/Helmet)

(1) Vapor/Gas removing cartridges or canisters

(2) Particulate removing filters

(3) Combination

b. Atmosphere (Air) Supplying Respirators

(1) Self-Contained Breathing Apparatus (SCBA)

(2) Supplied-Air Respirator (Airline) – pressure demand and continuous flow.

28.3.2 Air-Purifying Respirators (APRs)

28.3.2.1 General Limitations:

a. APRs only remove specific contaminants from the atmosphere. APRs do not protect against oxygen-deficient atmospheres or non-respiratory effects from airborne contaminants such as skin irritations or skin absorption.

b. Only full facepiece APRs will provide eye protection from contaminants in addition to respiratory protection.

c. The maximum contaminant concentration against which an air-purifying respirator will protect is determined by the design efficiency and capability of the cartridge, canister, or filter and the facepiece-to-face seal on the user. For gases and vapors, the maximum concentration for which the air-purifying element is designed is specified by the manufacturer or is listed on labels of cartridges and canisters.

d. Non-powered air-purifying respirators will not provide the maximum design protection specified unless the facepiece or mouthpiece/nose clamp is carefully fitted to the wearer's face to prevent inward leakage.

e. The time period over which protection is provided is dependent on canister, cartridge, or filter type; concentration of contaminant; humidity levels in the ambient atmosphere; and the wearer's respiratory rate. The proper type of canister, cartridge, or filter must be selected for the particular atmosphere and conditions. In addition, the time it takes to deplete the cartridge or canister's ability to safely filter the contaminant must be calculated prior to use and a change schedule developed.

f. Non-powered air-purifying respirators may cause discomfort due to noticeable breathing resistance. This problem is minimized in powered air-purifying respirators.

g. Respirator facepieces may present wearability problems to individuals required to wear prescription lenses. Respirators that allow prescription lenses to be worn in conjunction during use should be considered when determining the proper respiratory protection needed.

h. Use of air-purifying respirators in atmospheres immediately dangerous to life or health (IDLH) is limited to specific devices under specific conditions (e.g.the device is a powered-type respirator with escape provisions in place).

i. Respirator and other personal protective equipment (PPE) selection should be based on all contaminant hazards in the workplace.

j. An evaluation by a qualified Occupational Safety, Health and Medical Service Division (Code QH) industrial hygienist is required prior to assigning respiratory protection to ensure the respiratory protection is appropriate for the hazard.

28.3.2.2 Limitations of Vapor- and Gas-Removing Respirators:

a. No protection is provided against particulate contaminants.

b. A rise in canister or cartridge temperature indicates that a gas or vapor is being removed from the inspired air. An uncomfortably high temperature indicates a high concentration of gas or vapor and requires an immediate return to fresh air.

c. Use should be avoided and not approved in atmospheres where the contaminant(s) lack sufficient warning properties such as odor, taste, or irritation at a concentration in air at or above the permissible exposure limit. Conservative change schedules will be relied on as the primary basis for determining the service life of gas and vapor cartridges, not odor thresholds and/or other subjective warning properties.

28.3.2.3 Limitations for Particulate-Removing Respirators:

Protection against nonvolatile particles only. No protection against gases and vapors.

28.3.2.4 Combination Particulate-, Vapor- and Gas-Removing Respirators.

The advantages and disadvantages of the component sections of the combination respirators as described above apply.

28.3.3 Atmosphere (Air)-Supplying Respirators

28.3.3.1 General Limitations:

a. Atmosphere-supplying or air-supplied respirators deliver breathing-air through a supply hose connected to the wearer's facepiece. The Grade D breathing-air can be provided from a stationary source, i.e., by a compressed air tank or a breathing air compressor (see Section 28.8).

b. Atmosphere-supplying respirators are required when there is insufficient oxygen (<19.5 percent), when the concentration of contaminant is too high for an air-purifying cartridge to handle, the toxicity of the material is too hazardous for an air-purifying cartridge, and/or when required by specific OSHA regulations.

28.3.3.2 Specific Limitations for Self-Contained Breathing Apparatus (SCBA):

a. The period over which the device will provide protection is limited by the amount of breathing air in the apparatus, the ambient atmospheric pressure (service life of open-circuit devices is cut in half by a doubling of the atmospheric pressure), and the type of work being performed. Some SCBA devices have a short service life (less than 15 minutes) and are suitable only for escaping hazardous atmospheres (self-rescue from an irrespirable atmosphere).

b. Other limitations of SCBA devices are their weight or bulk, or both, limited service life, and the training required for their maintenance and safe use.

c. All SCBAs to be used in an IDLH environment must be rated for at least 30 minutes of service life and must be used in the pressure-demand mode.

