



Respiratory Protection Program

Document History

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1	Dec. 2017	Replaced Respirator Policy with <i>Respiratory Protection Program</i>
2	Dec. 2018	Updated voluntary use section and made all forms fillable
3	Mar. 2019	Revised steps for enrollment
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PURPOSE

The Kansas State University (KSU) Respiratory Protection Program (RPP) outlines the institutional requirements for respiratory protection. It is intended to provide program requirements, procedures, information and guidance that is consistent with the [Occupational Safety and Health Administration \(OSHA\) standards](#) and the [Environmental Protection Agency \(EPA\) Agricultural Worker Protection Standard \(WPS\)](#). KSU administration is concerned with maintaining employee and student health and abiding by Kansas Department of Labor expectations for occupational safety. This document is established to detail the requirements and proper procedures for use of protective respiratory equipment as deemed necessary to minimize exposure to airborne concentrations of hazardous substances and infectious agents and help ensure the safety of individuals enrolled in the RPP. OSHA regulation [29 CFR 1910.134](#), hereby referred to as the *Respiratory Protection Standard*, informs this document as a standard of care.

SCOPE

This document applies to all KSU employees, faculty, researchers, student workers and volunteers or interns that perform tasks requiring the use of respiratory protection at university facilities or other locations during the execution of KSU work activities. Persons using respiratory protection in the execution of their KSU job duties are **required to be enrolled** in this program through the KSU Department of Environmental Health and Safety (EHS).

This program does not apply to contractors or visitors not performing KSU work or research. Contractors are responsible for providing their own respiratory protection program, training and respiratory protective equipment. Visiting researchers may be provided with loose fitting respiratory protection by KSU for temporary use. In such events, these individuals must provide documentation that they are covered under their primary employer’s program and have medical approval to wear respiratory protection.

Individuals who *voluntarily* wear a tight-fitting, negative pressure respirator when a *respirator is not required* are still subject to partial participation in the RPP. EHS determines that voluntary use will not in itself create a hazard, the employee is still subject to the medical evaluation and cleaning, maintenance and storage elements of this program and the supervisor must provide the employee with the written information provided in [Voluntary Use of Respirator \(Appendix D\)](#). The voluntary use of respirators that have a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium (e.g. N95, N100, P100) does not require participation in the RPP; however, the employee must be provided with the information in [Appendix D](#).

POLICY STATEMENT

It is the policy of KSU to provide respiratory protection to prevent hazardous exposures when:

- a. elimination or substitution of substances presenting a respiratory hazard is not feasible; or,
- b. engineering controls fail to adequately eliminate or reduce employee exposure to respiratory hazards;
- c. administrative changes or modifications in hazardous operations fail to reduce exposures to below regulated or acceptable levels; and
- d. during interim periods when engineering controls are being implemented and no other means of worker protection is available.

The expense associated with training, medical evaluations and respiratory protection equipment is borne by the institution, department, or program employing the individual worker (depending on the nature of the funding arrangement).



PROCEDURES FOR RPP ENROLLMENT

Individuals must complete the steps below to enroll in the KSU RPP, which includes components of the *Respiratory Protection Standard* such as hazard evaluation, medical clearance, annual training and fit testing. **A [hazard evaluation](#) must be completed for any activity requiring respiratory protection and each department/program must develop a [worksite-specific respiratory protection plan](#).**

Initial Enrollment:

1. Identify and evaluate worksite hazards. If EHS does not have a hazard evaluation on file, then complete the [Respiratory Hazard Evaluation Form \(Appendix A\)](#) or use other reasonable methods that collect the indicated information and submit it to EHS to determine the need for an exposure risk assessment and the type of respiratory protection and cartridge appropriate for the work.
2. Create a [Worksite-Specific Respiratory Protection Plan \(Appendix F\)](#), in coordination with EHS, for use in conjunction with the RPP for operations that present health and safety hazards requiring the use of a respirator.
3. The [Initial Respirator Clearance and Enrollment Form \(Appendix B\)](#) is filled out by the employee and/or their supervisor. Part B of this form is filled out and signed by the physician or licensed health care provider (PLHCP) to indicate that the employee has been medically cleared to use a respirator under the conditions stipulated in the form. The completed form is returned to EHS.
4. The [Respirator Medical Evaluation Questionnaire \(Appendix C\)](#) is filled out by the employee and is reviewed only by the PLHCP. This questionnaire is kept by the medical provider. Responses to the questionnaire should not be provided to the supervisor or maintained in a personnel file (use a copy of the Initial Respirator Clearance form as documentation of medical approval). Medical evaluation is conducted upon initial enrollment to the program. A follow up medical evaluation is only needed if medical conditions change or there are significant changes to work activities and respiratory protection needs.
5. The respirator user completes respiratory protection training online through Vivid Learning Systems. Instructions for accessing and utilizing Vivid are provided in [Appendix G](#).
6. An EHS representative will contact the employee to schedule a respirator fit test after receiving the PLHCP-signed Initial Respiratory Clearance and Enrollment Form and upon confirmation of training completion. If a fit test is completed by another authorized provider (confirm acceptable vendors by contacting EHS), certification of the fit test must be provided to EHS along with the PLHCP-signed Initial Respiratory Clearance and Enrollment Form. Respirator users must be fit tested to the same make/model respirator(s) they will use at the worksite.

Annual Requirements:

1. Existing users that have already enrolled in the RPP must fill out the [Annual Respiratory Protection Clearance Form \(Appendix E\)](#).
2. Respirator users will be notified via email when their annual requirements (fit testing and training) are due. They must complete the online training through Vivid and submit the [Annual Respiratory Protection Clearance Form \(Appendix E\)](#) to respirator@ksu.edu. KSU EHS then contacts individuals to schedule their annual fit test. Those obtaining fit testing or training outside of KSU EHS must ensure the programs are approved by EHS and forward documentation annually to EHS.

RESPONSIBILITIES

Program Administrator

EHS shall serve as the Program Administrator and is responsible for developing, implementing and administering the overall RPP for KSU. The RPP Program Administrator will assist with implementing the following:

- a. Assisting departments in identifying and assessing respiratory hazards in the workplace. Recommending



- engineering and administrative methods to control those hazards. Providing assistance with generating a [Worksite-Specific Respiratory Protection Plan \(Appendix F\)](#) for use in conjunction with the RPP.
- b. Conducting exposure risk assessments and personnel exposure monitoring of airborne respiratory hazards as needed.
 - c. Assisting departments in selecting respirators, filtering media, and related equipment appropriate to needs and exposure hazards of employees.
 - d. Providing guidance and assisting respirator users with obtaining respirator medical clearances.
 - e. Providing training in the proper use and maintenance of respiratory protection. Ensuring compliance to respiratory protection training requirements.
 - f. Offering respirator fit testing services.
 - g. Maintaining records of respirator medical clearances received, respirator training and fit test results. Maintaining records and reports of contaminant air monitoring and copies of [Worksite-Specific Respiratory Protection Plans \(Appendix F\)](#).
 - h. Reviewing and updating the RPP to meet current standards of care and regulatory requirements.

Supervisors/Principal Investigators (PIs)

It is the responsibility of supervisors/PIs for each Organizational Unit/Academic Department to identify specific applications which may require the use of respirators. Supervisors/PIs in charge of research projects or other activities requiring the use of respiratory protection equipment are responsible for implementing and overseeing the RPP in their particular areas. In addition to being knowledgeable about the program requirements, supervisors/PIs must also ensure that the program is understood and followed by the employees under their charge.

Supervisors/PIs, in consultation with EHS, are responsible for:

- a. Identifying and evaluating worksite hazards for employees under their charge, notifying EHS of those hazards that may require respirator use. A [hazard evaluation](#) must be completed for any activity requiring respiratory protection. This can be done by completing the [Respiratory Hazard Evaluation Form \(Appendix A\)](#) or using other reasonable methods that collect the indicated information and submitting it to EHS to determine the needs of an exposure risk assessment.
- b. Developing a [worksite-specific respiratory protection plan](#), in coordination with EHS, for use in conjunction with the RPP for operations that present health and safety hazards requiring the use of a respirator.
- c. Ensuring those employees under their supervision who require respiratory protection equipment are in compliance with hazard assessment, enrollment, medical evaluation, training requirements and fit testing.
- d. Providing employees with respiratory protection per EHS recommendations, and the supplies and facilities necessary to properly clean, maintain and store the respiratory protection equipment.
- e. Ensuring that respirators fit well and do not cause discomfort. If an employee wears corrective glasses or goggles or other personal protective equipment (PPE), ensuring that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.
- f. Periodically checking and enforcing the proper use of respiratory protection when necessary. Continually ensuring that respirators are properly cleaned, maintained, inspected and stored according to the RPP.
- g. Being aware of tasks requiring the use of respiratory protection.
- h. Continually monitoring work areas and operations to identify respiratory hazards. Notifying EHS if additional respiratory hazards are identified and reporting any changes in existing operations in the workplace conditions (workload, protective clothing or temperature) that may result in substantial increase in physiological burden placed on an employee or impact the adequacy of the currently assigned respiratory protection.
- i. Informing EHS if voluntary use of respiratory protection is desired for employees under their supervision and ensuring that employees who voluntarily wear a respirator have signed and understand [Voluntary Use of Respirator \(Appendix D\)](#). Submitting signed copy of voluntary use form to EHS.



Respirator Users/Employees

Use of respiratory protection at KSU requires enrollment into the KSU RPP. Prior to enrollment into the KSU RPP, employees should work with their supervisor to complete a [hazard evaluation](#) and notify EHS of those hazards that may require respirator use. Enrollment (or registration) occurs following successful completion and submission of the [Initial Respirator Clearance and Enrollment Form \(Appendix B\)](#) (or equivalent approved documentation) to EHS. Employees may not use a respirator until they have been enrolled, medically approved to wear respiratory protection, trained, and fit tested as defined in this RPP.

Employees shall remain informed of potential respiratory health hazards and the respiratory protective requirements for their work areas. Respirator users are responsible for following the requirements of the RPP, including:

- a. Wearing respiratory equipment when and where required, in the manner in which they were trained. Using only the make, model and size of respirators for which they have been medically cleared and fitted to wear.
- b. Participating in required medical evaluations and completing the [Respirator Medical Evaluation Questionnaire \(Appendix C\)](#). Scheduling and attending applicable follow-up medical examinations. Annually renewing medical clearance by completing the [Annual Respiratory Protection Clearance Form \(Appendix E\)](#), Respiratory Protection training and fit testing.
- c. Inspecting respirator prior to each use and conducting user seal checks every time respirator is donned (put on). Report any deficiencies or malfunctions of a respirator to supervisor. Do not use defective respiratory protection equipment.
- d. Cleaning and disinfecting respirators as instructed and storing them in a clean, sanitary and accessible work area to guard against damage to respirator equipment. Ensuring respirators are not disassembled, modified, or otherwise altered in any way other than by the changing of respirator cartridges or filters.
- e. Notifying their supervisor or EHS if prescription glasses inserts are required for use with full-face respiratory protection.
- f. Reporting physiological changes (e.g. facial scarring, dental changes, cosmetic surgery, or change in body weight) or any medical problems or other changes that could affect the respirator fit or ability to safely wear a respirator to supervisor or EHS. Notifying their supervisor or EHS when the assigned respirator no longer fits well.
- g. When required to use tight-fitting respirators, removing facial hair to ensure a proper seal between the face and respirator and proper valve function.
- h. Reporting any existing or planned operations that may present a respiratory hazard to their supervisor/PI to initiate a respiratory hazard assessment if one has not been completed.
- i. Informing their supervisor or EHS of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the RPP.

PROGRAM ELEMENTS

Elements of the RPP include (1) Selection of Respirators; (2) Medical Evaluations; (3) Training; (4) Fit Testing; (5) Respirator Use; and (6) Maintenance and Care. Furthermore, supervisors/PIs must develop procedures that are specific to the worksite and the particular job task or research.

Enrollment in the KSU RPP is required for employees using respiratory protection in the execution of their KSU job duties. Respirators, training, and medical evaluations are provided at no cost to employees who are required to wear a respirator for protection from respiratory hazards at their worksite.

Respirator Selection

EHS will assist departments in selecting respirators, filtering media, and related equipment appropriate to the needs and exposure hazards of employees.



