



Dryden Flight Research Center
Edwards, California 93523

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Dryden Centerwide Procedure

Code SH

Chapter 16 **Respiratory Safety**

Electronically approved by
Assistant Director for Management Systems

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1.0 PURPOSE OF CHAPTER

This chapter establishes procedures and guidelines, delegates authority, and assigns responsibility for managing the Dryden Flight research Center Respiratory Safety Program.

2.0 PROCEDURE SCOPE & APPLICABILITY

This document is applicable to all persons under DFRC supervision who require the use of respiratory equipment. The use of respirators will be based upon Permissible Exposure Limits (PELs), Threshold Limit Values (TLV®), and/or whether an environment is considered Immediately Dangerous to Life or Health (IDLH). In the absent of air monitoring data the DFRC Industrial Hygienist's judgment will be used.

3.0 PROCEDURE OBJECTIVES, TARGETS, METRICS, & TREND ANALYSIS

Objective: Identify, eliminate, or control respiratory hazards

Target: Zero respiratory mishaps each year

Metric: Number of respiratory mishaps per year

Trend analysis: Metrics will be analyzed to determine whether procedural objectives have been met.

4.0 WAIVER AUTHORITY

This document may not be waived.

5.0 RESPONSIBILITY

5.1 Directorates and Single Letter Offices

Directorates and Single Letter Offices will develop safety measures that ensure personnel under their supervision are not exposed to hazardous airborne contaminants. The order of preference to eliminate or control air contaminants is

- A. Engineering controls
- B. Administrative controls
- C. Respiratory Protective Equipment

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5.2 Program or Project Managers

Program or Project Managers will ensure that training, medical clearance, respiratory equipment, and fit- testing is provided to employees where required.

5.3 The Safety, Health, and Environmental Office

Has safety oversight for the Respirator Program at DFRC.

- A. Appoint a Respirator Program Administrator for the management of the DFRC Respirator Program.
- B. Provide program surveillance and evaluation.
- C. Evaluate and update the Respirator Program as necessary to meet regulatory requirements.

5.4 The Respirator Program Administrator

- A. Provide baseline surveys of operations, tasks, or work places to determine the potential to create or contain harmful air contaminants.
- B. Make the surveys available to responsible management, site managers, supervisors, and employees.
- C. Make recommendations for control or elimination of any harmful air contaminants found.
- D. Select the type respirator that best meets the needs of the employee.
- E. Ensure training and certification is provided for all personnel at DFRC who are required to use a respirator.
- F. Provide work-site-specific procedures and elements for required respiratory use.
- G. Provide technical information regarding the selection, use, fit, maintenance and care, testing and checking, and limitations of respirators to both supervisors and employees.
- H. Conduct evaluations of workplaces to ensure that the written respiratory protection program is being properly implemented. See 29 CFR 1910.134 (I) for evaluation requirements.
- I. Maintain appropriate documentation and records of workplace surveys in accordance with 29 CFR 1910.1020, (medical) and NPD 1441.1 Record Retention Schedules.

5.5 Health Unit

Each employee who is required to wear a respirator is required to receive a medical evaluation by the Health Unit Medical Officer (HUMO) or his/her designee before the employee may be fitted with and permitted to use a respirator and annually thereafter. The medical evaluation will comply with current protocols. See Section 7.2.4, Medical Evaluation for further details.

5.6 Supervisors

- A. Identifying personnel who work in areas or jobs requiring respiratory protective equipment.
- B. Ensuring that each worker who uses respiratory equipment receives a physical evaluation, is trained, fit tested and follows appropriate respirator safety procedures.
- C. Enforcing the wearing of appropriate personal protective equipment, including respirators.
- D. Ensuring that appropriate warning signs are posted where breathing atmospheres require the use of respirators.
- E. Notifying the Safety Office of any incidents or near misses resulting from the use or non-use of respirators.
- F. Obtaining the appropriate supervisor respirator training.

5.7 Employee Responsibilities

- A. Following the procedures of this chapter and other documents that provide guidance for the use and care of assigned respirator/s.
- B. Cooperating with supervisors, medical, and safety personnel to prevent exposure to harmful breathing environment.
- C. Notifying supervisors of known or suspected respiratory hazards or change in health that would preclude the use of a respirator.
- D. Assuring they have met the medical, training, and fit testing requirements annually.

