

# Kennedy NASA Procedural Requirements

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Responsible Office: Spaceport Integration and Services

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## KSC Respiratory Protection Program

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National Aeronautics and  
Space Administration

John F. Kennedy Space Center

**Change Log**

Date	Revision	Description
12/7/11	C-1	Administratively changed to clarify Action Level definition in Appendix A. The application of the action level to exposures to chemicals substances identified in CFR 1910, where use of the action level is an OSHA requirement.
9/19/12	C-2	Administratively changed to replace reference to cancelled NPD 1820.1, NASA Environmental Health Program, with NPD 1800.2C, NASA Occupational Health Program on page 4, P.3c
5/20/14	C-3	Administratively changed to comply with NPR 1400.1, NASA Directives and Charters Procedural Requirements; replaced KBM-ST-2.1A and KBM-ST-2.1B with KSC-UG-1800.
5/18/15	C-4	Administrative changes to reflect change in directorate name from Center Operations to Spaceport Integration and Services.
5/11/16	D	The requirements and responsibilities were revalidated as written. Administratively changed to replace references to the Medical and Environmental Support Contract (MESC) to the Kennedy Environmental and Medical Contract (KEMCON), references to the Institutional Services Contract (ISC) to the Kennedy Propellants and Life Support Services Contract (KPLSS), add KSC Forms to P.4 Applicable Documents and Forms, change the signature authority from Michael J. Benik to Nancy P. Bray, and other administrative changes to content and structure to comply with NPR 1400.1, NASA Directives and Charters Procedural Requirements.
4/9/21	E	<p>Preface - Administrative and Formatting Changes Hyperlink Updates</p> <p>Chapter 1. - Administrative and Formatting Changes Hyperlink Updates 1.4.a Replaced KEMCON with a generic contractor name 1.7.b Replaced KPLSS with a generic contractor name</p> <p>Chapter 2. - Administrative and Formatting Changes 2.3.6 Added wording to address voluntary use of respirators 2.7 Updated numbering in 2.7.1 by adding a list for clarity</p> <p>Appendices - Administrative and Formatting Changes Hyperlink Updates</p> <p>Appendix B - Added SI-C4 and SI acronyms to list Removed KEMCON and KPLSS from list Removed acronyms not referenced in doc</p> <p>Appendix E - Added new appendix to include referenced documentation</p>

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## PREFACE

### P.1 PURPOSE

a. This Kennedy National Aeronautics and Space Administration (NASA) Procedural Requirements (KNPR) document contains the requirements for the implementation of the Kennedy Space Center (KSC) Respiratory Protection Program. It provides both general and specific requirements for protective measures to be taken for employees who may be exposed to toxic air contaminants and oxygen deficient atmospheres. This KNPR does not relieve NASA organizations and their associated contractors of responsibility for the protection of personnel under their cognizance.

b. It is KSC's policy to provide employees with an environment in which occupational health hazards are identified, evaluated, eliminated, or controlled in such a manner that personnel do not suffer adverse health effects as a result of their employment. Activities shall be conducted in a manner that conforms to all applicable Federal, state, and local regulatory requirements. Personnel exposure to chemical and physical agents should, at all times, be restricted to levels as low as reasonably achievable.

c. The requirements presented in this KNPR implement Federal Occupational Safety and Health Administration (OSHA) regulations and NASA management policy for industrial hygiene (IH) programs. NASA, contractor management, and operations organizations will supplement the provisions of this Directive by implementation of internal policies and instructions, as needed.