Proper selection of respirators shall be made according to the OSHA requirements set forth in the *Respiratory Protection Standard*. Respirators are selected as appropriate based on the assigned protection factor (APF) and calculated maximum use concentration (MUC). (See [Appendix H](#)). There are substance-specific standards that require additional criteria for respirator selection (e.g., 29 CFR 1910.1001(g) Asbestos). All such requirements of each applicable OSHA standard must be observed.

Chemical and physical properties of the contaminant, the toxicity and concentration of the hazardous material, and the amount of oxygen present will be considered in selecting the proper respirator. The nature and extent of the hazard, work activity and rate, environment, length of exposure time, work requirements and conditions, as well as the limitations and characteristics of the available respirators, are all selection factors that must be considered.

When **respirator use is required**, supervisors/Pis must provide employees with respiratory equipment following their medical evaluation and training, at no cost to the employee. All respirators worn by KSU employees [must be certified by the National Institute for Occupational Safety and Health \(NIOSH\)](#) and used in compliance with the conditions of certification.

Choosing the correct respiratory protection equipment involves several steps:

- a. Determination of the hazard;
- b. Choosing equipment that is certified for the hazard; and
- c. Assuring the device is performing as it is intended to do.

1.1.1 Respiratory Hazard Assessment

Supervisors/Pis must conduct a hazard evaluation for each operation, process, or work area under their charge where airborne contaminants may be present to identify the respiratory hazards to which their employees are exposed in operations or during an emergency and notify EHS of potential respiratory hazards. This can be done by completing the [Respiratory Hazard Evaluation Form \(Appendix A\)](#) or using other reasonable methods that collect the indicated information and submitting it to EHS. This form, once submitted to EHS, serves as a request for an evaluation of potential worksite exposure conditions. EHS will conduct exposure risk assessments and personnel exposure monitoring of airborne respiratory hazards as needed.

Employees who believe that respiratory protection is needed during a particular activity should contact their supervisor/PI or EHS for assessment.

Employees must report any existing or planned operations that may present a respiratory hazard to their supervisor/PI to initiate a respiratory hazard assessment if one has not been completed. Examples of operations that may require respiratory protection include, but are not limited to:

- a. activities that generate fumes or dusts such as welding, metals cutting, woodworking and farming
- b. safety data sheet or chemical label requires the use of a respirator
- c. work in areas where contaminant levels may become unsafe without warning, such as emergency response
- d. painting with oil-based paints or epoxies
- e. pesticide application or fumigation
- f. chemical usage without adequate ventilation or other engineering controls
- g. laboratory operations that may generate uncontained hazardous bioaerosols, gases or vapors
- h. animal handling
- i. asbestos removal
- j. concrete cutting
- k. sanding or grinding of lead-based paint
- l. clinical or healthcare operations where exposure to airborne infectious pathogens is suspected
- m. work with BSL3 agents

This list is not exhaustive. Supervisors/Pis and employees should consult with EHS if they have any questions about particular operations. Often the hazard may be adequately controlled through engineering or administrative practices.



Supervisors/PIs are required to have respirator selection criteria reassessed whenever circumstances change that may compel use of different levels of respiratory protection or if the work environment places increased physical demands upon the employee.

Identification and assessment of respiratory hazards may be done using the [Respiratory Hazard Evaluation Form \(Appendix A\)](#) or other reasonable methods that collect the indicated information. The assessment shall include:

- a. Identification of the hazardous substances used in the workplace, department, or work process and review of work processes to determine where potential exposures to these hazardous substances may occur.
- b. If applicable, exposure monitoring to quantify potential hazardous exposures. Where air sampling is needed, measurements will be made with calibrated equipment operated by trained personnel. These personnel may be members of EHS staff or EHS designees. Monitoring will be repeated as indicated by regulatory limits, or when changes occur which could render respiratory protective equipment inadequate.

1.1.2 Types of Respirators

There are two basic types of respirators 1) air-purifying respirators and 2) atmosphere-supplying respirators. A summary of the types of respirators is provided below. Additional information on the specific types of respirators, operating procedures and limitations of the respiratory equipment is provided in [Appendix I](#).

Air-purifying respirators (APRs) use filters, cartridges, or canisters to remove contaminants from the air the worker breathes. APRs can be used when it is necessary to remove particulates and/or vapor and gas contaminants from the air and their concentration is within the MUC. These respirators do not supply oxygen and therefore cannot be used in an atmosphere that is oxygen-deficient (<19.5%) or in atmospheres that are immediately dangerous to life or health (IDLH). The appropriate respirator for a particular situation will depend on the environmental contaminant(s).

- **Powered Air Purifying Respirators (PAPR)** function like other APRs in that they use filters, canisters or cartridges to remove contaminants from the air. Their difference lies in the belt-mounted, battery-operated blower that delivers a supply of purified air to the facepiece. PAPRs can be used with either a tight-fitting facepiece or a loose-fitting hood/helmet. A [PAPR User Fact Sheet](#) is provided in [Appendix J](#).

Atmosphere-Supplying Respirators provide breathing air from an uncontaminated source independent of the ambient atmosphere and are generally used in highly hazardous work environments. It is critical that such respirator systems provide breathing air of optimal quality and that the equipment operates reliably. The two types of such equipment are:

- **Self-contained breathing apparatus (SCBA)** units. They use a tight-fitting, elastomeric facepiece that covers the user's face and must be fit tested. The air is supplied from a cylinder of compressed breathing air that is designed to be carried by the equipment user. As its name implies, this respirator is truly self-contained. These respirators provide the highest level of respiratory protection.
- **Supplied-air or airline respirators (SAR)** supply clean breathing air to either a hood or a facepiece through a long hose, from a source of clean air such as a cylinder or compressor. If the facepiece is tight-fitting, it must be fit tested.

1.1.3 Required Respiratory Protection

Respirators are required in any situation where the potential for exposure to an airborne contaminant exceeds occupational exposure limits or a hazard assessment determines one to be necessary. Safety Data Sheets (SDS) or other credible information sources shall be used to ensure compliance. In the absence of an OSHA permissible exposure limit (PEL), commonly accepted guidelines such as the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) and the NIOSH Recommended Exposure Limits (RELs) will be referenced to evaluate potential airborne exposures from a particular operation or occupational environment.

Respiratory protection is required for individuals in the following situations:

- a. Working in areas known to have contaminant levels requiring the use of respiratory protection or in which contaminant levels requiring the use of respiratory protection may be created without warning (e.g.,



emergency purposes such as hazardous material spill responses).

- b. When the working atmosphere is or may be oxygen deficient and the engineering controls and work practices are not able to eliminate the hazard (e.g. confined spaces such as tanks, boilers, vaults, crawl spaces and storm drains).
- c. EHS has identified that respiratory protection is required based on sampling or other risk assessment. This determination will be made on a case-by-case basis.

1.1.3.1 Respirators for IDLH Atmospheres

If contaminants cannot be determined, or if the exposure level cannot be identified or reasonably estimated, or if no exposure limit or guidance is available and estimates of the toxicity cannot be made, the atmosphere shall be considered IDLH and requires the highest level of respiratory protection and reliability. All oxygen-deficient atmospheres (less than 19.5% oxygen by volume) are considered IDLH.

Contact EHS if there is a known or suspected IDLH atmosphere that needs to be entered. Rescue services must be onsite for entry into IDLH atmospheres.

The following respirator types are approved for use in IDLH atmospheres:

- a. Full facepiece pressure demand SCBA that is certified by NIOSH for a minimum service life of 30 minutes.
- b. Combination full facepiece pressure-demand SAR with auxiliary self-contained air supply.
- c. Respirators used for escape only from IDLH atmospheres must be NIOSH-certified for escape from the atmosphere in which they will be used.

The following procedures apply to all IDLH atmospheres:

- a. At least one employee will be located outside the IDLH atmosphere with a line of communication in case of emergency. These employees will be trained and equipped to provide emergency rescue, if needed.
- b. Visual, voice, or signal line communication will be maintained between employees inside and outside of the IDLH atmosphere.
- c. Supervisors shall be notified if emergency rescue is needed, following contact with emergency services.
- d. Employees outside the IDLH atmosphere will be equipped with the following:
 - Pressure demand or other positive pressure SCBA or supplied air respirator with auxiliary SCBA.
 - Appropriate retrieval and/or rescue equipment for removing the employee(s) who enter IDLH atmospheres.

1.1.3.2 Respirators for Non-IDLH Atmospheres

The respirators selected for non-IDLH atmospheres shall be adequate to protect the health of the employee and ensure compliance with OSHA requirements pertaining to respiratory protection under routine and reasonably foreseeable emergency situations. Respirators selected shall be appropriate for the chemical state and physical form of the contaminant(s) present.

For protection against **gases and vapors**, the respirator selected shall be:

- a. an atmosphere-supplying respirator, or
- b. an air-purifying respirator, provided it is equipped with a cartridge/canister appropriate for hazards and conditions. Cartridge/canister must be equipped with an **end-of-service-life indicator (ESLI)** a **change schedule** must be developed, with assistance from EHS, to ensure the cartridge/canisters are changed before the end of their service life. See [Respirator Filters/Cartridges and Change Schedule](#).

For protection against **particulates** use, the respirator selected shall be:

- a. an atmosphere-supplying respirator; or
- b. an air-purifying respirator equipped with high efficiency particulate air (HEPA) filters; or
- c. an air-purifying respirator equipped with any filter certified for particulates by NIOSH for contaminants consisting primarily of particles with mass median aerodynamic diameters of at least 2 micrometers.



1.1.4 Voluntary Respirator Use

Employees who voluntarily use respiratory protective equipment are covered in this program; however, voluntary use has different program requirements than required use. "Voluntary use" is only permitted if there are no airborne hazards at concentrations *requiring* the use of a respirator. Employees may request to wear a respirator when it is not required as an extra precaution or for comfort and protection against nuisance dust or odors. Voluntary use must be approved and is permitted only if the respirator use will not interfere with an employee's ability to work safely or create a new health hazard.

The decision to allow voluntarily use of respiratory protection is made by the department in consultation with EHS. Situations that may warrant voluntary use of respiratory protection might include:

- a. Avoid exposure to airborne contaminants that are below limits established by OSHA or KSU.
- b. Avoid nuisance dust or odors.
- c. Work in patient clinics (as a voluntary precaution when not required by procedure or policy).
- d. Work with animals.
- e. Work around potential allergens (e.g., sensitized individuals).

A hazard evaluation must be performed prior to voluntary use of a respirator to determine if use is voluntary or required. Where no recognized respiratory hazards exist, respirators may be used on a voluntary basis under the following requirements, based on the type of respirator:

Voluntary use of a filtering facepiece respirators. There are very limited requirements when it comes to allowing employees to wear filtering facepiece respirators voluntarily:

1. Determine that the respirator use will not in itself pose a hazard to employee; and
2. Provide the respirator user with the information found in [Voluntary Use of Respirator \(Appendix D\)](#) on a one-time basis. This appendix provides important information the employee needs to know about wearing filtering facepiece respirators. Supervisors should maintain a signed copy for their records and must send a copy to EHS.

Voluntary use of filtering facepiece respirators does not require any medical evaluation or fit test.

Voluntary use of respirators other than filtering facepiece. These types of respirators, such as tight-fitting negative-pressure respirators, place a much greater physiological burden on employees, so there are more requirements when allowing their use even on a voluntary basis:

1. Determine that the respirator use will not in itself create a hazard,
2. Provide the respirator users with the information contained in [Voluntary Use of Respirator \(Appendix D\)](#). Supervisors should maintain a signed copy for their records and must send a copy to EHS,
3. Respirator user must be medically qualified to wear respirator (see [Medical Evaluations](#) section), and
4. Respirators must be properly cleaned, stored, and maintained so their use does not present a health hazard to the user (see [Maintenance and Care](#) section).

Implementing the above aspects of the RPP for voluntary use will ensure that the respirator is used properly and does not create a hazard to the user. If these provisions are not implemented, potential hazards or problems could result:

- a. An employee's health could be jeopardized due to an undetected medical condition (e.g., asthma, heart condition).
- b. A dirty respirator could cause dermatitis.
- c. A dirty or poorly disinfected respirator could cause an ingestion hazard.

Either the Supervisor/PI or the employee can provide the respirator for voluntary use. The department is not required to pay for the voluntary-use respirators, but the department does have to pay for any expenses related to providing the



[Voluntary Use of Respirator \(Appendix D\)](#) information, as well as any necessary medical evaluations and respirator cleaning equipment.