6.0 RESPIRATORY PROTECTION PROGRAM

This section establishes the elements of the DFRC Respiratory Protection Program.

6.1 Engineering Controls

The use of engineering controls is the primary means of protecting workers from hazardous air contaminants.

- A. Facility design will be a consideration for processes that create air contaminants. Facility design reviews will determine if adequate ventilation exists to eliminate air contaminants and to ensure that processes that create hazardous air contaminants are located away from other workers.
- B. The selection, modification, and operation of equipment that reduces the amount or precludes the production of air contaminants
- C. The use of materials that produce the least air contaminants and meet the needs of the process

6.2 Administrative Controls

Administrative controls may include the following:

- A. Changing work schedule to minimize exposure to air contaminants i.e., conduct operations that produce hazardous air contaminants during non-duty hours.
- B. Ensuring workers have proper training and are aware of respiratory contaminants and hazards. (See Chapter 9, Hazard Communication.)

6.3 Respiratory Protection

Respiratory protection must be used:

- A. Where existing engineering or administrative controls are not adequate or feasible in controlling airborne contaminants that exceed TLV[®] or PEL, whichever is lower.
- B. When the oxygen content by volume drops below 19.5 percent.
- C. During handling, transfer, or use of a hazardous chemical that could cause the risk of injury in the event of a release due to a leak or spill.
- D. During confined space entry where the concentration of oxygen or air contaminants may not be known. (See Chapter 10, Confined_Space, for details.)
- E. When requested by an employee. (An employee may request a respirator when one is not actually required.)

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6.4 Medical Evaluation

- A. Dryden personnel, both civil servants and contractors, will receive a medical evaluation by the DFRC Health Unit Medical Officer (HUMO) before receiving initial respiratory training and fit testing, and an annual medical evaluation for continued use. A re-evaluation is required sooner if
- 1) An employee reports medical signs or symptoms that are related to his/her ability to use the assigned respirator.
 - 2) The HUMO, supervisor, or Respirator Program Administrator notifies the employee's supervisor that the employee needs to be re-evaluated.
 - 3) Information from the Respirator Program Administrator, including observations made during fit testing and program evaluation, indicates a need for employee re-evaluation.
 - 4) A change occurs in workplace conditions that result in a physical or emotional burden placed on the employee.
- B. The employee's supervisor or the DFRC Respirator Program Administrator will provide the HUMO with the following information:
- 1) The type and weight of the respirator to be used.
 - 2) The duration and frequency the respiratory is worn.
 - 3) The physical work effort by the employee when wearing the respirator.
 - 4) Any other information that could have an influence on the HUMO's recommendation.
- C. As a minimum, the medical evaluation will include those mandatory items listed in 29 CFR 1910.134, Sections 1 & 2, Part A of Appendix C or an initial medical examination that obtains the same information. The HUMO will ensure that a follow-up medical examination is provided for an employee who gives a positive response to the initial medical evaluation. The follow-up medical examination will include any medical tests, consultations, or diagnostic procedures that the HUMO deems necessary to make a final determination. The results of the medical evaluation and any follow-up information will be placed in the individual's medical file.
- D. The HUMO will make a written recommendation regarding the employee's ability to use a respirator. This recommendation should include:
- 1) A recommendation of whether or not the employee should wear the proposed respirator.

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- 2) Any limitations related to the medical condition of the employee or to the workplace conditions in which the respirator will be used.
 - 3) The need, if any, for follow-up medical evaluation.
 - 4) A statement that the HUMO has provided the employee with a copy of the written recommendation.
- E. The HUMO is responsible for providing the supervisor and the DFRC Respirator Program Administrator with a copy of the written recommendation before the employee may be trained and fit tested for the proposed respirator.

6.5 Respirator Equipment Selection

The Respirator Program Administrator or designee will review the conditions in which the employee will be using the respirator and will advise the employee of the type respirator required. The employee may select a respirator from several models, if available, that are of the required type. Respirators and filters used at DFRC must meet standards listed in 42 CFR 84 and NIOSH Publication No. 96-101, as appropriate.