28.3.3.3 Specific Limitations for Supplied-Air Respirators (Airline):

a. Ordinary airline respirators (no emergency escape air bottle) are limited to use in atmospheres from which the wearer can escape unharmed without the aid of the respirator (i.e., non-IDLH and non-oxygen deficient atmospheres).

b. The wearer is restricted in movement by the hose and must return to the respirable atmosphere by retracing their route of entry. The hose is subject to being severed or pinched off.

28.3.4 Selection and Use

28.3.4.1 The supervisor is responsible for determining potential respirator users based on their work activities involving airborne contaminants. Supervisors shall either contact the respirator program administrator or Occupational Safety, Health, and Medical Service Division (Code QH) industrial hygiene representative or have the employee do so to determine if a respirator is required for their work activity.

28.3.4.2 The Respiratory Protection Program Administrator or Occupational Safety, Health, and Medical Service Division (Code QH) industrial hygienist will select NIOSH-certified respirators to be used. This selection shall be based on the hazards to which the worker is exposed, the work environment, and the characteristics and limitations of the respirator.

28.3.4.3 Respiratory protective equipment shall be used only for the purpose intended, and no modifications of the equipment shall be made.

28.3.4.4 Each supervisor shall document conditions for respiratory protection use by listing the following information on the ARC 28 Form:

a. The toxic substance(s) or hazard(s) present in the work environment for each activity.

b. The period of time and frequency for which the respiratory protection will be required.

c. Expected work place concentrations.

d. For each process the initial determination of work place concentrations and specific toxic substances will be determined with the assistance of a qualified Occupational Safety, Health, and Medical Service Division (Code QH) industrial hygienist either through calculation or sampling. Subsequent evaluations will also need to be conducted any time process changes occur that would significantly change the concentration, substance, or environment the respirator will be worn in.

28.3.4.5 Once the type of hazard and its concentration are identified, the supervisor shall work with the Occupational Safety, Health, and Medical Service Division (Code QH) to determine the required type of respirator based on OSHA's Assigned Protection Factors (APF). An APF is the level of protection that a particular type of respirator can be expected to provide 95% of the time. An APF of 10 means that type of respirator (if used properly) can be safely used in an atmosphere that has a hazardous concentration of up to 10 times the Occupational Exposure Limit (OEL) for that hazard. Appendix E provides OSHA's Table of Assigned Protection Factors.

28.3.4.6 In addition, OSHA defines the "Maximum Use Concentration (MUC)" as the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the APF of the respirator or class of respirators and the exposure limit of the hazardous substance. Employees may not use a respirator if the MUC has been exceeded. An explanation of MUCs and an example calculation are provided in Appendix F of this document.

28.3.4.7 For protection against gases and vapors, the following forms of protection may be used:

a. An atmosphere-supplying respirator with an appropriate APF to reduce exposure below the Occupational Exposure Limit (OEL).

b. An air-purifying respirator, provided that:

(1) The cartridges are replaced as specified in the change out schedule calculated by the Occupational Safety, Health, and Medical Service Division (Code QH) qualified industrial hygienist.

(2) If the respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant, this should be used as well to indicate if the cartridge is depleted sooner than the change schedule predicts.

28.3.4.8 For protection against particulates, any of the following forms of protection may be used:

a. An atmosphere-supplying respirator.

b. An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR Part 11 as a high-efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR Part 84 (see Appendix C).

28.3.5 Voluntary Use of Respiratory Protection in Non-Hazardous Atmospheres

Supervisors may provide respirators at the request of employees or permit employees to use their own respirators in non-hazardous areas. The supervisor shall provide voluntary respirator users with a copy of Appendix G, "Mandatory Information for Employees Using Respirators When Not Required Under the Standard". Employees shall provide Code QH the signed copy of Appendix G indicating they have read and understand it. Only those medically able should voluntarily wear a respirator.

28.4 Use of Respirators

28.4.1 Normal Operations

28.4.1.1 Only respiratory protective equipment that has current approval from NIOSH shall be used.

28.4.1.2 Respirators shall be used as issued. No modifications or substitutions to issued equipment shall be permitted. Any modification, no matter how slight, will result in voiding of respirator approval.

28.4.1.3 A respirator shall be used only by the person to whom it was issued with the exception of emergency response respiratory protection such as SCBAs.