Unlike for required respirator use, employees are not prohibited from having facial hair when they use a tight-fitting respirator voluntarily because the air is safe to breathe. However, this is discouraged and respirator users are advised to follow sound industrial hygiene practices, as well as the manufacturer's instructions, even for voluntary use.

1.1.5 Respirator Filters/Cartridges and Change Schedule

There are many types of filters, cartridges and canisters used on air purifying respirators. The type of filter, cartridge or combination selected will depend on the nature and concentration of contaminants present. Cartridges are color coded based on the type of contaminant(s) for which they offer protection. A table of cartridge color code information is provided in [Appendix K](#).

A filter is a component used in respirators to remove solids or liquid aerosols (e.g., particulates) from inhaled air. When protection against airborne particulates is needed, OSHA requires either a HEPA filter, certified under 30 CFR Part 11, or a filter that has been certified under 42 CFR Part 84. Service life determination for particulate filters is not required under the *Respiratory Protection Standard*; it is only required for gases and vapors.

Employees wearing filtering facepiece respirators or APRs with particulate filters for protection against *dust* and other *particulates* should change the respirator or filter cartridges on their respirators if they become damaged, soiled, or an increase in breathing resistance becomes noticeable. In addition to these considerations, N series filters should not be used against oily aerosols, R series filters should be changed every 8 hours if used against oily aerosols; and P series filters used in environments containing oily aerosols should be limited to 40 hours of use or 30 days, whichever is first.

For APRs that protect against gases and vapors, a system must be in effect that will reliably warn respirator wearers of contaminant breakthrough. These systems include an ESLI or an established and enforced cartridge or canister change schedule. An ESLI is a component of the cartridge that indicates, typically by changing colors, when the cartridge needs to be replaced.

1.1.5.1 Change Schedule

The useful service life of a filter, cartridge or canister is defined by how long it provides respirator users with adequate protection from harmful chemicals in the air. The service life of a cartridge depends on many factors, including:

- a. the contaminants the respirator is used for and the concentration of contaminants in the air,
- b. how many hours the cartridge is used each day and the frequency of use (i.e., is the respirator used continuously or intermittently throughout the work shift),
- c. environmental conditions (e.g., temperature, humidity) and air flow through the cartridge or canister,
- d. the employees' level of exertion affecting breathing rate,
- e. cartridge capacity, and
- f. the presence of other potentially interfering chemicals.

The purpose of a change schedule is to establish the time period for replacing respirator filters, cartridges and canisters; this is critical to preventing contaminants from respirator breakthrough and thereby over-exposing workers. A few cartridge/canisters for APRs are equipped with an ESLI, a system that warns the respirator user of the end of adequate respiratory protection. The indicator is usually a sorbent material that changes color when the cartridge approaches saturation or is no longer effective. For all other cartridges and canisters without an ESLI, change out schedules will be developed to ensure that canisters and cartridges are changed before the end of their service life.

EHS will develop change-out schedules based on available data and information that can be relied upon to ensure that cartridges are changed before the end of their useful service life. Such information includes, but is not limited to, exposure assessment and information based on breakthrough test data, calculation tools for establishing end of use schedules and/or mathematically based estimates, reliable use recommendations from the respirator and cartridge/canister manufacturers and/or chemical suppliers. Supervisors/PIs must include the specific



cartridges/canisters change out schedules for all respirators used within the department/program in their [Worksite-Specific Respiratory Protection Plan](#).

The cartridge change-out schedule for some chemicals is established by regulatory requirements. Those chemicals with substance-specific standards under OSHA, and their corresponding cartridge change-out schedule, are as follows:

- a. Acrylonitrile - 1910.1045(h)(2)(ii): end-of-service life or end of shift (whichever occurs first).
- b. Benzene - 1910.1028(g)(2)(ii): end-of-service life or beginning of each shift (whichever occurs first).
- c. 1,3-Butadiene - 1910.1051(h)(2)(ii): every 1-4 hours depending on the concentration (refer to Table 1 provided in the standard); and at beginning of each shift.
- d. Vinyl chloride - 1910.1017(g)(3)(ii): end-of-service life or end of shift in which they are first used (whichever occurs first).
- e. Methylene chloride - 1910.1052(g)(2)(ii): canisters may only be used for emergency escape and must be replaced after use.

Furthermore, when the following conditions apply, the cartridges/canisters will be changed as indicated:

- a. Gas and vapor cartridges or canisters used for non-routine, highly infrequent, and emergency situations will be changed prior to each use.
- b. Once opened, maximum use time is 6 months (even if not used). The carbon will absorb contaminants from the general environment.
- c. Where contaminant migration is possible, respirator cartridges/canisters should be changed after every shift where exposure occurs.
- d. For organic vapors with a boiling point less than 65°C, it is recommended that the organic vapor cartridge never be used longer than one shift even if the estimated service life is greater than 8 hours and the cartridge is used for only a short time during the shift.
- e. Whenever a cartridge has become saturated or a contaminant has broken through the cartridge, the respirator must be taken out of service so that the cartridge can be replaced.

As an alternative, OSHA published a guide for estimating times for organic vapor cartridge change-outs. It states the following:

- a. If a chemical's boiling point is greater than 70°C and the concentration is less than 200 parts per million (ppm), an 8-hour service life at a normal working rate can be expected.
- b. Service life is inversely proportional to work rate. (This means that as the work rate increases or if it is already high, the length of time the cartridge will remain effective will be less than when work rates and, consequently, breathing rates are lower.)
- c. Reducing concentrations by a factor of 10 will increase service life by a factor of five.
- d. Humidity above 85% will reduce service life by 50%.

Change out schedules are not the same from one manufacturer's cartridges or canisters to that of another manufacturer. This is because the volume and type of adsorbent varies between manufacturers.

Reliance on odor thresholds and other warning properties will not be permitted as the primary basis for determining the service life of gas and vapor cartridges and canisters. Only employees *voluntarily* wearing APRs with organic vapor cartridges may change the cartridges on their respirators based on breakthrough (i.e., based on detecting the presence of odor or irritation). All others must follow the prescribed change-out schedule for chemical cartridges/canisters.

Medical Evaluations

Employees who are either required to wear respirators (including filtering facepieces), or who choose to wear an APR voluntarily, must pass a medical evaluation before being permitted to wear a respirator on the job. *Voluntary use of filtering facepieces do not require a medical evaluation.* Employees are not permitted to wear respirators until a physician or other licensed health care professional (PLHCP) has determined that they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respiratory protection.



Medical evaluation procedures are as follows:

- a. The medical evaluation is conducted using the [Respirator Medical Evaluation Questionnaire \(Appendix C\)](#).
- b. The employee completes the questionnaire and the PLHCP assesses the information to determine fitness for respirator use. The employee may or may not be required to visit the PLHCP in person.
- c. The PLHCP will be provided a copy of the [Initial Respirator Clearance and Enrollment Form \(Appendix B\)](#).

This form provides a list of hazardous substances to which the employee may be exposed, proposed respirator type, length of time required to wear respirator, expected physical work load (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing.

Part B of this form is filled out and signed by the PLHCP to indicate that the employee has been medically cleared to use a respirator under the conditions stipulated in the form.

- a. The medical evaluation and completion of the medical questionnaire and enrollment form will be completed during normal working hours, or at a time and place that is convenient to the employee prior to fit testing.
- b. Follow-up medical exams maybe granted to employees as deemed necessary by the PLHCP.
- c. All employees will be granted the opportunity to speak with the physician about their medical evaluation, if they so request.

After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations will be provided under the following circumstances:

- a. Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
- b. The PLHCP or supervisor informs EHS that the employee needs to be reevaluated;
- c. Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;
- d. A change occurs in workplace conditions that may result in an increased physiological burden on the employee.
- e. Employees exhibiting signs and symptoms of exposure will also be referred for medical evaluation (in addition to further worksite hazard assessment and/or exposure monitoring)

A list of employees currently included in the respirator medical surveillance is maintained by EHS. All examination and questionnaires are to remain confidential between the respirator user and the physician. Only medical clearance forms may be kept as documentation of medical approvals for respirator use.

Training

Annual respiratory protection training is mandatory for all employees at KSU who wear a respirator for protection against hazardous air contaminants. The purpose of training is to inform respirator users of the importance and limitations of respiratory protection and educate them on the different types of respirators and how to properly maintain and use them. Respirator users will be assessed on their comprehension of key program elements through a physical demonstration of the use of the respirator and successful completion of a training quiz.

The annual training covers all elements outlined in the *respiratory protection standard* including, but not be limited to:

- a. Types of respiratory hazards;
- b. Classes of respirators and their limitations;
- c. General rules for respiratory protection;
- d. Positive and negative pressure seal checks;
- e. Fit testing of respirators; and
- f. Cleaning, maintaining and storage of respirators.

Online Respiratory Protection training is available through EHS (via Vivid Learning Systems). Contact EHS to request access to online training. *The online training materials can be accessed any time throughout the year (in the event an*



individual needs a refresher mid-year before donning a respirator. If users cannot access training online, hard copies of tests are available and other training may be coordinated through EHS. Instructions for accessing the online training can be found in [Appendix G](#). Training must be completed prior to fit testing.

Colleges and departments that want to use alternate training, must have the training program evaluated and approved by KSU EHS. Documentation of training completion must be sent with RPP enrollment forms to KSU EHS.

Annual Refresher Training. Respiratory protection training must be conducted annually. Refresher training must be completed within 12 months of the initial or previous training. If conditions of respirator use or respirator type change, employees must be provided with timely training on the proper use and care of new equipment and instructed on new workplace risks. In this event, training and/or instructional sessions may be required prior to the 12 month training anniversary. Circumstances requiring retraining include: changes in the type of respirator assigned to the employee that render previous training obsolete; when the employee has not retained the requisite understanding or skill to use the respirator properly; or any other situation in which retraining appears necessary to ensure safe respirator use.

Those **voluntarily using filtering facepiece respirators** (e.g., N95, disposable respirator) are exempt from annual training. They must however, be given a copy of [Voluntary Use of Respirator \(Appendix D\)](#). Supervisors must maintain a signed copy, ensuring the employee reads and understands the information contained in the document. A copy of the signed document must be submitted to EHS.

Fit Testing

EHS will provide a sufficient number of respirator sizes and models for employees to try during fit testing to identify the acceptable respirator that correctly fits the users.

A fit test is a test protocol conducted to verify that a respirator comfortably fits and adequately protects the user. Fit testing is required at least annually for all tight-fitting facepiece respirators and filtering facepiece respirators (when use is required) and shall only be provided to individuals deemed medically able to wear respiratory protection and who have completed annual respiratory protection training.

Fit testing must be performed:

- a. using the same make, model, style, and size of respirator that will be used,
- b. prior to initial use in the work environment,
- c. whenever a different respirator facepiece is used,
- d. when there are changes in the respirator user's physical condition that could affect respirator fit (e.g., obvious change in body weight, facial scarring, dental changes, cosmetic surgery, etc.), and
- e. at least annually thereafter.

The fit test shall be administered using the OSHA accepted Quantitative Fit Test (QNFT) or Qualitative Fit Test (QLFT) protocols (see [Appendix L](#)). Fit testing uses a test agent, either qualitatively detected by the wearer's sense of taste, smell, or involuntary cough (irritant smoke) or quantitatively measured by an instrument, to verify the respirator's fit. Individuals must be clean shaven for the fit test procedure and during use of tight fitting respirators. Some styles and/or amount of facial hair may be acceptable, but must be verified by a fit test procedure and appropriately administered subsequent user seal checks.

1.1.6 Quantitative Fit Testing Procedure

This procedure is the primary method used by KSU EHS for evaluating the seal between the individual's face and the respirators. The QNFT measures the amount of leakage into the respirator by using an aerosol as a test agent. An instrument measures respirator fit by comparing the aerosol concentration outside a respirator to the aerosol concentration inside the respirator. The ratio of the outside aerosol concentration to that of the concentration inside the respirator determines the respirator fit factor. Half-face respirators must achieve a minimum fit factor of 100, and a minimum fit factor of 500 is required for full-face respirators. The fit factor must exceed the APF by at least ten times in order for the fit to be deemed adequate. After completion of training and fit testing requirements, respirator users receive a copy of the TSI Fit Test Results.



1.1.7 Qualitative Fit Testing Procedure

The QLFT requires the introduction of an aerosol test agent (i.e., saccharin, irritant smoke or Bitex™) into the area surrounding the head of negative pressure air-purifying respirator users. If the respirator user detects the presence of the test agent (i.e., odor, taste or irritation), the respirator fit is deemed inadequate. If the user detects no odor, taste, or irritation, the respirator fit is acceptable. QLFT will be performed on an as-needed basis if QNFT cannot be performed and may only be used to fit test negative-pressure APRs that must achieve a fit factor of 100 or less.