6.6 Respirator Filter Cartridge Replacement

For air-purifying respirators used to remove toxic gases and vapors, the filter cartridges must be replaced under the following conditions:

- For cartridges with a visual indicator, the change in the visual indicator signals that filter change is required
- Cartridges without a visual indicator have been used for 8 hours
- Breakthrough of the chemical contaminant is detected by odor, taste, or irritation.

6.7 Voluntary Use of Respirators

The voluntary use of respirators at DFRC is encouraged even when exposures are below the exposure limits, however, the use of a respirator itself can become a hazard to the wearer if not fitted, cleaned, maintained, and stored properly. Employees at DFRC who choose to wear a respirator when not required by exposure limits will contact the Respirator Program Administrator who will recommend the best type respirator for the condition in which it will be used. The employee will obtain a medical clearance and be fit-tested.

6.8 Dust Masks

Dust masks are available at DFRC. These masks may be used for nuisance dusts only. All applications of use must be preapproved by the Respirator Program Administrator or designee. A short training session is required before using dust masks; medical clearance and fit testing is not required. The Respirator Program Administrator or designee will cover the items listed in 29 CFR 1910.134, Appendix D, with the employee.

7.0 TRAINING & CERTIFICATION

7.1 Training

The Respirator Program Administrator is responsible for ensuring that employees and their supervisors receive training on the proper use and care of respirator equipment before the first use and annually thereafter. Training will be conducted in a manner that is understandable to the employee. Following training the Respirator Program Administrator will assure that the employee can demonstrate knowledge of at least the following.

- A. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- B. The limitations and capabilities of the respirator
- C. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- D. How to inspect, put on and remove, use, and how to check the seals of the respirator
- E. The procedures for maintenance and storage of the respirator
- F. How to recognize personal symptoms that may indicate an ineffective or wrong type respirator

7.2 Prior Training

An employee may be exempt from receiving training if he/she has had appropriate respirator training in the last 12 month and can demonstrate knowledge of the items listed above and has documentation of the training from a qualified trainer. The employee must, however, receive training within 12 month from the date of the previous training in order to continue to use the respirator.

7.3 Refresher Training

Refresher training is required.

- A. Yearly as long as the individual uses the respirator.
- B. Changes in the workplace or the type of respirator render the previous training obsolete.
- C. Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the required understanding or skill needed to safely use the respirator.
- D. Other situation or conditions that arises in which retraining appears necessary to ensure safe respirator use.

7.4 Fit Testing

Fit testing is required prior to an employee using any respirator with a negative or positive pressure tight-fitting face piece. Fit testing will be accomplished by the Respirator Program Administrator or designee. The Respirator Program Administrator will ensure that the employee passes an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT). Procedures for both QLFT and QNFT are listed in 29 CFR 1910.134, (f), Fit Testing, and Appendix A, Fit Testing Procedures. Employees is refitted

- A. Upon request for a different model, make, or size respirator by the employee.
- B. When the employee's work conditions change which require a different type respirator.
- C. A loss or gain of weight, or a change to facial features, such as the growth of facial hair, scarring, etc. occurs.
- D. When requested, for any reason, by an employee who used respiratory equipment.

7.5 Certification

The Respirator Program Administrator will certify respiratory training. A copy will be kept in the Safety, Health, and Environmental Office and a copy provided to the trainee.

8.0 MANAGEMENT RECORDS & RECORD RETENTION

8.1 Medical Evaluation Records

Medical evaluations will be maintained in accordance with 29 CFR 1910.1020 and NPD 1441.1 D, Record Retention Schedules.

8.2 Fit Testing and Training Records.

Fit testing, initial, and annual training records will be maintained by the Respirator Program Administrator for the period the employee uses the respirator plus three (3) years and then may be destroyed. See NPD 1441.1D, Record Retention Schedules.