28.4.1.4 Personnel who use respiratory protection shall leave the hazardous atmosphere if they detect the odor of a contaminant or experience difficulty breathing. Re-entry shall not be undertaken until respirator integrity and fit, adequate airflow, or filter cartridge replacement, as appropriate, have been accomplished. If employees experience physical symptoms, they shall immediately leave the area of the hazardous atmosphere,notify their supervisor, and go to the NASA Ames Health Unit and/or seek medical care.

28.4.1.5 All respirator cartridges will be changed out as specified in section 28.4.9 Changing Cartridges in this document.

28.4.1.6 Proper use, inspection, fitting, and maintenance of the respirator are the responsibility of the individual to whom the respirator was issued. If emergency response respiratory protection is shared, the individual in current possession of the respirator is responsible to conduct these activites.

28.4.2 Work in a Confined Space

28.4.2.1 APR 8715.1 Chapter 26, Confined Space Entry, discusses requirements for working in confined spaces.

28.4.3 Procedures for IDLH Atmospheres

28.4.3.1 For all IDLH atmospheres, the Supervisor shall ensure that:

a. Occupational Safety, Health, and Medical Service Division (Code QH) is notified and approval is received prior to working in and/or around IDLH atmospheres.

b. One employee or, when needed, more than one employee is located outside the IDLH atmosphere to monitor the conditions and activities of the employee(s) in the IDLH atmosphere.

c. Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

d. The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.

e. Employee(s) located outside the IDLH atmospheres are equipped with pressure-demand or other positive pressure SCBAs, or a pressure-demand or other positive-pressure supplied-air respirator with auxiliary SCBA; and either:

(1) Appropriate retrieval equipment for removing the employee(s) who enter these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry, or

(2) Equivalent means for rescue where retrieval equipment is not required.

28.4.4 Concurrent Work Requiring Respirator Protection

Two or more different jobs that both require respirator protection may be conducted simultaneously, provided that the level and type of respiratory protection worn is adequate for all the airborne contaminants and the concurrent work does not create additional hazards. In such scenarios, potential additive or synergistic effects of the multiple contaminants should be considered before determining the appropriate respiratory protection. Contact the Occupational Safety, Health, and Medical Service Division (Code QH) in advance for an evaluation by a qualified industrial hygienist prior to assigning respiratory protection to ensure the respiratory protection is appropriate for the hazard.

28.4.5 Assist Trades and Supervisors

Employees required to support, assist, or supervise any job task requiring a respirator to be worn shall be qualified for respirator use and wear the proper respiratory protection.

28.4.6 Posting/Guarding Access to Controlled Areas

Unless the area in which respiratory protection is required is limited to the immediate space occupied by the employee who is performing the work, posting and/or guarding access shall be established and controlled to allow only the necessary number of qualified personnel wearing respirators within the area.

28.4.7 Prohibited Uses

28.4.7.1 Air-purifying respirators shall not be used for the accomplishment of work in the following environments:

a. Untested tanks or voids

b. Oxygen-deficient atmospheres (<19.5 percent).

c. Atmospheres immediately dangerous to life or health (IDLH).

28.4.7.2 Access to life-threatening areas shall be limited to emergency situations. Such areas shall be tested and ventilated to safe conditions prior to conducting routine work.

28.4.8 Surveillance of Work Area

Supervisors who assign personnel to operations that require the use of respiratory protection shall, when possible, observe the operation to ensure that conditions have not changed.

28.4.9 Changing Cartridges

28.4.9.1 Particulate-filter Elements

a. Particulate filters, including paint-mist prefilters, should be changed if breathing becomes more difficult.

b. Type R filters (rated under 42 CFR 84) must be changed at the end of each shift where exposure includes airborne oil mists.

28.4.9.2 Vapor- and Gas-removing Cartridges and Canisters

a. Cartridges or canisters should be replaced as specified in the change schedule, after eight hours of continuous use, or more often if necessary, i.e. if the wearer can smell or taste the airborne contaminant.

b. If the wearer detects an odor or taste of gas in their inspired air, or feels eye or throat irritation, they should leave the hazardous atmosphere area immediately and go to a clean area before doffing the respirator to change out the cartridges.

28.4.10Personnel Protective Equipment (PPE)

Many operations that require respirators also require other personal protective clothing and gear. These requirements are delineated in APR 8715.1 Chapter 33, Personal Protective Equipment (PPE), which shall be complied with at in all instances.

28.4.11Powered Air-Purifying Respirator (PAPR)

28.4.11.1 The use of PAPRs in lieu of supplied-air respirators or respirators with a lower APF may be allowed and/or required under special circumstances as determined by the Occupational Safety, Health, and Medical Service Division (Code QH).

28.4.11.2 PAPRs may be a half mask, full facepiece, or helmet/hood type respirators depending on the type of hazard and working conditions.