Individuals fit test using QLFT methods involving odor or taste, must not smoke, eat, chew gum, or drink anything other than water at least 30 minutes prior to fit testing.

Use of Respirators

Procedures for the proper use of respirators in both routine jobs and emergencies must be established and implemented. Specific procedures are required to:

- a. Prevent leaks in the respirator facepiece seal.
- b. Prevent employees from removing respirators in hazardous environments.
- c. Avoid changing conditions that can render respiratory protection inadequate (e.g., increased airborne contaminate concentration)
- d. Ensure that respirators operate effectively throughout the work shift.
- e. Protect employees entering IDLH atmospheres.

Tight-fitting respirators shall not be worn by employees who have facial hair as previously defined or any condition that interferes with the face-to-facepiece seal or valve function.

Additional personal protective equipment (PPE) shall be worn in such a manner that does not interfere with the seal of the facepiece to the face of the user.

Procedures for respirator use in IDLH atmospheres are stated under [Respirators for IDLH Atmospheres](#).

1.1.8 User Seal Check

Respirator users must conduct a user seal check **every time** a tight-fitting respirator is donned (put on) or adjusted to ensure that the respirator is seated properly on the face with no noticeable leaks. The user seal check procedure conducted must be either the positive and/or negative pressure checks described in the *Respiratory Protection Standard* (see [Appendix M: User Seal Check Procedures](#)), or the manufacturer's recommended procedures (when equally protective). If leaks are present, the respirator user should adjust the respirator and try again.

Respirators with tight-fitting facepieces may not be worn by employees who have conditions that would compromise the facepiece-to-face seal. Examples of these conditions include facial hair (e.g., beard stubble, sideburns, or certain mustaches) that interferes with the facepiece seal or valve function, absence of normally worn dentures, facial deformities (e.g., scars, deep skin creases, prominent cheekbones), or the use of jewelry or headgear that projects under the facepiece seal.

Corrective glasses or goggles, or other PPE, must be worn in such a way that does not interfere with the seal of the facepiece to the face. It should be noted that in some cases a full-facepiece respirator or PAPR may be more comfortable and less cumbersome than the combination of a half-mask and chemical goggles. The *Respiratory Protection Standard* allows the use of contact lenses with respirators where the wearer has successfully worn such lenses before.

1.1.9 Continuing Respirator Effectiveness

The supervisor/PI shall periodically monitor the work area conditions, and employee exposures or stress to ensure the continued effectiveness of a selected respirator. Supervisors/Pis shall ensure that employees leave the respirator use area during the following conditions:

- a. *Skin or Eye Irritation*. Skin or eye irritation can result from wearing a respirator in hot, humid conditions as well as in contaminated environments. Such irritation can cause considerable distress to respirator users,



causing them to remove or adjust the respirator or to refrain from wearing the respirator at all, thereby rendering it ineffective. To prevent skin or eye irritation associated with respirator use, employees should leave the respirator use area to wash their faces and respirator facepieces as needed.

- b. *Vapor or Gas Breakthrough.* Whenever the respirator user can detect vapor or gas breakthrough (by odor, taste, and/or irritation effects) or a change in breathing resistance or leakage of the facepiece, they must leave the respirator use area to replace the respirator or the filter, cartridge, or canister elements. Similarly, respirator users must leave the respirator use area if they are replacing cartridge or canister elements according to a change schedule, or when the ESLI shows that the canister or cartridge(s) must be changed.
- c. *Impairments.* Because respirators must be in good working condition to function, they should not be used if they have been impaired in any way. Impairments include filter or cartridge element that is not functioning properly, a broken strap, loss of respirator shape, and a face seal that can no longer be maintained. Respirators that are not properly functioning must be replaced, repaired, or discarded.

Maintenance and Care of Respiratory Protection Equipment

Respirators are to be properly maintained at all times in accordance with manufacturer's instructions and per the requirements of the *Respiratory Protection Standard* in order to ensure that they function properly and adequately protect the user. Primary responsibility for cleaning and inspecting the respirator rests with the user. Supervisors must periodically check to determine if respirators are being maintained and cared for properly and assure facilities and supplies are available to the employee for cleaning their equipment.

To ensure respiratory equipment remains serviceable and delivers effective protection, maintenance must include cleaning and disinfecting procedures, proper storage, regular inspections for defects, and repair methods. Proper care and maintenance should be tailored to the type of facilities, working conditions and hazards involved.

Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts must be replaced prior to use. No components are to be replaced or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere-supplying respirators are to be conducted by the manufacturer.

1.1.10 Cleaning and Disinfecting

Cleaning and sanitizing respirators is necessary to prevent skin irritation and dermatitis. Where the contaminant is a dust, mist, or fume, its build-up on the respirator face-to-facepiece seal or within the respirator can reduce the protection provided by the respirator because the contaminant is in the breathing zone or has compromised the seal. In addition, the build-up of contamination on the respirator can contribute to the deterioration of the respirator's materials, which can lead to reduced protection.

Respirators that are issued for the exclusive use of an employee must be cleaned and disinfected as often as necessary to remain sanitary. Respirators used by more than one employee must be cleaned and disinfected prior to being used by a different individual. The Worksite-Specific Respirator Plan must detail how this is addressed. Respirators maintained for escape-only use, as well as respirators used in fit testing and training, must be cleaned and disinfected after each use.

The respirator user must clean and disinfect respiratory equipment as described in the *Respiratory Protection Standard* (see [Appendix N: Respirator Cleaning Procedures](#)) or per the manufacturer's instructions, as long as they are equivalent in effectiveness to the OSHA method. Equivalent effectiveness simply means that the procedures used ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user. Supervisors are to ensure that adequate supply of the appropriate cleaning and disinfecting agents are maintained at the cleaning station.

Filtering facepiece respirators cannot be re-used or cleaned/disinfected and must be discarded upon doffing.

Respirators used in conditions where potentially infectious agents are present must follow specific protocols for disinfection of re-usable air purifying respirators (e.g., half face, full-face respirators, PAPR) and may require specific



disinfectant cleaning solutions, which differ from standard disinfectant wipes (e.g., alcohol or bleach-based wipes). Care should be taken when selecting disinfection solutions to ensure that the solutions will not damage the respirator or any components of the respirator. Contact the manufacturer or EHS for guidance.

1.1.11 Storage

All respirators must be stored so that they are protected against damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Used filter cartridges must be stored separately from respirator facepieces that have been cleaned. This is to prevent contamination of the interior of the respirator facepiece from hazardous particulate matter (e.g., lead, asbestos, cadmium, silica) that may have accumulated on the filter cartridge.

If plastic bags are used for storage after use, respirators must be allowed to dry before they are placed in a bag. Storing the respirator in a plastic sealable bag after use can prevent adequate drying and encourages microbial growth.

When respirators are packed or stored, the facepiece and exhalation valve must be stored in a manner that will prevent deformation. Each respirator should be positioned so that it retains its natural configuration. Synthetic materials and even rubber will warp if stored in an unnatural shape, thus affecting the fitting characteristics of the facepiece. Do not hang respirators by their straps for long periods as facepieces and straps will become distorted and the straps will lose their elasticity.

Disposable respirators such as filtering facepieces (e.g., N95, N100, P100) should be disposed after each work shift or when they become damaged, bent, folded, cracked, distorted, wet, or visibly soiled. Store unused disposable masks in a manner that prevents them from being crushed, misshapen, torn, or exposed to moisture.

1.1.12 Inspection and Maintenance

To ensure the continued reliability of respiratory equipment, it must be inspected on a regular basis. The frequency of inspection and the procedures to be followed depend on whether the respirator is intended for routine use or emergency escape and the type of equipment. Worksite Specific Respirator Plans must specify roles and responsibilities associated with the required inspection elements defined here.

Inspection frequency:

- a. **Routine Use.** All respirators used in routine situations must be inspected before each use and during cleaning.
- b. **Emergency Use.** Respirators maintained for use in emergency situations must be inspected at least monthly and in accordance with the manufacturer's recommendations and shall be checked for proper function before and after each use. Records of the monthly inspections must be maintained by the supervisor or their designee.
- c. **Escape-Only Use.** Respirators used for escape-only must be inspected before being carried onto the worksite.

For all respirators, inspections include checking the following items:

- a. Facepiece: cracks, tears, or holes facemask distortion cracked or loose lenses/face shield;
- b. Head straps: breaks or tears, broken buckles;
- c. Valves: residue or dirt, cracks or tears in valve material;
- d. Filters/Cartridges: approval designation, gaskets, cracks or dents in housing, and proper cartridge for hazard; and
- e. Air Supply Systems: breathing air quality/grade, condition of supply hoses, hose connections, and settings on regulators and valves.
- f. No discoloration or odors
- g. Foam seal is not degraded
- h. No rust on staples and/or nosepiece



SCBAs must meet the following requirements:

- a. Inspections conducted monthly (see [Appendix O: SCBA Inspections](#)).
- b. The air and oxygen cylinders must be maintained in a fully charged state and recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.
- c. The regulator and warning devices must be inspected to ensure that they function properly.
- d. Inspection records must include:
 - date of the inspection,
 - name of the inspector,
 - the findings of the inspection,
 - any required remedial action, and
 - a serial number or other means of identifying the inspected respirator.
- e. Provide inspection 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.

Respiratory protection equipment that fails an inspection or is otherwise found to be defective must be removed from service, and will be discarded or repaired or adjusted in accordance with the following procedures:

- a. Repairs or adjustments to respirators will be made only by persons appropriately trained to perform such operations and will use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- b. Repairs will be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and,
- c. Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.
- d. When a respirator is taken out of service, the respirator must be tagged "out of service," and the respirator user should be given a replacement of the same make, model and size.

PROGRAM EVALUATION

EHS is responsible for reviewing the RPP annually to assure the provisions of the current written program are being properly implemented and that it continues to be effective. The Program will be updated as needed to reflect current conditions and practices.

EHS or other authorized personnel may consult individual employees periodically and/or during fit testing and training sessions to assess the employee's views on the program effectiveness and to identify any problems. Factors to be assessed include:

- a. Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- b. Appropriate respirator selection for the hazards the employee encounters;
- c. Proper respirator used under the workplace conditions the employee encounters; and
- d. Proper respirator maintenance.

The responsible supervisor/PI must ensure the on-going assessment of their work areas, and review and update their [Worksite-Specific Respiratory Protection Plan \(Appendix F\)](#) as necessary to ensure the plan is effectively implemented. Supervisors/PIs must notify EHS whenever workplace conditions may exist or change that may affect employee exposure to respiratory hazards.



RECORDKEEPING

The Respirator Medical Evaluation Questionnaire is confidential and will remain with the licensed healthcare professional medically evaluating the employee. KSU EHS will only retain the physician's medical clearance form or other written recommendation regarding each employee's ability to wear a respirator.

Training and fit test records, enrollment forms and initial and annual respiratory protection clearance forms are maintained centrally by EHS. These records will be updated as new employees are trained, as existing employees receive refresher training, and as fit tests are conducted. Fit test records will be retained for respirator users until the next fit test is administered. Copies of records documenting medical approvals, training and fit testing must be provided to EHS.

KSU EHS will retain a copy of the current written respirator program. Employees may access the RPP through the KSU EHS website.

WORKSITE-SPECIFIC PROCEDURES

Once the respiratory hazard evaluation has been completed and the appropriate respirators have been selected, supervisors/PIs must develop and implement written worksite-specific procedures for proper respirator use for employees under their charge. In accordance with the *Respiratory Protection Standard*, all work areas where respirators are used must have worksite-specific written procedures outlining when respirators will be used, the types of respirators for each application, cartridge change-out schedules, storage locations for respirators, and inspection/maintenance schedules for respirators that are not used routinely.

Worksite-Specific Respiratory Protection Plan

The Worksite-Specific Respiratory Protection Plan is the responsibility of the Supervisor/PI. It must contain worksite-specific procedures and hazard assessments addressing the hazards in the workplace and the respiratory protection selected. EHS is available to assist supervisors/PIs with this requirement and developed a template to use to create a [Worksite-Specific Respiratory Protection Plan \(Appendix F\)](#). Individual departments, units or supervisors can use this document to design a respiratory protection plan customized for their workplace by inserting the appropriate information as needed in the template.