### P.2 APPLICABILITY

a. This directive applies to all NASA organizational elements located at KSC and NASA-KSC facilities and operations at other locations. This includes NASA-KSC contractors, grant recipients, or parties to agreements only to the extent specified or referenced in the appropriate contracts, grants, or 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 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. [Executive Order 12196, Occupational Safety and Health Programs for Federal Employees](#)

b. [Title 29, Code of Federal Regulations \(CFR\), Part 1960](#)

c. [NASA Policy Directives \(NPD\) 1800.2, NASA Occupational Health Program](#)

d. [NASA Procedural Requirements \(NPR\) 8715.1, NASA Occupational Safety and Health Programs](#)

**P.4 APPLICABLE DOCUMENTS AND FORMS**

- a. [Title 29 CFR 1910.134](#), and [1910.1000 – End](#)
- b. [Title 29 CFR 1910.1020](#)
- c. [Title 29 CFR Part 1926](#)
- d. [Title 42 CFR Part 84](#)
- e. [Privacy Act of 1974 \(5 USC 522.\(i\)\(1\)\)](#)
- f. [KNPR 8715.3, KSC Safety Procedural Requirements](#)
- g. [KSC-UG-1800, John F. Kennedy Space Center \(KSC\) Medical Standards User Guide](#)
- h. [KSC-PLN-1910, Site Specific Respiratory Protection Plan Template for NASA Civil Service Organization Operations at Kennedy Space Center](#)
- i. [KSC Form 16-539, KSC Respirators Usage Questionnaire](#)
- i. [KSC Form 16-540, KSC Respirator Medical Evaluation Questionnaire](#)
- k. [KSC Form 13-116, Physical Examination Request/Certificate](#)
- l. [KSC Form 31-81, Respirator Training/Qualification](#)

**P.5 MEASUREMENT/VERIFICATION**

None

**P.6 CANCELLATION**

This document cancels KNPR 1820.4, Rev. D, KSC Respiratory Protection Program.

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Nancy P. Bray  
Director, Spaceport Integration and Services

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## CHAPTER 1. RESPONSIBILITIES

### 1.1 Heads of Primary Organizations

The leadership of primary organizations, and to the extent provided by their contracts, the leadership of contractor organizations shall:

- a. Provide operational implementation in accordance with the requirements of this KNPR.
- b. Ensure personnel receive the following:
  - (1) Notification of hazards and protective measures governing work with hazardous chemical agents.
  - (2) Appropriate training and orientation on identifying hazards associated with chemical agents in their work places and the use of respiratory protective equipment provided for their safety.
  - (3) Notification of any changes or modifications to systems that are used to control exposure to chemical agents.
- c. Implement and maintain control measures required to prevent or otherwise reduce potential employee exposure to hazardous chemical agents.
- d. Ensure that plans, processes, and operations are reviewed for elimination or control of air contaminant hazards.
- e. Designate organization representatives to the KSC Respiratory Protection Panel (RPP).

### 1.2 Kennedy Space Center Occupational Medical Officer

The KSC Occupational Medical Officer (OMO), or designated representative, shall:

- a. Provide medical evaluations to personnel who are identified by their organizations as respirator users.
- b. Provide medical screening and surveillance examinations for those employees who may be occupationally exposed to certain hazardous chemical agents, as required by [29 CFR Part 1910](#), [29 CFR Part 1926](#), or other applicable NASA requirements.
- c. Provide, on a case by case basis, special physical evaluations to personnel identified as being exposed, or potentially exposed, to hazardous chemical agents, as the result of an accident, mishap, or other unusual circumstance.
- d. Ensure that physical examination criteria, as defined in [KSC-UG-1800](#), is implemented to conform to the protocols defined by OSHA and other nationally recognized standards, as applicable.

- e. Maintain records of all occupational medicine activities associated with support to the KSC Respiratory Protection Program as defined by Federal regulation (e.g., OSHA, NASA Health Standards).
- f. Provide employee access to medical records in accordance with [29 CFR 1910.1020](#) and the [Privacy Act of 1974](#), as amended.

### **1.3 Kennedy Space Center Industrial Hygiene Officer**

The KSC IH Officer, or designated representative, shall implement and administer the KSC Respiratory Protection Program for NASA civil service personnel.