28.5 Respirator User's Inspection Guide

28.5.1 General

28.5.1.1 All respirators shall be inspected for obvious defects by the user prior to each use.

28.5.1.2 Emergency respirators (e.g., SCBA) shall be inspected monthly and after each use. A log shall be maintained by the owning organization to document these inspections.

28.5.2 Air-Purifying and Air-Supplied (Half Mask or Full Facepiece) Respirators

28.5.2.1 Respirators shall be free of the following defects, as applicable:

a. Excessive dirt

b. Cracks, tears or deterioration

c. Distortion

d. Inflexibility

e. Cracked or badly scratched lenses

f. Incorrectly mounted lenses

g. Poorly seated or torn inhalation and/or exhalation check valves or diaphragms

h. Deterioration

i. If the device has a corrugated breathing tube, examine it for deterioration by stretching the tube and looking for cracks.

28.5.2.2 Straps shall be free of the following defects, as applicable:

a. Breaks, tears, or cuts

b. Loss of elasticity

c. Broken buckles

d. Worn serration or missing tabs or a head harness that may permit slippage.

28.5.3 Inspect face piece and straps as outlined 28.5 Respirator User's Inspection Guide.

28.5.4 If the device has a corrugated breathing tube, examine it for deterioration by stretching the tube and looking for cracks.

28.5.5 Also examine the respirator system components for accumulation of dirt, grit, oil, tears, breaks, etc.

28.5.6 Air-Supplied Hoods

28.5.6.1 Air supplied hoods shall be inspected for holes and tears prior to use.

28.5.6.2 Air-supplied hoods may be used in lieu of air-supplied respirators, provided the hood has NIOSH approval for the work being performed.

28.6 Respirator Fitting/Testing Procedures

28.6.1 General

28.6.1.1 A respirator cannot provide optimum levels of protection unless an airtight seal is obtained between the respirator and the user's face. Accordingly:

a. A respirator shall not be worn if facial hair comes between the sealing periphery of the facepiece and the face, or if facial hair interferes with valve functions.

b. Because half mask respirators are manufactured in different sizes (e.g., small, medium, and large) to fit various sized and shaped faces, and since the wearer is required to have a properly fitting respirator, it is imperative that supervisors make arrangements to obtain the specific model and size respirator certified for each employee who must use one.

c. If spectacles, goggles, face shield, or welding helmet must be worn with a face piece, it shall be worn so as not to interfere with the seal of the facepiece to the face.

d. User Seal Check: The facepiece seal of any respirator shall be checked by the wearer each time the respirator is donned. To check the seal, complete the following negative- and positive-pressure tests:

(1) Negative-pressure test:

(a) Close off the air inlet(s) for the canister, cartridge(s), filter(s), or hose(s) by covering with the palms, being careful not to dislodge the face piece.

(b) inhale gently so that the elastomeric facepiece collapses slightly, and

(c) Hold breath for ten seconds.

(d) If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator fit is adequate.

(2) Positive-pressure test:

(a) Close off the opening of the exhalation valve by covering with the palm, being careful not to dislodge the facepiece.

(b) Exhale gently into the facepiece.

(c) If slight positive pressure can be built up inside the face piece without leaking, the respirator fit is adequate.

28.6.2 Respirator Facepiece Fit-Test Requirements

28.6.2.1 The respirator cannot provide proper respiratory protection unless it seals airtight with the face of the wearer and thereby excludes the contaminated atmosphere. To do this, the respirator must be properly fitted to the individual.

28.6.2.2 Fit testing is required for employees that are required to wear respirators to perform job duties and may also be performed on employees voluntarily wearing respirators upon request. Employees who are required to wear respirators will be fit tested:

a. Prior to being allowed to wear any respirator with a tight-fitting facepiece

b. Annually

c. When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.)

28.6.2.3 Quantitative fit testing is the preferred method of testing a proper facepiece fit, and is required for the use of SCBA respirators. However, qualitative tests using irritant smoke or other agents approved by the Occupational Safety, Health, and Medical Service Division (Code QH) may also be conducted. All fit testing performed must be conducted annually, in accordance with the OSHA 29 CFR 1910.134 Appendix A of the Respiratory Protection Standard, and documented on all persons who will wear a tight-fitting respirator. The results of the qualitative fit test shall be used to select specific types, makes, and models of negative-pressure respirators for use by the individual.

28.7 Respirator Cleaning, Maintenance, and Storage

28.7.1 General

Reusable rubber facepiece respirators shall be inspected and cleaned after each use to prevent the spread of possible contamination and to maintain the rubber parts in good condition. Spare parts for reusable respirators must be procured from the respirator manufacturer.