They must contain all the information needed to maintain an effective respirator program to meet the user's individual requirements. These procedures are a set of step-by-step instructions written so that a task (i.e., respirator use, fit-testing procedures, cleaning and storage, etc.) can be performed by all personnel in a uniform and consistent way, while supplying the maximum protection for workers who use respirators in the workplace. The Supervisor/PI must anticipate both the routine and non-routine use of respirators, as well as any possible emergency use based on the conditions in the workplace in which they are to be used.

The [Worksite-Specific Respiratory Protection Plan \(Appendix F\)](#) shall be written and maintained by the Supervisor/PI and submitted to EHS. EHS personnel can assist supervisors in the collection of data necessary to complete this document. This form includes information regarding the following:

- a. Hazard assessment (performed in partnership with EHS)
- b. Departmental respirator users and site-specific program information
- c. Respirator cleaning, storage, inspection and maintenance procedures
- d. Additional relevant information and/or documentation
- e. Emergency respirator use – record of monthly inspection (if relevant to the program)

Changes must be submitted to EHS. Modification of the worksite specific plan may be required when any of the following situations present:

- a. Addition or removal of employees to the respirator program (required)
- b. Equipment or process additions and/or modifications
- c. Work practice alterations



- d. New inhalation hazards
- e. Any condition that may affect the proper use of respirator equipment

The Supervisor/PI is responsible for ensuring the information in this worksite-specific respiratory protection plan is completed, and updated, when necessary.

ACRONYMS AND DEFINITIONS

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APF	Assigned Protection Factor
APR	Air-Purifying Respirator
CDC	Center for Disease Control
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
ESLI	end-of-service-life indicator
HEPA	high efficiency particulate air filter
IDLH	immediately dangerous to life or health
MUC	maximum use concentration
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAPR	powered air-purifying respirator
PEL	permissible exposure limit
PI	Principle Investigator
PLHCP	physician or other licensed health care professional
PPE	personal protective equipment
QLFT	qualitative fit test
QNFT	quantitative fit test
REL	recommended exposure limits
RPP	Respiratory Protection Program
SAR	supplied-air respirator
SCBA	self-contained breathing apparatus
TLV	threshold limit value

Definitions

Air-purifying respirator means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned protection factor (APF): the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by this section.

Atmosphere-supplying respirator: a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.



Canister or cartridge: a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Demand respirator: an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

Emergency situation: any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

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 (disposable respirator): 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. Often referred to as a N95.

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. (See also Qualitative fit test and Quantitative fit test.)

Helmet: a rigid respiratory inlet covering that also provides head protection against impact and penetration.

High efficiency particulate air (HEPA) filter: a filter that is at least 99.97% 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.

Hood: a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

Immediately dangerous to life or 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.

Loose-fitting facepiece: a respiratory inlet covering that is designed to form a partial seal with the face.

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, and 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.

Negative pressure respirator (tight fitting): a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen deficient atmosphere: an atmosphere with an oxygen content below 19.5% by volume.

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 of the health care services required by paragraph (e) of this section.

Positive pressure respirator: a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.



Powered air-purifying respirator (PAPR): an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Pressure demand respirator: a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

Qualitative fit test (QLFT): a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test (QNFT): an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory inlet covering: that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

Respiratory Protection Standard: Title 29 US Code of Federal Regulations Section 1910.134.

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 or 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.

Tight-fitting facepiece: a respiratory inlet covering that forms a complete seal with the face.

User seal check: an action conducted by the respirator user to determine if the respirator is properly seated to the face.

APPENDICES



Appendix A: Respiratory Hazard Evaluation Form

Request for EHS Exposure Risk Assessment

Department:		Date:	
Location where task occurs:			
Please provide a detailed description of the job task:			
What is the expected physical work effort:			
<input type="checkbox"/> Light/Sedentary <input type="checkbox"/> Moderate <input type="checkbox"/> Strenuous <input type="checkbox"/> Very Strenuous			
Employees Names and eIDs:			
Supervisor name:		Phone:	
Exposure to chemicals:			
<input type="checkbox"/> Formaldehyde/Formalin ¹ <input type="checkbox"/> Ammonia <input type="checkbox"/> Acid gas (e.g. hydrogen chloride, hydrogen sulfide)			
<input type="checkbox"/> Mercury vapors <input type="checkbox"/> Pesticides <input type="checkbox"/> Organic Vapors (e.g. benzene, toluene, MEK, acetone, paint thinners)			
<input type="checkbox"/> Methylene Chloride <input type="checkbox"/> Other: _____			
! Please approximate duration/frequency of use and quantity: _____			
Exposure to dust, mist, fumes or particulates:			
<input type="checkbox"/> Asbestos <input type="checkbox"/> Cotton dust <input type="checkbox"/> Welding fumes <input type="checkbox"/> Biological hazards (list): _____			
<input type="checkbox"/> Lead <input type="checkbox"/> Grain dust <input type="checkbox"/> Asphalt fumes <input type="checkbox"/> Other: _____			
<input type="checkbox"/> Pesticide application <input type="checkbox"/> Animal dust <input type="checkbox"/> Nanoparticles ¹ (list): _____			
<input type="checkbox"/> Paint spraying <input type="checkbox"/> Wood dust _____			
! Please approximate duration/frequency of use and quantity: _____			
Work involving any of the above mentioned hazards is performed:			
<input type="checkbox"/> Outside <input type="checkbox"/> In the shop <input type="checkbox"/> In confined space ¹			
<input type="checkbox"/> In a fume hood/Biosafety Cabinet <input type="checkbox"/> In a spray paint room or booth <input type="checkbox"/> In an oxygen deficient atmosphere ¹			
<input type="checkbox"/> In the lab (bench top) <input type="checkbox"/> In a mechanical room <input type="checkbox"/> Other: _____			
Type of respirator currently in use, if applicable:			
<input type="checkbox"/> N, R, or P disposable respirator e.g., N95, P100 (filter mask, non-cartridge type only)			
<input type="checkbox"/> Half facepiece (negative pressure) respirator			
<input type="checkbox"/> Full facepiece (negative pressure) respirator			
<input type="checkbox"/> Powered-air purifying respirator (PAPR) loose fit			
<input type="checkbox"/> Powered-air purifying respirator (PAPR) tight fit			
<input type="checkbox"/> Self-Contained Breathing Apparatus (SCBA)			
<input type="checkbox"/> Supplied-air respirator/Airline			
<input type="checkbox"/> None			
Type of filter/cartridge currently in use (include color of label): _____			
Hazard concentration:			
<input type="checkbox"/> Unknown <input type="checkbox"/> Known (please attach sampling data)			

- Submit completed form to EHS for review and to initiate an exposure risk assessment.
- Form can be sent by email to respirator@ksu.edu or hard copy can be mailed to:
- KSU EHS, 135 Dykstra Hall, 1628 Claflin Rd., Manhattan, KS 66506

¹ Work performed in these environments require an exposure risk assessment. Please contact EHS at 785-532-5856.



Appendix B: Initial Respirator Clearance and Enrollment Form

Health Clearance and Initial Enrollment to the Respiratory Protection Program (RPP)

Employee Name:			Date:	
Employee Title:			Employee Phone:	
Employee Signature:			eID:	
PI/Supervisor:			Supervisor Phone:	
College/Unit:			Department:	

Information for Employee and Supervisor

Complete the section above and **PART ONE** of this form. This form must be completed in conjunction with the **Respirator Medical Evaluation Questionnaire (Appendix E)** and submitted to the medical provider. **PART TWO** of this form is to be completed and signed by the physician or other licensed healthcare professional (PLHCP). This form must be completed and employee medically approved to wear respiratory protection *prior* to fit testing.

After PART TWO is completed and signed by the PLHCP, this document must be returned to Environmental Health and Safety (EHS) before the employee can be fit tested and approved for respirator use at KSU. If fit testing is conducted elsewhere, employee must provide documentation of fit testing and a copy of this executed form to KSU EHS. This form must be completed in conjunction with the Respirator Medical Evaluation Questionnaire.

IMPORTANT: A hazard assessment or job duty review must be completed prior to employee enrollment into the Respiratory Protection Program and selection of respirator. Contact KSU EHS 785-532-5856 for information.

Information for Occupational Health Care Provider

The KSU employee being medically evaluated will/may be required to wear respiratory protection in the execution of their work responsibilities. Following your assessment of the employee’s fitness for respirator use (in accordance with the OSHA Respiratory Protection Standard 29 CFR 1910.134), please complete **PART TWO** of this form, indicating if the employee is medically cleared to wear the respirator(s) identified/checked below under the conditions identified herein (**PART ONE**) and return the signed form to the address listed below.

Initial clearance may be sent by email to: respirator@ksu.edu
or hard copy can be mailed to:

KSU Environmental Health & Safety
(attn: Occupational Safety Manager)
135 Dykstra Hall
1628 Claflin Rd.
Manhattan, KS 66506



Initial Respirator Clearance and Enrollment Form

PART ONE (To be completed by employee/supervisor)

Type of Respirator (Questions? Contact RPP administrator by email respirator@ksu.edu or phone 785-532-5856)

- | | |
|--|---|
| <input type="checkbox"/> N, R, or P disposable respirator e.g., N95, P100
(filter mask, non- cartridge type only) | <input type="checkbox"/> Supplied-air respirator/Airline |
| <input type="checkbox"/> Half facepiece (negative pressure) respirator | <input type="checkbox"/> Self-Contained Breathing Apparatus (SCBA) |
| <input type="checkbox"/> Full facepiece (negative pressure) respirator | <input type="checkbox"/> Powered-air purifying respirator (PAPR) tight fit |
| | <input type="checkbox"/> Powered-air purifying respirator (PAPR) loose fit |

Why do you need respiratory protection? (Check all that apply)

- | | | | | |
|--|----------------------------------|--|-------------------------------------|------------------------------------|
| <input type="checkbox"/> Asbestos work; check applicable: | <input type="checkbox"/> 16-hour | <input type="checkbox"/> abatement worker | <input type="checkbox"/> supervisor | <input type="checkbox"/> inspector |
| <input type="checkbox"/> Laboratory worker/researcher with occupational exposure potential to specific hazards | | | | |
| <input type="checkbox"/> Facilities maintenance (e.g., painting, lead paint removal, welding, etc.) Specify: _____ | | | | |
| <input type="checkbox"/> Non-routine use to permit safe entry to restricted areas where exposure is possible. | | | | |
| <input type="checkbox"/> Clinic or healthcare use | | <input type="checkbox"/> Visual or performing arts | | |
| <input type="checkbox"/> Hazardous waste technician* | | <input type="checkbox"/> Emergency responder* | | |
| <input type="checkbox"/> Other: _____ | | | | |

***Hazardous waste and emergency response may require the use of restrictive personal protective clothing that can be confining and hot. Medical assessment for these duties should consider the burden of these special conditions. Emergency response will also involve high stress situations, and strenuous activities with physical demands beyond routine work conditions.**

Duration of respirator use

- Escape only (no rescue)
- Emergency rescue only
- Less than 2 hours per use
- 2 to 4 hours per use
- More than 4 hours per use

Frequency of respirator use

- Less than 5 times per year
- 5 to 10 times per year
- About once per month
- About once per week
- Other: _____

Expected physical work effort

- | | | | |
|--|-----------------------------------|------------------------------------|---|
| <input type="checkbox"/> Light/Sedentary | <input type="checkbox"/> Moderate | <input type="checkbox"/> Strenuous | <input type="checkbox"/> Very Strenuous |
|--|-----------------------------------|------------------------------------|---|

Potential for heat stress

- | | | |
|-------------------------------|-----------------------------------|------------------------------|
| <input type="checkbox"/> High | <input type="checkbox"/> Moderate | <input type="checkbox"/> Low |
|-------------------------------|-----------------------------------|------------------------------|

If high or moderate, describe: _____

Potential inhalation hazards or special conditions encountered while wearing the respirator(s)

- | | | |
|--|------------------------------------|--|
| <input type="checkbox"/> Confined spaces | <input type="checkbox"/> BSL3 work | <input type="checkbox"/> Life-threatening conditions |
| <input type="checkbox"/> Chemical vapor/gas. List: _____ | | |
| <input type="checkbox"/> Particulates. List: _____ | | |
| <input type="checkbox"/> Radioisotopes. List: _____ | | |
| <input type="checkbox"/> Human pathogens. List: _____ | | |
| <input type="checkbox"/> Other: _____ | | |



Initial Respirator Clearance and Enrollment Form

PART TWO (To be completed by licensed health care provider and returned directly to KSU Environmental Health & Safety by mail or email to respirator@ksu.edu)

Medical Release/Approval

I have reviewed health information and/or examined _____
(Print KSU employee named on page 1)

and determined that they **are** / **are not** medically approved to wear the indicated respiratory protection devices in the performance of their job functions (as described herein [Part One]) **with*** or **without** limitations.