9.0 RELEVANT DOCUMENTS

9.1 Authority Documents

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|------------------|---|
| ANZI Z88.2-1991 | Practices for Respiratory Protection. Portions of this standard are authoritative when "Incorporated by reference" by OSHA or NASA. |
| NPD 8700.1 | NASA Policy for Safety and Mission Success. |
| NPR 8715.3 | NASA Safety Manual with Changes through Change 1, 6/19/02. |
| 29 CFR 1910.134 | Respiratory Protection. This CFR establishes that employer's institute a respirator program when employees are required to utilize respiratory protective equipment. |
| 29 CFR 1910.1000 | Air Contaminants: This CFR lists air contaminants and their exposure limits. |
| 29 CFR 1910 1200 | Hazard Communications: This CFR establishes the procedures for communicating information to employees by the employer of all hazardous chemicals and substances used in the work place. |
| 42 CFR 84 | Approval of Respirator Protective Devices: This CFR establishes the manufacture, testing, and maintenance standards for respiratory equipment. |

9.2 Reference Documents

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| State of California | CCR 8, Section 5144 |
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NIOSH	Department of Health and Human Services Document 96-101, Selection and use of Particulate Respirators. This publication is certified by 42 CFR 84.
DFRC Safety Handbook	Chapter 9, Hazard Communication.
DFRC Safety Handbook	Chapter 10, Confined Space.
American Conference of Governmental Industrial Hygienists (ACGIH) Industrial Ventilation, Current Edition. Portions of this ACGIH guideline are "incorporated by reference" by NASA as authority for ventilation requirements.	

10.0 ACRONYMS & DEFINITIONS

10.1 Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists.
ESLI	End of Service Life Indicator
HEPA	High Efficiency Particulate Air filter system
HUMO	Health Unit Medial Officer
IDLH	Immediately Dangerous to Life or Health
NIOSH	National Institution of Occupational Safety and Health
OSHA	Occupational Safety and Health Association
PEL	Permissible Exposure Limit
QLFT	Qualitative Fit-test
QNFT	Quantitative fit test
TLV [®]	Threshold Limit Value
SARs	Supplied Air Respirators
SCBA	Self-contained Breathing Apparatus

10.2 Definitions

Air-purifying respirator	A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants.
Atmosphere-supplying respirator	A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere; includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA).

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Canister or cartridge	A container with a filter, absorbent, catalyst, or combination of these items, which removes specific contaminants from air.
Demand respirator	An atmosphere-supplying respirator that admits breathing air to the face piece only when a negative pressure is created inside the face piece by inhalation.
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 absorbent is approaching saturation or is no longer effective.
Filter or air purifying element	A component used in respirators to remove solid or liquid aerosols from the inspired air.
Fit test	The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.
High efficiency particulate air (HEPA) filter	A filter that is at least 99.97% efficient removing monodisperse particles of greater than 0.3 micrometers in diameter.
Immediately Dangerous to Life or Health (IDLH)	A condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death, immediate or delayed permanent adverse health effects, or prevent escape from such an environment in the event of the failure of respirator protection equipment.
Negative pressure respirator	A respirator in which the air pressure inside the face piece is negative during inhalation with respect to ambient pressure.
Oxygen deficient atmosphere	An atmosphere with an oxygen content below 19.5 % by volume.
Permissible Exposure Limits (PEL)	Standards are listed in 29 CFR 1910.1000 Tables Z-1, Z-2, and Z-3.
Positive pressure respirator	A respirator in which the pressure inside the respirator is greater than ambient.
Self-containing breathing apparatus (SCBA)	An atmosphere-supplying respirator for which the breathing air source is carried by the user.
Supplied-air-respirator (SAR) or airline	An atmosphere-supplied respirator for which the source of breathing air is not designed to be carried by the user.

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respirator

Threshold Limit
Value (TLV[®])

The level of exposure, day after day, under which it is believed that nearly all workers may be repeatedly exposed without adverse health effects. Usually listed for a Time Weighted Average (TWA) concentration such as for 8-hour workday and 40-hour workweek.

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Admin. Change	Baseline-1	05-12-05	All	<ul style="list-style-type: none"> • Separates each chapter of the document into individual files. • Minor formatting corrections.
Revision	A	04-24-09	3, 8	No IPP was held for Revision A. Affected users of Section 6.6 were individually notified by e-mail by Code SH. Page 3: Revised Section 3.0 Page 8: Added Section 6.6

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