### **1.4 Kennedy Environmental and Medical Contractor Industrial Hygiene Office**

The Kennedy environmental and medical contractor IH Office shall:

- a. Provide baseline surveys of operations, tasks, or procedures which possess the potential to create harmful air contamination.
- b. Provide health hazard evaluations of operations, tasks, or procedures where baseline surveys have shown the presence of harmful air contaminants at concentrations which may pose a health hazard to personnel.
- c. Provide area and personal exposure monitoring for those areas where previous surveys have shown the presence of air contaminants at concentrations in excess of the action level.
- d. Provide the KSC OMO access to exposure monitoring records.
- e. Provide the following to supervisors, site managers, and responsible safety organizations in the affected work area:
  - (1) Results of surveys and recommendations.
  - (2) Recommended methods for the control or elimination of air contaminant hazards.
  - (3) Requirements for employees to participate in the KSC Respiratory Protection Program.
  - (4) Recommendations on the selection of respiratory protective equipment.
  - (5) Assistance in completing [KSC-PLN-1910](#).
- f. Notify employers of exposure monitoring results for affected employees.
- g. Review facility plans and operational procedures to assess the adequacy of precautions taken to control workplace air contaminants.
- h. Provide technical assistance in the selection and design of engineering controls and work practices used to control or eliminate air contaminants.
- i. Perform inspections of breathing air compressors and associated air filtration systems.

- j. Advise and assist in development of Respiratory Protection Program training classes.
- k. Chair the KSC RPP.

## **1.5 Kennedy Space Center Respiratory Protection Panel**

1.5.1 The RPP serves as a Government and contractor forum for the implementation of respiratory protection programs. Membership consists of the following offices and representatives:

- a. KSC IH officer.
- b. Designated representatives of NASA.
- c. Designated representatives of KSC contractor organizations including the following:
  - (1) Occupational Medicine.
  - (2) Environmental Health.
  - (3) Life Support.
  - (4) Fire Services.
  - (5) Safety.
  - (6) Training.
  - (7) Each KSC contractor's respiratory protection program administrator.

1.5.2 The RPP shall:

- a. Provide consultative services to KSC management and contractors on items related to respiratory protection.
- b. Coordinate actions to resolve problems or rectify deficiencies in the selection, use, and maintenance of respirators.
- c. Provide a forum for discussion and resolution of issues related to IH, life support, occupational medicine, fire, and training services provided by NASA to its contractors in support of their respiratory protection programs.
- d. Assist the KSC IH Officer in the development and maintenance of respiratory protection policies, requirements, and general practices of the KSC Respiratory Protection Program.
- e. Coordinate permanent deployment and removal of Escape-Only Respirators (EORs) (formerly known as Breathing Escape Units) as outlined in [Chapter 2, paragraph 2.4](#).



## 1.6 Technical Training

The KSC technical training contractor, or other contractor training organizations, shall, to the extent provided by the contract, provide respirator fit testing, training, and certification, and maintain associated employee training and certification records.

## 1.7 Kennedy Space Center Propellants and Life Support Services Contractor

The Kennedy propellants and life support services contractor shall:

- a. Service all respirators assigned to life support to include inspection, testing, cleaning, sanitizing, repair, and refilling of cylinders, and maintain records of all elements performed.
- b. Act as the primary point of procurement initiation and issuance for supplied air respiratory protective devices, in coordination with the KSC IH Office and the Spaceport Integration and Services Propellants and Life Support Branch (SI-C3) of the Spaceport Integration and Services Directorate (SI).
- c. Perform periodic preventive maintenance procedures, as detailed in the Operational Maintenance Requirements and Specifications Documents (OMRSD), on all assigned respirators, and maintain records of these inspections on a recurring basis, as determined by SI-C3.
- d. Ensure life support technicians, who perform respirator maintenance, maintain appropriate manufacturer's certifications.
  - (1) Ensure periodic recertification to maintain and upgrade technicians' capabilities.
  - (2) Maintain records of all such training, certification, and recertification.
- e. Prepare and update, as required, the Operation and Maintenance Instructions for the use, servicing, and repair of all used respirators, in accordance with the OMRSD and manufacturers' recommendations.
- f. Provide consultative support to the KSC RPP on all aspects of respiratory protective equipment.
- g. Provide training, including information and documentation, relative to changes in procedures or configuration of respiratory protective equipment that could affect the respiratory training program.