28.7.2 Cleaning Procedures

28.7.2.1 Respirators shall be cleaned by the employees in a designated respirator cleaning area, as determined by their supervisor.

28.7.2.2 Respirators issued for the exclusive use of an employee shall be cleaned after each use.

28.7.2.3 Respirators may not be cleaned with solvents or paint removers, because damage to rubber or plastic pieces may result.

28.7.2.4 Respirators shall be cleaned in accordance with the respirator manufacturer's instructions or by the following method:

a. Remove filters by detaching speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard and replace any defective parts.

b. Wash components in warm (43 °C [110 °F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

c. When the cleaner used does not contain a disinfecting agent, respirator components should be disinfected with commercially available cleansers or wipes of equivalent disinfectant quality and used as directed if their use is recommended or approved by the respirator manufacturer.

d. Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis upon contact with the skin. In addition, some disinfectants may cause deterioration of rubber parts or corrosion of metal parts if not completely rinsed away.

e. Components should be hand-dried with a clean, lint-free cloth or air-dried in a clean area.

f. Test the respirator to ensure that all components work properly.

g. For self-contained breathing apparatuses (SCBAs), disassemble and hand-clean the pressure-demand and exhalation valve as appropriate, exercising care to avoid damaging the rubber diaphragm.

h. Visually inspect facepieces and all parts for deterioration, distortion, or other faults that might affect the performance of the respirator. Discard faulty items, replacing only with parts specifically designed for the particular respirator.

i. Place respirator in a clean container or bag for storage after it has completely dried.

28.7.3 Pesticide Contamination

For decontamination against pesticide residues, wash with alkaline soap and rinse with 50 percent ethyl or isopropyl alcohol.

28.7.4 Respirator Storage

28.7.4.1 Cleaned respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. The storage area shall be clean and sanitary.

28.7.4.2 Respirators shall be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired because the face piece sat in an abnormal position.

28.7.4.3 Respirators issued to individuals shall be stored in a clean plastic bag, carton, or carrying case, as appropriate.

28.7.5 Emergency-Use Respirators

28.7.5.1 Emergency escape-only respirators shall be inspected before being brought into the workplace for use.

28.7.5.2 SCBA air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90 percent of the manufacturer's recommended pressure level. The inspection must:

a. Establish that the regulator and warning devices function properly.

b. Check the respirator function, tightness of connections, and the condition of the various parts including, but not limited to, facepiece, head straps, valves, and connecting tube; and

c. Check the elastomeric parts for pliability and signs of deterioration.

28.7.5.3 For respirators maintained for emergency use, the maintaining organization shall:

a. Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.

b. Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

28.8 Breathing-Air Quality and Supplied-Air Systems

28.8.1 Compressed air for breathing purposes shall be at least Grade D breathing air. Grade D breathing air consists of:

a. Oxygen content: 19.5 – 23.5 percent.

b. Less than 10 ppm carbon monoxide.

c. Less than 1,000 ppm carbon dioxide.

d. Less than 5 mg/m^3 total hydrocarbons.

e. No objectionable odors.

28.8.2 Temperature Considerations

Compressed air that is to be used at temperatures below freezing should have excess water vapor removed so as to attain a dew point below the minimum temperature anticipated. Compressed air, as it passes through regulators and valves from a high pressure to a low pressure, expands and cools down resulting in a temperature lower than the surrounding temperature.

28.8.3 Breathing-Air Compressors

Breathing-air compressors must be located where contaminated air cannot enter the system. If the compressor is oil-lubricated it shall be equipped with both a high-temperature and carbon monoxide alarm. The high-temperature alarm will be set at the temperature specified by the manufacturer. The carbon monoxide alarm will be set at 10 ppm. Compressors used for breathing air must be specifically designed and certified for this purpose.

28.8.4 Breathing-Air Testing

Breathing-air quality shall be laboratory tested and certified at least quarterly. Supervisors of those activities capable of producing their own breathing air are responsible for such testing and record keeping (see 28.8.1 for required Grade D breathing air parameters). The air from non-oil-lubricated, low-pressure air pumps designed specifically to provide respirator breathing-air does not need to be tested.

28.8.5 Breathing-Air Hoses

28.8.5.1 Only hoses designed for breathing-air shall be used,they shall have NIOSH approval, and be compatible with the respirator being used.

28.8.5.2 Airline hoses shall be protected from damage. Hoses shall be arranged to prevent tripping and allow ready access and exit when using.