Medical Health Care Provider Signature Date

Name of Health Care Provider: _____

Name of Firm: _____

Address: _____

Phone Number: _____

***If approved for one, but not all indicated respirators (refer to those checked on first page), or if approved with limitations, please provide clarification below.**

Please indicate which devices **MAY** be used by employee as applicable:

- | | |
|---|---|
| <input type="checkbox"/> N, R, or P disposable respirator e.g., N95, P100
(filter mask, non-cartridge type only) | <input type="checkbox"/> Full facepiece (negative pressure) respirator |
| <input type="checkbox"/> Half facepiece (negative pressure) respirator | <input type="checkbox"/> Powered-air purifying respirator (PAPR) tight fit |
| | <input type="checkbox"/> Powered-air purifying respirator (PAPR) loose fit |
| | <input type="checkbox"/> Supplied-air respirator/airline |
| | <input type="checkbox"/> Self-Contained Breathing Apparatus (SCBA) |

If not approved for one or all of the requested devices, or if approved with limitations, indicate whether restriction is:

- Permanent Until further notice Until (specify date): _____

Additional comments and/or restrictions:



Appendix C: Annual Respirator Clearance Form

Health Clearance and Annual Registration to the Respiratory Protection Program (RPP)

Employee Name:		Date:	
Employee Title:		Employee Phone:	
Employee Signature:		eID:	
PI/Supervisor:		Supervisor Phone:	
College/Unit:		Department:	

Information for Employee and Supervisor

Complete the section above and **PART ONE** of this form. This form must be completed annually and submitted to KSU Environmental Health and Safety (EHS) *prior* to fit testing. (Note: If this is the initial/first enrollment into the respiratory protection program, employee must fill out the Initial Respiratory Protection Clearance and Enrollment *instead of this form.*)

Respiratory Protection Training must be completed before employee will be contacted for a respirator fit test. This training is required annually. Complete the “Respiratory Protection” online training through HSI/Vivid Learning Systems. Contact KSU EHS 785-532-5856 if employee needs assistance gaining access to this training.

Submit this completed form to EHS via email or hard copy to the address listed below. EHS will contact employee to schedule the annual fit test after receiving this form and upon confirmation of training completion. If fit testing is conducted elsewhere, test documentation must be provided to EHS, along with a copy of this completed form.

Question for Employee

Have there been changes to your health, medical status, or physical abilities (e.g., a positive response on the Respirator Medical Evaluation Questionnaire) that might affect your ability to wear respiratory protection?

- Yes – Follow-up medical evaluation is required. Complete **PART ONE** of this form in conjunction with the **Respirator Medical Evaluation Questionnaire (Appendix E)** and submit to the medical provider. **PART TWO** of this form is to be completed and signed by the medical provider and returned to EHS.
- No – Submit this page and **PART ONE** to EHS.

Annual clearance may be sent by email to: respirator@ksu.edu
or hard copy can be mailed to:

KSU Environmental Health & Safety
(attn: Occupational Safety Manager)
135 Dykstra Hall
1628 Claflin Rd.
Manhattan, KS 66506



Annual Respirator Clearance Form

PART ONE (To be completed by employee/supervisor)

Has there been any changes to work practices or type of material you work with in the past year? Yes No

Type of Respirator (Questions? Contact RPP administrator by email respirator@ksu.edu or phone 785-532-5856)

- N, R, or P disposable respirator e.g., N95, P100 (filter mask, non- cartridge type only)
- Half facepiece (negative pressure) respirator
- Full facepiece (negative pressure) respirator
- Supplied-air respirator/Airline
- Self-Contained Breathing Apparatus (SCBA)
- Powered-air purifying respirator (PAPR) **tight fit**
- Powered-air purifying respirator (PAPR) **loose fit**

Why do you need respiratory protection? (Check all that apply)

- Asbestos work; check applicable: 16-hour abatement worker supervisor inspector
- Laboratory worker/researcher with occupational exposure potential to specific hazards
- Facilities maintenance (e.g., painting, lead paint removal, welding, etc.) Specify: _____
- Non-routine use to permit safe entry to restricted areas where exposure is possible.
- Clinic or healthcare use Visual or performing arts
- Hazardous waste technician* Emergency responder*
- Other: _____

***Hazardous waste and emergency response may require the use of restrictive personal protective clothing that can be confining and hot. Medical assessment for these duties should consider the burden of these special conditions. Emergency response will also involve high stress situations, and strenuous activities with physical demands beyond routine work conditions.**

Duration of respirator use

- Escape only (no rescue)
- Emergency rescue only
- Less than 2 hours per use
- 2 to 4 hours per use
- More than 4 hours per use

Frequency of respirator use

- Less than 5 times per year
- 5 to 10 times per year
- About once per month
- About once per week
- Other: _____

Expected physical work effort

- Light/Sedentary Moderate Strenuous Very Strenuous

Potential for heat stress

- High Moderate Low

If high or moderate, describe: _____

Potential inhalation hazards or special conditions encountered while wearing the respirator(s)

- Confined spaces BSL3 work Life-threatening conditions
- Chemical vapor/gas. List: _____
- Particulates. List: _____
- Radioisotopes. List: _____
- Human pathogens. List: _____
- Other: _____



Annual Respirator Clearance Form

PART TWO (To be completed by licensed health care provider and returned directly to KSU Environmental Health & Safety by mail or email to respirator@ksu.edu)

Medical Release/Approval

I have reviewed health information and/or examined _____
(Print KSU employee named on page 1)

and determined that they **are** / **are not** medically approved to wear the indicated respiratory protection devices in the performance of their job functions (as described herein [Part One]) **with*** or **without** limitations.

Medical Health Care Provider Signature

Date

Name of Health Care Provider: _____

Name of Firm: _____

Address: _____

Phone Number: _____

***If approved for one, but not all indicated respirators (refer to those checked on first page), or if approved with limitations, please provide clarification below.**

Please indicate which devices **MAY** be used by employee as applicable:

- | | |
|---|---|
| <input type="checkbox"/> N, R, or P disposable respirator e.g., N95, P100
(filter mask, non-cartridge type only) | <input type="checkbox"/> Full facepiece (negative pressure) respirator |
| <input type="checkbox"/> Half facepiece (negative pressure) respirator | <input type="checkbox"/> Powered-air purifying respirator (PAPR) tight fit |
| | <input type="checkbox"/> Powered-air purifying respirator (PAPR) loose fit |
| | <input type="checkbox"/> Supplied-air respirator/airline |
| | <input type="checkbox"/> Self-Contained Breathing Apparatus (SCBA) |

If not approved for one or all of the requested devices, or if approved with limitations, indicate whether restriction is:

- Permanent Until further notice Until (specify date): _____

Additional comments and/or restrictions:



Appendix D: Voluntary Use of Respirator

Supervisors: All employees who voluntarily use respirators must complete and sign a copy of this document. Maintain a signed copy for your records.

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.

(Please Print)

Employee Name:		Date:	
Department:		PI/Supervisor:	
Work Tasks:			
Respirator Type:			
Employee Signature:		eID:	

If you have any questions about this document, or the use of respirators please contact your supervisor or KSU EHS at 785-532-5856 or respirator@ksu.edu.



Appendix E: KSU Respirator Medical Evaluation Questionnaire

KSU Respiratory Protection Program

Respirators must be used in workplaces where employees are exposed to hazardous airborne contaminants. When respiratory protection is required, employees must enroll in the KSU Respiratory Protection Program [per 29 CFR 1910.134] using the EHS Initial Respirator Clearance and Enrollment form. Before wearing a respirator, workers must first be medically evaluated using the attached Medical Questionnaire and approved by the healthcare provider as documented in the KSU Initial Respirator Clearance and Enrollment Form. Before using respiratory protection, the worker must receive training. To determine if respiratory protection is needed, a workplace exposure assessment must be performed by KSU EHS or their designee.

Alternately, EHS may make this determination based on existing quantitative data, or based on area and/ or activity-specific procedure or policy requiring respirator use.

OSHA Medical Evaluation and Questionnaire Regulatory Requirements

adopted for KSU by reference

- The employer must identify a physician or other licensed health care professional (PLHCP) to perform all medical evaluations using the medical questionnaire in Appendix C of the Respiratory Protection standard or a medical examination that obtains the same information. (See Paragraph (e)(2) (i).)
- The medical evaluation must obtain the information requested in Sections 1 and 2, Part A of Appendix C. The questions in Part B of Appendix C may be added at the discretion of the health care professional. (See Paragraph (e)(2)(ii).)
- The employer must ensure that a follow-up medical examination is provided for any employee who gives a positive response to any question among questions 1 through 8 in Part A Section 2, of Appendix C, or whose initial medical examination demonstrates the need for a follow-up medical examination. The employer must provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP. (See Paragraph (e)(3)(i).)
- The medical questionnaire and examinations must be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee and in a manner that ensures that he or she understands its content. The employer must not review the employee's responses, and the questionnaire must be provided directly to the PLHCP. (See Paragraph (e)(4)(i).)
- The PLHCP provides the employer with an approval for the employee to use respiratory protection.

For additional information contact KSU Environmental Health and Safety at 785-532-5856 or visit www.ksu.edu/safety.

Reference Appendix C of 29 CFR 1910.134: OSHA Respirator Medical Evaluation Questionnaire

Employer: By regulation, answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination. Under the discretion of the PLHCP, additional examination or testing may be required to make a final determination on the employee's ability to use a respirator.

Employee: Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your supervisor must not look at or review your answers. Your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it and/or where to go to for testing/examination by the health care professional if indicated.



Once filled out, the attached questionnaire must be given to the PLHCP. This form should not be submitted to the supervisor or OSHA. Using the Initial Respirator Clearance form, the PLHCP must provide KSU EHS with an approval indicating the employee is cleared to wear the type(s) of respiratory protection indicated.



KSU Respirator Medical Evaluation Questionnaire

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date: _____
2. Your name: _____
3. Your age (to nearest year): _____
4. Sex (circle one): Male/Female
5. Your height: _____ ft. _____ in.
6. Your weight: _____ lbs.
7. Your job title: _____
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____
9. The best time to phone you at this number: _____
10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No
11. Check the type of respirator you will use (you can check more than one category):
 - a. _____ N, R, or P disposable respirator (filter-mask, non-cartridge type only).
 - b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).
12. Have you worn a respirator (circle one): Yes/No
 - If "yes," what type(s): _____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

	YES	NO
1. Do you currently smoke tobacco, or have you smoked tobacco in the last month?	<input type="checkbox"/>	<input type="checkbox"/>
2. Have you ever had any of the following conditions?		
a. Seizures	<input type="checkbox"/>	<input type="checkbox"/>
b. Diabetes (sugar disease)	<input type="checkbox"/>	<input type="checkbox"/>
c. Allergic reactions that interfere with your breathing	<input type="checkbox"/>	<input type="checkbox"/>
d. Claustrophobia (fear of closed-in places)	<input type="checkbox"/>	<input type="checkbox"/>
e. Trouble smelling odors	<input type="checkbox"/>	<input type="checkbox"/>
3. Have you ever had any of the following pulmonary or lung problems?		
a. Asbestosis	<input type="checkbox"/>	<input type="checkbox"/>
b. Asthma	<input type="checkbox"/>	<input type="checkbox"/>
c. Chronic bronchitis	<input type="checkbox"/>	<input type="checkbox"/>
d. Emphysema	<input type="checkbox"/>	<input type="checkbox"/>
e. Pneumonia	<input type="checkbox"/>	<input type="checkbox"/>
f. Tuberculosis	<input type="checkbox"/>	<input type="checkbox"/>