## 1.8 Civil Service Line Management and Contract Employers

Civil service line management and contract employers shall:

- a. Coordinate with appropriate safety and environmental health personnel to request workplace health hazard assessment of operations with suspected air contaminant generation.
- b. Complete [KSC-PLN-1910](#) for the use of respiratory protection equipment, as identified in the health hazard evaluation.

- c. Ensure proper completion and submittal of KSC Forms [16-539](#), [16-540](#) and [13-116](#) required for the medical evaluation.
- d. Ensure employees, who have a medical evaluation by a physician or licensed health care professional outside of the KSC Occupational Medicine Services, have the appropriate documentation on file with their employer that states conformity and compliance with OSHA's medical evaluation guidelines.
- e. Ensure that employees seeking certification to use respiratory protective equipment are medically certified to use such equipment and attend training and respirator fit testing, as required.
- f. Ensure that employees obtain the proper visual correction devices that are compatible with proper and effective respirator use, when visual correction has been determined necessary by the physician or other licensed health care professional.
- g. Attend respirator training if they supervise employees requiring the use of respirators.
- h. Verify that employees are issued the correct type and size respirator for which they have been fitted and certified.
- i. Ensure the proper use of respiratory protection equipment, engineering controls, and work practices established to reduce workplace exposure to harmful air contaminants.
- j. Ensure that employees are not assigned to tasks requiring the use of respirators when they have facial hair, scars, or missing dentures which have the potential for causing leakage in the sealing surface of the respirator.
- k. Notify their affected employees of the results of health hazard evaluations and exposure monitoring surveys, as defined in [Section 2.7 of this KNPR](#).
- l. Ensure the proper care and maintenance of respirators issued to their employees.
- m. Maintain a current list of employees that have respirator use certifications.
- n. Review work assignments and work area hazards to determine potential need for use of respiratory protection equipment.
- o. Review Safety Data Sheets (SDS) for hazardous materials with affected employees when respiratory protection must be worn for protection.
- p. Assist in the development of strategies to control or eliminate hazardous exposure.

### **1.9 Individual Employees**

Individual employees shall:

- a. Use control procedures established to maintain air contaminant control, including wearing and maintaining respiratory protective devices, as instructed.

- b. Cooperate with supervisory, medical, environmental health, and safety personnel in activities to evaluate and control air contaminant hazards.
- c. Notify supervisors of areas, operations, or equipment that may be a source of air contaminants.
- d. Report any suspected chemical exposures to their supervisors.
- e. Complete a KSC Respirator Medical Evaluation Questionnaire Form ([KSC Form 16-540](#)), and submit to Occupational Health Facility for evaluation if they require a respirator certification physical.
- f. Notify supervisors of changes in their health status that may affect their ability to safely use respiratory protection and resubmit the [KSC Form 16-540](#).

## CHAPTER 2. RESPIRATORY PROTECTION PROGRAM

### 2.1 General

This section establishes requirements for the use of respiratory protective equipment. These requirements establish practices and procedures where the use of such equipment is required to perform tasks that are inherently hazardous because of the presence of toxic air contaminants or oxygen deficient atmospheres. These requirements are applicable to all NASA civil service and contractor organizations as well as their subcontractors. Mandatory requirements for compliance with the OSHA Respiratory Protection Standard are not repeated in this KNPR, but may be found in [29 CFR 1910.134](#).

### 2.2 Written Operating Procedures

2.2.1 Respirators will only be used when authorized by an operating procedure or a written site-specific respiratory protection plan as described in [29 CFR 1910.134\(c\)\(1\)](#).

2.2.2 Hazardous operating procedures that require the use of respiratory protective equipment will meet the requirements for hazardous technical operating procedures found in [KNPR 8715.3](#).