28.8.5.3 Airlines used for supplying breathing air shall be tagged or labeled as "Breathing-Air Supply Line." Breathing-airlines shall be labeled by the owning organization.

28.8.5.4 All breathing-airline couplings shall be incompatible with outlets for other gas systems.

28.8.5.5 When not in use, ends of breathing-airlines shall be capped or sealed.

28.8.5.6 The total hose length shall be limited to a maximum of 300 feet.

28.8.5.7 All equipment used inline between the respirator facepiece to the breathing-air pump must be from the same manufacturer.

28.9 Respirator Training

28.9.1 Who Requires Training

All personnel who will use respirators shall receive appropriate respirator training annually. Supervisors are recommended to take respirator training annually. The class Respiratory Protection for Supervisors will be used for supervisors who do not intend to wear respirators but have employees who wear respirators.

28.9.2 Respirator Training Topics

28.9.2.1 Why respirators are necessary and how improper fit, usage, or maintenance can compromise the protective effect of respirators.

28.9.2.2 The limitations and capabilities of respirators.

28.9.2.3 How to use respirators effectively in emergency situations, including situations in which the respirator malfunctions.

28.9.2.4 How to inspect, put on and remove, use, and check the seals of respirators.

28.9.2.5 The procedures for maintenance and storage of respirators.

28.9.2.6 How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

28.9.2.7 The general requirements of the OSHA respiratory standard (29 CFR 1910.134).

28.9.3 Request for Respirator Training

28.9.3.1 To schedule respirator training, Sections I-III of the ARC 28 Form, Request for Respirator Training must be properly filled out, including description(s) of the activities to be performed while wearing a respirator (Section I) and medical clearance given by a physician or licensed health care professional (Section II).

28.9.3.2 Section I: To be filled out by the employee and the employee's supervisor. The supervisor may need to consult with an Occupational Safety, Health and Medical Service Division (Code QH) qualified industrial hygienist for assistance with concentration and toxicity information.

28.9.3.3 Section II: After completion of Section II, the form is forwarded to the NASA Ames Health Unit (for Civil Servants) or medical professional (for Contractors). The NASA Ames Health Unit or other licensed health care professional performs the respiratory protection medical clearance, which has been

scheduled by the employee or supervisor named in Section I. This section is then completed by the physician or licensed health care professional.

28.9.3.4 Section III-IV: These sections are completed by the fit tester after successful completion the fit test. A cartridge change schedule will be entered on the form.

28.9.3.5 Following completion of Sections I-IV, Code QH Occupational Safety, Health, and Medical Service training coordinator will provide a link to the SATERN training for completion of the requirements.

28.9.4 Respirator Authorization Card

28.9.4.1 Each person who satisfactorily completes the respirator medical examination, fit-testing, and training shall be emailed a Respirator Authorization Card (see Appendix D: Respirator Authorization Card).

28.9.4.2 The expiration date on the card shall be one year from the earliest date of:

a. Respirator physical examination

b. Respirator training or

c. Respirator fit-testing.

28.9.4.3 The Respirator Authorization Card shall show the respirators of which the person was satisfactorily fit tested and authorized for.

28.9.4.4 The Respirator Authorization Card shall be carried on the individual's person or readily available when the individual is using a respirator.

28.10 Loss of Authorization

28.10.1The use of an unauthorized respirator will result in an NASA Ames Safety Accountability Program (ASAP) entry.

28.10.2Employees may lose their respirator use qualification and/or respirator at any time for any of the following reasons:

a. Expiration of qualification (typically medical clearance date).

b. Determination by an occupational medical officer that the employee is not physically qualified for respirator use.

c. Lack of knowledge or willful neglect of requirements, as demonstrated by failing the qualification exam or by serious violations of this instruction, such as:

(1) Use of the wrong type of respirator.

(2) Failure to wear a respirator where required.

(3) Removal of a respirator in an area requiring it to be worn.

(4) Tampering with respirator.

(5) Unprotected entry into an untested, oxygen-deficient, or IDLH atmosphere.

(6) Wearing the respirator with facial hair that prohibits proper sealing or interferes with proper internal valve operation.