KSU Respirator Medical Evaluation Questionnaire

	YES	NO
g. Silicosis	<input type="checkbox"/>	<input type="checkbox"/>
h. Pneumothorax (collapsed lung)	<input type="checkbox"/>	<input type="checkbox"/>
i. Lung cancer	<input type="checkbox"/>	<input type="checkbox"/>
j. Broken ribs	<input type="checkbox"/>	<input type="checkbox"/>
k. Any chest injuries or surgeries	<input type="checkbox"/>	<input type="checkbox"/>
l. Any other lung problem that you've been told about	<input type="checkbox"/>	<input type="checkbox"/>
4. Do you currently have any of the following symptoms of pulmonary or lung illness?		
a. Shortness of breath	<input type="checkbox"/>	<input type="checkbox"/>
b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline	<input type="checkbox"/>	<input type="checkbox"/>
c. Shortness of breath when walking with other people at an ordinary pace on level ground	<input type="checkbox"/>	<input type="checkbox"/>
d. Have to stop for breath when walking at your own pace on level ground	<input type="checkbox"/>	<input type="checkbox"/>
e. Shortness of breath when washing or dressing yourself	<input type="checkbox"/>	<input type="checkbox"/>
f. Shortness of breath that interferes with your job	<input type="checkbox"/>	<input type="checkbox"/>
g. Coughing that produces phlegm (thick sputum)	<input type="checkbox"/>	<input type="checkbox"/>
h. Coughing that wakes you early in the morning	<input type="checkbox"/>	<input type="checkbox"/>
i. Coughing that occurs mostly when you are lying down	<input type="checkbox"/>	<input type="checkbox"/>
j. Coughing up blood in the last month	<input type="checkbox"/>	<input type="checkbox"/>
k. Wheezing	<input type="checkbox"/>	<input type="checkbox"/>
l. Wheezing that interferes with your job	<input type="checkbox"/>	<input type="checkbox"/>
m. Chest pain when you breathe deeply	<input type="checkbox"/>	<input type="checkbox"/>
n. Any other symptoms that you think may be related to lung problems	<input type="checkbox"/>	<input type="checkbox"/>
5. Have you ever had any of the following cardiovascular or heart problems?		
a. Heart attack	<input type="checkbox"/>	<input type="checkbox"/>
b. Stroke	<input type="checkbox"/>	<input type="checkbox"/>
c. Angina	<input type="checkbox"/>	<input type="checkbox"/>
d. Heart failure	<input type="checkbox"/>	<input type="checkbox"/>
e. Swelling in your legs or feet (not caused by walking)	<input type="checkbox"/>	<input type="checkbox"/>
f. Heart arrhythmia (heart beating irregularly)	<input type="checkbox"/>	<input type="checkbox"/>
g. High blood pressure	<input type="checkbox"/>	<input type="checkbox"/>
h. Any other heart problem that you've been told about	<input type="checkbox"/>	<input type="checkbox"/>
6. Have you ever had any of the following cardiovascular or heart symptoms?		
a. Frequent pain or tightness in your chest	<input type="checkbox"/>	<input type="checkbox"/>
b. Pain or tightness in your chest during physical activity	<input type="checkbox"/>	<input type="checkbox"/>
c. Pain or tightness in your chest that interferes with your job	<input type="checkbox"/>	<input type="checkbox"/>
d. In the past two years, have you noticed your heart skipping or missing a beat	<input type="checkbox"/>	<input type="checkbox"/>
e. Heartburn or indigestion that is not related to eating	<input type="checkbox"/>	<input type="checkbox"/>
f. Any other symptoms that you think may be related to heart or circulation problems	<input type="checkbox"/>	<input type="checkbox"/>
7. Do you currently take medication for any of the following problems?		
a. Breathing or lung problems	<input type="checkbox"/>	<input type="checkbox"/>
b. Heart trouble	<input type="checkbox"/>	<input type="checkbox"/>
c. Blood pressure	<input type="checkbox"/>	<input type="checkbox"/>
d. Seizures	<input type="checkbox"/>	<input type="checkbox"/>



KSU Respirator Medical Evaluation Questionnaire

	YES	NO
8. If you've used a respirator, have you ever had any of the following problems? (If you've never used a respirator, check the following space and go to question 9.)		<input type="checkbox"/>
a. Eye irritation	<input type="checkbox"/>	<input type="checkbox"/>
b. Skin allergies or rashes	<input type="checkbox"/>	<input type="checkbox"/>
c. Anxiety	<input type="checkbox"/>	<input type="checkbox"/>
d. General weakness or fatigue	<input type="checkbox"/>	<input type="checkbox"/>
e. Any other problem that interferes with your use of a respirator	<input type="checkbox"/>	<input type="checkbox"/>
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire?	<input type="checkbox"/>	<input type="checkbox"/>

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you ever lost vision in either eye (temporarily or permanently)?	<input type="checkbox"/>	<input type="checkbox"/>
11. Do you currently have any of the following vision problems?		
a. Wear contact lenses	<input type="checkbox"/>	<input type="checkbox"/>
b. Wear glasses	<input type="checkbox"/>	<input type="checkbox"/>
c. Color blind	<input type="checkbox"/>	<input type="checkbox"/>
d. Any other eye or vision problem	<input type="checkbox"/>	<input type="checkbox"/>
12. Have you ever had an injury to your ears, including a broken eardrum?	<input type="checkbox"/>	<input type="checkbox"/>
13. Do you currently have any of the following hearing problems?		
a. Difficulty hearing	<input type="checkbox"/>	<input type="checkbox"/>
b. Wear a hearing aid	<input type="checkbox"/>	<input type="checkbox"/>
c. Any other hearing or ear problem	<input type="checkbox"/>	<input type="checkbox"/>
14. Have you ever had a back injury?	<input type="checkbox"/>	<input type="checkbox"/>
15. Do you currently have any of the following musculoskeletal problems?		
a. Weakness in any of your arms, hands, legs, or feet	<input type="checkbox"/>	<input type="checkbox"/>
b. Back pain	<input type="checkbox"/>	<input type="checkbox"/>
c. Difficulty fully moving your arms and legs	<input type="checkbox"/>	<input type="checkbox"/>
d. Pain and stiffness when you lean forward or backward at the waist	<input type="checkbox"/>	<input type="checkbox"/>
e. Difficulty fully moving your head up or down	<input type="checkbox"/>	<input type="checkbox"/>
f. Difficulty fully moving your head side to side	<input type="checkbox"/>	<input type="checkbox"/>
g. Difficulty bending at your knees	<input type="checkbox"/>	<input type="checkbox"/>
h. Difficulty squatting to the ground	<input type="checkbox"/>	<input type="checkbox"/>
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs.	<input type="checkbox"/>	<input type="checkbox"/>
j. Any other muscle or skeletal problem that interferes with using a respirator	<input type="checkbox"/>	<input type="checkbox"/>



KSU Respirator Medical Evaluation Questionnaire

Part B. (Optional) Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No
 - If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No
2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No
 - If "yes," name the chemicals if you know them:
 - _____
 - _____
3. Have you ever worked with any of the materials, or under any of the conditions, listed below?
 - a. Asbestos: Yes/No
 - b. Silica (e.g., in sandblasting): Yes/No
 - c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
 - d. Beryllium: Yes/No
 - e. Aluminum: Yes/No
 - f. Coal (for example, mining): Yes/No
 - g. Iron: Yes/No
 - h. Tin: Yes/No
 - i. Dusty environments: Yes/No
 - j. Any other hazardous exposures: Yes/No If "yes," describe these exposures:
 - _____
 - _____
4. List any second jobs or side businesses you have:
 - _____
 - _____
5. List your previous occupations:
 - _____
 - _____
6. List your current and previous hobbies:
 - _____
 - _____



KSU Respirator Medical Evaluation Questionnaire

7. Have you been in the military services? Yes/No
 - If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

8. Have you ever worked on a HAZMAT team? Yes/No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No If "yes," name the medications if you know them:
 - _____
 - _____

10. Will you be using any of the following items with your respirator(s)?
 - a. HEPA Filters: Yes/No
 - b. Canisters (for example, gas masks): Yes/No
 - c. Cartridges: Yes/No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?
 - a. Escape only (no rescue): Yes/No
 - b. Emergency rescue only: Yes/No
 - c. Less than 5 hours *per week*: Yes/No
 - d. Less than 2 hours *per day*: Yes/No
 - e. 2 to 4 hours per day: Yes/No
 - f. Over 4 hours per day: Yes/No

12. During the period you are using the respirator(s), is your work effort:
 - a. *Light* (less than 200 kcal per hour): Yes/No
 - If "yes," how long does this period last during the average shift: _____hrs. _____mins.
 - Examples of a light work effort are *sitting* while writing, typing, drafting, or performing light assembly work; or *standing* while operating a drill press (1-3 lbs.) or controlling machines.
 - b. *Moderate* (200 to 350 kcal per hour): Yes/No
 - If "yes," how long does this period last during the average shift: _____hrs. _____mins.
 - Examples of moderate work effort are *sitting* while nailing or filing; *driving* a truck or bus in urban traffic; *standing* while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; *walking* on a level surface about 2 mph or down a 5-degree grade about 3 mph; or *pushing* a wheelbarrow with a heavy load (about 100 lbs.) on a level surface. c. *Heavy* (above 350 kcal per hour): Yes/No
 - If "yes," how long does this period last during the average shift: _____hrs. _____mins.
 - Examples of heavy work are *lifting* a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; *shoveling*; *standing* while bricklaying or chipping castings; *walking* up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).



KSU Respirator Medical Evaluation Questionnaire

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No If "yes," describe this protective clothing and/or equipment:
- _____
 - _____
14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No
15. Will you be working under humid conditions: Yes/No
16. Describe the work you'll be doing while you're using your respirator(s):
- _____
 - _____
 - _____
17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):
- _____
 - _____
18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):
- Name of the first toxic substance: _____
 - Estimated maximum exposure level per shift: _____
 - Duration of exposure per shift: _____
 - Name of the second toxic substance: _____
 - Estimated maximum exposure level per shift: _____
 - Duration of exposure per shift: _____
 - Name of the third toxic substance: _____
 - Estimated maximum exposure level per shift: _____
 - Duration of exposure per shift: _____
 - _____
 - The name of any other toxic substances that you'll be exposed to while using your respirator: _____
 - _____
 - _____
 - _____
19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):
- _____
 - _____



Appendix F: Worksite-Specific Respiratory Protection Plan

College/Unit:		Department:	
Location of Work:			Date Created:
PI/Supervisor:		eID:	Phone:

The PI/Supervisor is responsible for the administration of the worksite-specific respiratory protection plan for the above mentioned unit and for ensuring the information in this plan is complete, and updated, when necessary. Prior to completing this plan, contact KSU EHS for a hazard assessment to determine if respirator use is required, and assist with respirator and filter/cartridge selection if needed.

Hazard Assessment

Attach the hazard assessment to the worksite-specific respiratory protection plan. This will document the tasks, task frequency, air contaminants, engineering controls, and any pertinent additional information present regarding respirator use.

Program Information

This worksite-specific plan should include the following information:

- Respiratory hazard exposure assessment (performed in partnership with EHS)
- Selection of respirators and filters/cartridges (performed in partnership with EHS)
- Cartridge change-out schedule (if applicable)
- List of Departmental respirator users
- Medical clearance, training and fit testing
- Respirator cleaning, maintenance, and storage procedures
- Emergency respirator use procedures and record of monthly inspection (if relevant to site program)
- Additional relevant information and/or documentation

Employee Name and Job Title	Respirator Make/Model and Filter/Cartridge	Cartridge Change-Out Schedule	Respirator Medical Date	Date Updated:	Initial/Refresher Training Date	Fit Test Date



Cleaning, maintenance, and storage procedures

List respirator cleaning procedures (using procedures identified in the KSU RPP or those recommended by the manufacturer if they are equivalent in effectiveness to the OSHA method):

List respirator inspection and maintenance procedures (using procedures specific to type of respirator used and location of spare parts, filters, other applicable equipment and/or procedures):

List respirator storage location(s):

List any additional relevant information and/or documents pertaining to this worksite-specific respiratory protection plan. Attach supporting documents to this plan (e.g., air monitoring results, respirator manufacturer’s literature, fit test certifications, etc.):



Appendix G: Vivid Online Training

Online Respiratory Protection training from Vivid Learning Systems is available through EHS. Send email to respirator@ksu.edu to request enrollment in the online training.

- Once enrolled, you will receive an email from Vivid Learning Systems providing you with your login credentials to begin using this online learning system. If you did not receive this email, you should check your “Clutter” or “Junk” mail for an email from Vivid LMS.
- Click on the “Training Portal” link provided in that email (<https://k-state.vividlms.com/>). This will take you to the login screen for the system. Use the login/user ID and password sent in the email to sign in to the system. Figure 1 provides an example of the login portal. Enter your login and email.