### 2.3 Respiratory Protective Equipment

2.3.1 Adequate respiratory protection shall be provided by the employer whenever:

- a. Personnel are required to work in hazardous atmospheres where the action level of the hazardous air contaminant is exceeded or oxygen deficient atmospheres are present.
- b. Personnel are involved in the handling, transfer, or use of hazardous chemicals where the toxicity of the chemical is of such a nature as to place those personnel at significant risk of serious illness or injury in the event of a leak, spill, or other release of the chemical.
- c. Personnel are required to enter atmospheres which have unknown concentrations of oxygen or air contaminants.
- d. An industrial hygienist or safety professional determines that personnel exposure(s) could exceed the action level.

2.3.2 The selection of respiratory protection equipment will take into consideration:

- a. The nature of the hazard(s) associated with the operation or process.
- b. The nature of the work operation or process.
- c. The physical and chemical properties and additive effects of the air contaminant(s) (additional general considerations are sorbent efficiencies, odor warning properties, irritation potential, and lower flammability limit).
- d. The adverse health effects of the air contaminant(s).
- e. Warning properties of the hazardous air contaminant(s).

- f. The relevant occupational exposure limits.
- g. The measured concentration(s) of hazardous air contaminant(s).
- h. Worker activities in the area of the operation and the potential stress of work conditions on employees wearing the respirators.
- i. The period of time respiratory protection will be worn by employees during the work shift.
- j. The physical characteristics, functional capabilities, and limitations of the respirator.
- k. The substance-specific OSHA standard.

2.3.3 Selection of appropriate respiratory protection equipment must take into account the assigned protection factor (APF) for each type of respirator as listed in [Appendix C](#) and OSHA specific substance standards. When using a combination respirator (e.g., airline respirators with an air-purifying filter), employers shall ensure that the APF is appropriate to the mode of operation in which the respirator is being used.

#### 2.3.4 Maximum Use Concentration

2.3.4.1 The employer shall select a respirator for employee use that maintains the employee's exposure to the hazardous substance, when measured outside the respirator, at or below the maximum use concentration (MUC).

2.3.4.2 Employers shall not apply MUCs to conditions that are immediately dangerous to life or health (IDLH); instead, they must use respirators listed for IDLH conditions in [29 CFR 1910.134\(d\)\(2\)\(ii\)](#).

2.3.4.3 When the calculated MUC exceeds the IDLH level for a hazardous substance, or the performance limits of the cartridge or canister, then employers shall set the maximum MUC at that lower limit.

2.3.5 For selection and use limitations of particulate respirators, consult [42 CFR Part 84](#).

2.3.6 Use of respiratory protection by employees when exposure to air contaminants are below the allowable exposure limits is permissible under the voluntary use provision of the OSHA Respirator standard ([29 CFR 1910.134](#)).

2.3.6.1 Under the voluntary use provision, employees who use respirators when their use is not required under the OSHA standard are still required to implement certain aspects of the written respiratory protection program as outlined in this KNPR. Therefore, employees are required to do the following:

- a. Pass the annual medical respirator physical.
- b. Attend annual respirator use training.

2.3.6.2 The only exception to these requirements pertains to the use of disposable paper dust masks when their use is not required. In this instance there is no requirement for medical certification, training, or fit testing. Under this exception, employers are only required to:

- a. Provide employees written information on the use of respirators (Appendix D to OSHA regulation 29 CFR [1910.134](#)). A copy of the information sheet is attached in Appendix E.
- b. Ensure the employees understand the information provided.

## **2.4 Escape-Only Respirator (Formerly Known as Breathing Escape Unit)**

2.4.1 EORs are required in work areas where:

- a. A potential exists for the rapid development of an IDLH atmosphere.
- b. There is no immediate means for the affected employees to egress the IDLH area to a safe atmosphere.