APPENDIX A. DEFINITIONS

Air-Purifying Respirator	A respirator that purifies the air by drawing contaminated air through a filter or sorbent media. This type of respirator is distinguished from a supplied-air respirator, which supplies breathing-air from an outside source versus the ambient atmosphere to the respirator wearer
Assigned Protection Factor (APF)	The level of protection that a particular type of respirator can be expected to provide 95% of the time. An APF of 10 means that type of respirator (if used properly) can be safely used in an atmosphere that has a hazardous concentration of up to 10 times the Occupational Exposure Limit (OEL) for that hazard. APF's are determined by the Occupational Safety and Health Administration (OSHA). For example, a half face negative pressure air purifying respirator has an APF of 10. Full-face negative pressure air purifying respirators have an APF of 50.
Canister or Cartridge	A container with a filter, sorbent, catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
Dust	A solid, natural or mechanically produced particle that is generally greater than one micron in size. Examples of dusts include sawdust, cement, and metal grindings.
Employee Exposure	Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.
End-of-Service-Life Indicator (ESLI)	A system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.
Escape-Only Respirator	A respirator intended to be used only for emergency exit.
Filter or Air-Purifying Element	A component used in respirators to remove solid or liquid aerosols from the inspired air.
Filtering Facepiece (Dust Mask)	A negative-pressure particulate respirator with a filter as an integral part of the face piece or with the entire face piece composed of the filtering medium.
Fit Factor	A quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit Test	The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.
Fume	A solid condensation particle generally less than one micron in size. An example of a fume is the particles generated by welding operations.
Gas	A material that has no liquid phase at standard temperature and pressure. Examples of gases include oxygen, nitrogen, and hydrogen.
High Efficiency Particulate Air (HEPA) Filter	A filter that is at least 99.97 percent efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.
Immediately Dangerous to Life and Health (IDLH)	An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
Maximum Use Concentration (MUC)	The maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator. The MUC is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance (See Appendix F).
Mist	A liquid condensation particle that is generally greater than one micron in size. An example of a mist is paint overspray.
National Institute of Occupational Safety and Health (NIOSH)	The governmental agency that assigns approval numbers to respirators.
Negative Pressure Respirator (tight-fitting)	A respirator in which the air pressure inside the face piece is negative during inhalation with respect to the ambient air pressure outside the respirator.
Non-Hazardous Atmosphere	An atmosphere where the oxygen content is between 19.5 and 23.5 percent, no toxic chemicals or gases are present in excess of applicable occupational exposure limits, the atmosphere tests less than 10 percent of the lower explosive limit, and the air temperature does not present a heat or cold stress hazard.
Organic Vapor	The gaseous phase of a liquid at room temperature that is carbon based. Examples of materials that create organic vapors include xylene, toluene, and 1,1,1-trichloroethane.
Oxygen-Deficient Atmosphere	An atmosphere with an oxygen content below 19.5 percent by volume.

Permissible Exposure Limits (PEL)	Chemical airborne concentrations that are promulgated by either Federal or California OSHA. These are the concentrations of chemicals that a healthy individual may be exposed to for up to eight hours in a normal working day, every workday of the year, without suffering adverse health effects.
Physician or other licensed health care professional (PLHCP)	An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all the health care services required by the OSHA respiratory protection standard.
Powered Air-Purifying Respirator	An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.
Program Manager	The single point of contact within NASA ARC or within a contractor with responsibility for overseeing the respiratory protection program.
Self-Contained Breathing Apparatus (SCBA)	An atmosphere-supplying respirator for which the breathing-air source is designed to be carried by the user.
Service Life	The period of time that a respirator, filter, sorbent, or other respiratory equipment provides adequate protection to the wearer.
Supplied-Air Respirator (SAR) or Airline Respirator	An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.
Vapor	The gaseous phase of a liquid at room temperature. Examples of materials that create vapors include xylene, toluene, and 1,1,1-trichloroethane.

APPENDIX B. ACRONYMS

ANSI	American National Standards Institute
APF	Assigned Protection Factor
APR	Air-Purifying Respirator
ARC	Ames Research Center
ASAP	Ames Safety Accountability Program
CFR	Code of Federal Regulations
COR	Contracting Officer's Representative
ESLI	End of Service Life Indicator
HEPA	High-Efficiency Particulate Air
IDLH	Immediately Dangerous to Life or Health
Mg/m^3	Milligrams per Cubic Meter
MUC	Maximum Use Concentration
NPR	NASA Procedural Requirement
NASA	National Aeronautics and Space Administration
NIOSH	National Institute for Occupational Safety and Health
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PAPR	Powered Air-Purifying Respirator
PCB	PolyChlorinated Biphenyl
PEL	Permissible Exposure Limit
PF	Protection Factor
PPE	Personal Protective Equipment
PPM	Parts Per Million
SCBA	Self-Contained Breathing Apparatus
SWPF	Simulated Workplace Protection Factor
WPF	Workplace Protection Factor

APPENDIX C. THE NIOSH DESIGNATIONS FOR FILTERS (42 CFR 84)

Filter Designations:

		Compatibility with Oil-Based Particulates		
		N	**R**	**P**
Filter Efficacy	**95%**	N95	R95	P95
	99%	N99	R99	P99
	99.97%	N100	R100	P100

Code Letters:
N - **N**ot for oil mists, **N**ot resistant to oil
R - **R**esistant to Oil (good for a single shift)
P- Oil-**P**roof (good for use with oily mists, and over several shifts)

a. Filter or prefilter labeled **N95** may be used for:
(1) Non oily dusts, fumes, mists
(2) Most metal welding fumes
(3) Airborne dusts (non oily)
(4) Sawdust
(5) Nuisance dusts
(6) Water-based pesticide mists *
(7) Paint Spray Mists (Enamel and waterbase paints) *

b. Filter or prefilter labeled **R95** or **P95** may be used for oily mists to include:
(1) Lubricant oil mists
(2) Cutting oil mists
(3) Glycerin mists
(4) PCBs *
(5) Triphenyl phosphate
(6) Asphalt fumes
(7) Oil/solvent-based pesticides *
(8) Coal-tar pitch volatiles *
(9) Coke oven emissions
(10) Paint spray mists (oil-based paints) *

c. Filter or prefilter labeled **N99** may be used for:
(1) Tuberculosis germ exposures

d. Filter or prefilter labeled **N100** may be used for:
(1) Asbestos dusts
(2) Lead dusts and fumes
(3) Cadmium dusts and fumes

e. Filter or prefilter labeled **P100** may be used for:

(1) Radionuclides and radioactive dusts

***When used in conjunction with an appropriate chemical cartridge.**

APPENDIX D. RESPIRATOR AUTHORIZATION CARD

has completed Respirator Authorized User training requirements at NASA Ames Research Center

Authorization Expires:

This training was conducted on **05/29/2025** as required by OSHA & NASA standards.

Manufacturer	Size

Safety, Health, and Medical Service Division
650-604-2056

APPENDIX E. OSHA'S LIST OF ASSIGNED PROTECTION FACTORS

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

Notes:

[1]Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

[2]The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

[3]This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

[4]The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

[5]These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

APPENDIX F. MAXIMUM USE CONCENTRATIONS (MUC)

F.1 OSHA defines the "Maximum Use Concentration as the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC usually can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the permissible exposure limit, short term exposure limit, ceiling limit, peak limit, or any other exposure limit used for the hazardous substance." The MUC is the highest concentration of contaminant in which a respirator can be used safely. At no time should a respirator be used in an environment that exceeds the MUC. The MUC must be calculated for gases and vapors and is not appropriate for particulates dusts and fumes.

F.2 If the contaminant concentration is unknown, a respirator with an “unlimited" maximum use concentration should be selected. These include SCBA, pressure-demand airline devices with an emergency-escape capability, and other respirators as applicable.The MUC is calculated by multiplying APF times PEL. Below gives an example of calculating the MUC for nitric acid.

To Calculate the MUC

MUC = PF x PEL

FOR NITRIC ACID EXPOSURE THE MAXIMUM USE CONCENTRATION WOULD BE CALCULATED AS FOLLOWS:

Half Face Respirator

PEL for nitric acid = 2 parts per million (ppm)

PF of half mask respirator = 10

MUC = 2 ppm x 10

= 20 ppm

A half mask respirator cannot be used in atmospheres with a nitric acid concentration greater than 20 ppm.

Full Face Respirator

PEL for nitric acid = 2 parts per million (ppm)

PF of Full facepiece respirator = 50

MUC = 2 ppm x 50

= 100 ppm

A half-face respirator cannot be used in atmospheres with nitric acid.

APPENDIX G. 29 CFR 1910.134 APP D - MANDATORY INFORMATION FOR EMPLOYEES USING RESPIRATORS WHEN NOT REQUIRED UNDER THE STANDARD

U.S. Department of Labor
Occupational Safety & Health Administration

Regulations (Standards - 29 CFR)
(Mandatory) Information for Employees Using Respirators When not Required Under Standard. - 1910.134 App D

• **Part Number:**	1910
• **Part Title:**	Occupational Safety and Health Standards
• **Subpart:**	I
• **Subpart Title:**	Personal Protective Equipment
• **Standard Number:**	1910.134 App D
• **Title:**	(Mandatory) Information for Employees Using Respirators When not Required Under Standard.

Appendix D to Sec. 1910.134 (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

I have read and understand this information:

Print Name Sign Date

Please sign, copy, and return this form to Code QH respiratory protection program administrator (Eric Bieniek) at eric.w.bieniek@nasa.gov.