2.4.2 Requests for permanent deployments or removal of EOR will be made to the KSC RPP. The RPP shall appoint a team that will make an evaluation as to whether the above criteria are met. The evaluation team will include representatives of the following:

- a. The responsible contractor safety and health organization (i.e., the team lead responsible for coordinating the assessment representatives).
- b. Life Support.
- c. Environmental Health.
- d. The requesting organization.

2.4.3 Upon completion of the evaluation, the Chair of the KSC RPP shall prepare a written report, for concurrence by the members of the evaluation team, to include the following:

- a. Evaluation of the toxic properties of the hazardous commodities in question.
- b. Evaluation of accident scenarios in which an IDLH atmosphere could rapidly develop.
- c. Identification of operations in the affected area and the number of employees potentially exposed to the hazardous condition.
- d. Identification of the availability of rapid egress routes for affected employees to take in the event of an emergency and time required for the egress.
- e. Identification of the appropriate type(s) of National Institute for Occupational Safety and Health certified EOR for accident scenario(s), evaluated by the team, where potential exists for the rapid development of an IDLH atmosphere, and there is no immediate means to a safe atmosphere.
- f. Provision of list that details other mitigating factors, as applicable.

2.4.4 Upon distribution of the report, the Kennedy propellants and life support services contractor will provide EORs, based upon availability. The requesting organization is responsible for coordinating with the Kennedy propellants and life support services contractor for the deployment and removal of EORs.

2.4.5 It is the responsibility of the requesting organization to revise all documentation (e.g., OMI, requirements documentation, and facility drawings) needed to ensure the proper scheduling and deployment of the requested EOR. When additional EORs are required, but are not available for support from the existing life support inventory, it is the responsibility of the requesting organization to coordinate their procurement and maintenance with Spaceport Integrations and Services (SI).

## **2.5 Respirator Care and Maintenance**

Cleaning and disinfection of respirators shall be in accordance with [29 CFR 1910.134](#).

## **2.6 Breathing Air**

2.6.1 Compressed breathing air shall meet the requirements in [29 CFR 1910.134](#) paragraph (i) Breathing air quality and use.

2.6.2 The KSC IH Officer, or designated representative, shall test compressor-supplied breathing air in accordance with Table B in Appendix C.

## **2.7 Health Hazard Evaluation**

2.7.1 An initial health hazard evaluation of potentially hazardous operations shall be conducted by the KSC environmental health contractor industrial hygiene office when any information, observation, or calculation shows that an employee may be exposed to oxygen-deficient atmospheres or air contaminants above the applicable action levels. This includes the following:

- a. Data from monitoring of similar operations.
- b. Procedure reviews.
- c. Potential for skin and eye contact.
- d. Employee complaints of unusual odors, irritations, or other signs or symptoms of potential exposures.

2.7.2 The health hazard evaluation will include the following:

- a. Evaluation of the operation, process, or equipment generating the air contaminant(s).
- b. Identification of the approximate concentrations of the air contaminant(s).
- c. Consideration of other operations in the area.
- d. Quantity of potentially exposed employees.
- e. Evaluation of the duration and frequency of the exposure.
- f. Evaluation of the respiratory protection requirements, including applicable respirator filter cartridge change out schedule.
- g. Identification of any associated personal protective equipment
- h. Consideration of any regulatory requirements applicable to the operation.

2.7.3 Health hazard evaluations will be repeated annually or whenever any changes to facilities, equipment, work practices, procedures, or engineering control measures are made.

2.7.4 Employees and their representatives will be provided an opportunity to observe area and personal exposure monitoring.

2.7.5 Results of health hazard evaluations will be posted in the affected employees' work areas or otherwise provided to affected employees for their review.

## **2.8 Medical Screening and Surveillance Examinations**

2.8.1 A medical evaluation is required for any employee assigned to tasks requiring the use of respiratory protective equipment.

2.8.2 Specific requirements for medical evaluation are defined in [29 CFR 1910.134](#), Appendix C, or as otherwise directed by the OMO.

2.8.3 For employees not residing at KSC, the OMO may accept an already existing medical examination, or written opinion, from a licensed physician stating whether the employee has any detected medical condition which would place the employee's health at increased risk from respirator use, and any recommended limitations on the use of respirators.

## **2.9 Employee Training and Respirator Fit Testing**

2.9.1 Respirator training and fit-testing shall be in accordance with [29 CFR 1910.134](#).

2.9.2 Upon completion of respirator fit-testing and verification of employees' medical certifications, each employee will be issued an employee training certification card ([KSC Form 31-81NS](#)) which identifies the employee, and the manufacturer(s), model(s), size(s), expiration date, protection factor(s) of the respirator(s), and fit tester's initials for which the employee has been fit tested.



2.9.3 Qualitative and quantitative respirator fit tests shall be performed only by qualified individuals specifically trained and assigned responsibility for providing respirator fit tests.

2.9.4 Fit-test results are related to APF as follows:

- a. Half-mask, air-purifying respirators may be worn in atmospheres no greater than 10 times the established exposure limit, when the respirator user passes the qualitative fit test, or when the respirator user passes a quantitative fit-test with a minimum fit factor of greater than 100.
- b. Full-facepiece, air-purifying respirators may be worn in atmospheres no greater than 50 times the established exposure limit, when the respirator user passes a quantitative fit test with a minimum fit factor greater than 500.
- c. Powered air-purifying respirators (PAPR) and supplied-air respirators with tight-fitting facepieces require fit testing. They may be used in atmospheres no greater than allowed by the APF for that respirator (See Appendix C, Table A.)

## 2.10 Records and Documentation

2.10.1 Access to employee exposure and medical records shall be in accordance with [29 CFR 1910.1020](#) and the [Privacy Act of 1974](#), as amended (5 USC 522.a).

2.10.2 Employee exposure and medical records shall be maintained in accordance with the requirements of [29 CFR 1910.1020](#).

2.10.3 Copies of this KNPR, [29 CFR 1910.134](#), and other applicable OSHA regulations, and any appropriate records required by this KNPR shall be provided by the Industrial Hygiene Officer, upon request, to employees, former employees, representatives of employees, representatives of the United States Department of Labor, and NASA Headquarters personnel. This KNPR, and other current NASA issuances, are available electronically at the [KSC Business World](#) Web site under KSC Directives.

## APPENDIX A. DEFINITIONS

Action Level: The concentration designated in [29 CFR Part 1910](#) for a specific substance, calculated as an eight-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Assigned Protection Factor (APF): The workplace level of respiratory protection a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified in Chapter 2 of this KNPR.

Demand: A mode of operation for a Supplied Air Respirator (SAR) in which air flows into the respirator only when inspiration creates a lower pressure within the facepiece than the ambient atmospheric pressure.

Escape-Only Respirator (EOR): Respiratory devices that are designed for use only during escape from hazardous atmospheres.

Filtering Facepiece: A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

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. This is determined by the APF of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the APF specified for a respirator by the required OSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no OSHA exposure limit is available for a hazardous substance, an employer must determine an MUC on the basis of relevant available information and informed professional judgment.

Occupational Exposure Limit: The most stringent of:

- a. The permissible exposure level (PEL) for the hazardous chemical as listed in [29 CFR Part 1910, Subpart Z](#).
- b. The Threshold Limit Value (TLV) assigned by the American Conference of Governmental Industrial Hygienists in the latest edition of "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment."
- c. A NASA PEL when published as a NASA Health Standard.
- d. Where there is no PEL, TLV, or NASA standard for the chemical, an exposure level based on available published scientific information such as SDS.

Primary Organization: NASA KSC major division level organizations (SI, SA, NE...)

Resident: An employee who is employed by a federal or contractor organization that is a tenant of KSC.

Respirator: Any device worn by an individual that is intended to provide the wearer with respiratory protection against inhalation of air contaminants or oxygen deficient atmospheres.

## APPENDIX B. ACRONYMS

ANSI	American National Standards Institute
APF	assigned protection factor
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CO	carbon monoxide
EOR	Escape-Only Respirators
IDLH	immediately dangerous to life or health
IH	industrial hygiene
KDP	Kennedy Documented Procedure
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
MUC	Maximum Use Concentration
NASA	National Aeronautics and Space Administration
NPR	NASA Procedural Requirements
OMO	Occupational Medical Officer
OMRSD	Operational Maintenance Requirements and Specifications Documents
OSHA	Occupational Safety and Health Administration
PAPR	Powered air-purifying respirators
PEL	permissible exposure level
RPP	Respiratory Protection Panel
SAR	Supplied Air Respirator
SCBA	self-contained breathing apparatus
SDS	Safety Data Sheets
SI	Spaceport Integration and Services Directorate
SI-C3	Spaceport Integration and Services Propellants and Life Support Branch
SI-C4	Spaceport Integration and Services Logistics Branch
TLV	Threshold Limit Value
UG	user guide

**APPENDIX C. TABLES**

<b>Table A – Assigned Protection Factors (APF)<sup>9</sup></b>					
Type of respirator <sup>1,2</sup>	Quarter Mask	Half Mask	Full Facepiece <sup>5</sup>	Helmet/Hood	Loose-Fitting Facepiece
Air-Purifying Respirator <sup>3</sup>	5	10 <sup>4</sup>	50	–	–
PAPR	–	50	1,000	25/1,000 <sup>4</sup>	25
<b>Supplied Air Respirator (SAR) or Airline Respirator<sup>6,7</sup></b>					
Demand Mode	–	10	50	–	–
Continuous Flow Mode	–	50	1,000	25/1,000 <sup>8</sup>	25
Pressure-Demand or Other Positive-Pressure Mode	–	50	1,000	–	–
<b>Self-Contained Breathing Apparatus</b>					
Demand Mode	–	10	50	50	–
Pressure-Demand or Other Positive-Pressure Mode (e.g., open or 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 APF in Table A are only effective when the employer implements a continuing, effective respirator program including training, fit testing, maintenance, and use requirements.*
3. *Air-purifying respirators may not be used in oxygen deficient atmospheres.*
4. *This APF category includes filtering facepieces and half-masks with elastomeric facepieces.*
5. *Only full-facepiece respirators are to be used in contaminant concentrations that produce eye irritation.*
6. *Any SAR may be used in an oxygen deficient atmosphere where the oxygen content is above the oxygen deficient IDLH limits.*
7. *Only a full-facepiece pressure demand SCBA, or combination full-facepiece pressure demand SAR with auxiliary self-contained air supply, may be used in unknown IDLH or oxygen deficient IDLH atmospheres.*

8. 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 workplace factor or simulated workplace factor study or equivalent testing. Subsequently without such testing, all other PAPRs and SARs with helmets or hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

9. 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](#).

<b>Table B – Compressor Breathing Air Evaluations</b>			
COMPRESSOR TYPE	CO ALARM	HIGH TEMP ALARM	EVALUATE
OIL LUBRICATED	Yes	Yes	90 Days
	Yes	No	90 Days
	No	Yes	45 Days
	No	No	45 Days
OIL-FREE	Yes	Yes	90 Days
	Yes	No	90 Days
	No	Yes*	90 Days
	No	No	45 Days

\*Auto shutoff device installed. Historic evaluations are satisfactory.

## **APPENDIX D. REFERENCES**

- D.1 ANSI/CGA G-7.1-2004, Commodity Specification for Air.
- D.2 ANSI/CGA C-7-2004, Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers.
- D.3 ANSI Z88.2-1992, American National Standard for Respiratory Protection.
- D.4 Federal Specification BB-A-1034B, Compressed Air, Breathing.
- D.5 American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (current edition).
- D.6 National Institute for Occupational Safety and Health, Guide to Industrial Respiratory Protection.

## APPENDIX E. SUPPORTING DOCUMENTATION

### 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. 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]