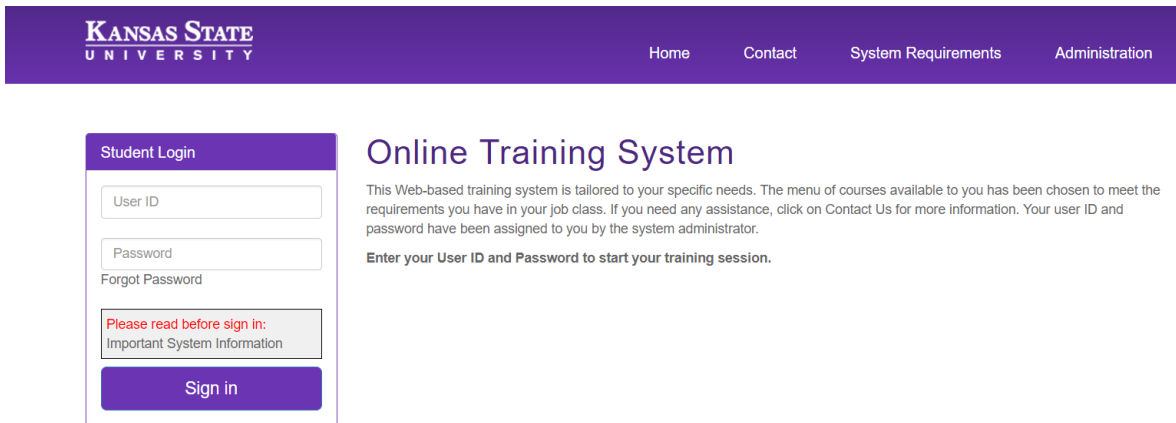


Figure 1. Login Portal

- Change your password after you successfully enter the system. On the home screen, click on the “My account” link on the upper right-hand corner to access your profile). An example of the home screen is provided in Figure 2.

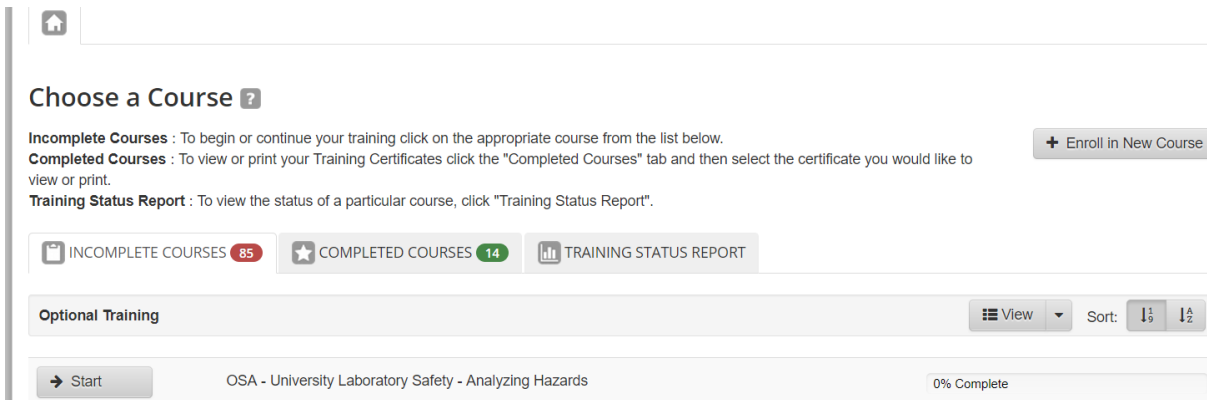


Figure 2. Home Screen

- On the home screen, there are three tabs. The "incomplete courses" tab lists all the courses you have access to, including the Respiratory Protection course. Click the start button for the “**Respiratory Protection**” course (See Figure 3).
 - You are not required to take all courses listed on the incomplete course list. Your college or department safety training system administrator may elect to alter the courses available in the future.
- The "completed courses" tab lists the courses you have taken and completed.



- The “training status” tab is where you will see courses that you are required to take. This tab is also where you will be able to print a report of your training status, a wallet card or export this information for your records. If you begin a course, you may need to finish it before you are able to take the related quiz and see the results here.

→ Start	Process Safety Management Overview	0% Complete
→ Start	Radio Communications	0% Complete
→ Start	Respiratory Protection	0% Complete
→ Start	Respiratory Protection Overview	0% Complete

Figure 3. Respiratory Protection Training Initiation

- Once you click start it will bring up another page showing the training sections or “modules” for the Respiratory Protection course. Click “launch” to start the individual training modules. You can stop anytime and come back later and it will show you your total progress and where you left off. All four portions have to be completed before taking the exam.

Respiratory Protection

Select a section from the list below. When completed, the section will be checked. All required content (I) must be completed.

	Section
1.	→ Launch Respiratory Hazards
2.	→ Launch Respirator Basics
3.	→ Launch User Responsibilities
4.	→ Launch Special Considerations
	→ Launch I Respiratory Protection Exam

Figure 4. Respiratory Protection Training Modules

- Once you complete and pass the exam you should see “100% complete” listed for this course.

Once training is completed, EHS will update the individual’s training record. Per the earlier section on medical clearance, in addition to completing the training, individuals will also need to complete the appropriate medical and enrollment forms before a fit test is scheduled. *The online training materials can be accessed any time throughout the year (e.g., if an individual needs a refresher mid-year before donning a respirator); additionally, if users cannot access training online, hard copies of tests are available and other training may be coordinated through EHS.*



Appendix H: Assigned Protection Factors

This appendix reproduces Table 1 under 29 CFR 1910.134(d)(3)(A), which requires employers to use the APFs listed in Table 1 to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), employers must ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.

Table 1: Assigned Protection Factors²

Type of respirator ^{3,4}	Quarter mask	Half mask	Full facepiece	Helmet/hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	⁵ 10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)	50	1,000	⁶ 25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator	10	50	.....	.....
• Demand mode	50	1,000	⁶ 25/1,000	25
• Continuous flow mode	50	1,000	.....	.....
• Pressure-demand or other positive-pressure mode	50	1,000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)	10	50	50	.....
• Demand mode	10	50	50	.....
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	10,000	10,000	.....

Notes:

- Air purifying respirators may not be used in oxygen deficient atmospheres.
- Only full facepiece respirators are to be used in contaminant concentrations that produce eye irritation.
- 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 atmospheres.

² 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).

³ 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.

⁴ 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.

⁵ This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

⁶ 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.



Appendix I: Respirator Types, Limitations and Operating Procedures

There are two main types of respiratory protection—air-purifying respirators (APRs) and atmosphere-supplying respirators (ASRs). Each respirator type provides a different level of protection based on its design. Therefore, it’s important to choose the right type of respirator for the specific exposure. To do that, you must identify all respiratory hazards in your environment and the amount of exposure. Additionally, each type of respirator has an assigned protection factor (APF). This indicates the level of protection you can expect to receive from that respirator. [Table 1 of the OSHA Respiratory Protection standard](#) presents the APFs for each type of respirator.

TYPES OF RESPIRATORY PROTECTION



Elastomeric Half Facepiece Respirators are reusable and have replaceable cartridges or filters. They cover the nose and mouth and provide protection against gases, vapors, or particles when equipped with the appropriate cartridge or filter.



Elastomeric Full Facepiece Respirators are reusable and have replaceable canisters, cartridges, or filters. The facepiece covers the face and eyes, which offers eye protection.



Filtering Facepiece Respirators are disposable half facepiece respirators that filter out particles such as dusts, mists, and fumes. They do NOT provide protection against gases and vapors.



Powered Air-Purifying Respirators (PAPRs) have a battery-powered blower that pulls air through attached filters, canisters, or cartridges. They provide protection against gases, vapors, or particles, when equipped with the appropriate cartridge, canister, or filter. Loose-fitting PAPRs do not require fit testing and can be used with facial hair.



Supplied-Air Respirators are connected to a separate source that supplies clean compressed air through a hose. They can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH).



Self-Contained Breathing Apparatus (SCBAs) are used for entry into or escape from environments considered to be IDLH. They contain their own breathing air supply and can be either open circuit or closed circuit.



Combination Respirators can be either a supplied-air/SCBA respirator or supplied-air/air-purifying respirator. The SCBA type has a self-contained air supply if primary airline fails and can be used in IDLH environments. The air-purifying type offers protection using both a supplied-air hose & an air-purifying component and cannot be used for entry into IDLH environments.



Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

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For more information about selecting the proper respirator for the hazard, please refer to the NIOSH [respirator selection logic](#).

Air-Purifying Respirators (APRs)

APRs use filters, cartridges, or canisters to remove gases, vapors, aerosols, or a combination of contaminants from the air. Tight-fitting APRs require fit testing prior to use. Below are the different types of APRs.

Filtering facepiece respirator (FFR)	Elastomeric half mask respirator (EHMR)
---	--



Photo courtesy of Shutterstock

FFRs are disposable respirators that cover the nose and mouth.



Photo courtesy of Shutterstock

EHMRs are reusable respirators and cover the nose and mouth.

Elastomeric full facepiece respirator



Photo courtesy of Shutterstock

Elastomeric full facepiece respirators are reusable and cover the nose, mouth, and eyes.

Powered air-purifying respirator (PAPR)



Photo courtesy of MaxAir

PAPRs are reusable and often have a hood or helmet that covers the nose, mouth, and eyes. A battery-powered blower pulls air through filters or cartridges.

Mention of any company or product does not constitute endorsement by NIOSH, CDC

APRs use filters, cartridges, or canisters to remove gases, vapors, aerosols, or a combination of contaminants from the air. Tight-fitting APRs require fit testing prior to use. Below are the different types of APRs.

1. Particulate Filtering Facepiece Respirator (FFR) (Disposable)

Commonly referred to as a dust mask or N95, this type of air-purifying respirator protects by filtering particles out of the air the user is breathing. There are seven classes of filters for NIOSH-approved filtering facepiece respirators. Ninety-five percent is the minimal level of filtration that will be approved by NIOSH. The N, R, and P designations refer to the filter's oil resistance as described below.

Select a type of respirator to see all approved models:

[N95 – Filters at least 95% of airborne particles. Not resistant to oil.](#)

[Surgical N95 – A NIOSH-approved N95 respirator that has also been cleared by the Food and Drug Administration \(FDA\) as a surgical mask.](#)



[N99 – Filters at least 99% of airborne particles. Not resistant to oil.](#)

[N100 – Filters at least 99.97% of airborne particles. Not resistant to oil.](#)

[R95 – Filters at least 95% of airborne particles. Somewhat resistant to oil.](#)

[P95 – Filters at least 95% of airborne particles. Strongly resistant to oil.](#)

[P99 – Filters at least 99% of airborne particles. Strongly resistant to oil.](#)

[P100 – Filters at least 99.97% of airborne particles. Strongly resistant to oil.](#)

These respirators protect *only* against particles—not gases or vapors. Since airborne biological agents such as bacteria or viruses are particles, they can be filtered by particulate respirators.

Respirators that filter out at least 95% of airborne particles during “worse case” testing using a “most-penetrating” sized particle are given a 95 rating. Those that filter out at least 99% receive a “99” rating. And those that filter at least 99.97% (essentially 100%) receive a “100” rating.

Respirators in this family are rated as N, R, or P for protection against oils. This rating is important in industry because some industrial oils can degrade the filter performance, so it doesn’t filter properly. Respirators are rated “**N**,” if they are **Not** resistant to oil, “**R**” if somewhat **R**esistant to oil, and “**P**” if strongly resistant (oil **P**roof). Thus, there are nine types of disposable particulate respirators:

- N-95, N-99, and N-100;
- R-95, R-99, and R-100;
- P-95, P-99, and P-100



NIOSH uses very high standards to test and approve respirators for occupational uses.

NIOSH-approved disposable respirators are marked with the manufacturer’s name, the part number (P/N), the protection provided by the filter (e.g., N-95), and “NIOSH.” This information is printed on the facepiece, exhalation valve cover, or head straps. View a listing of all [NIOSH-approved disposable respirators](#). **If a disposable respirator does not have these markings (see figure below) and does not appear on one of these lists, it has not been certified by NIOSH.**

2) Markings and Approval Labels

Some products may look very similar to NIOSH-approved respirators. However, there are two key ways you can identify NIOSH-approved respirators: the NIOSH *approval number* and the *approval label*. All NIOSH-approved respirators include an approval number. Since 2008, NIOSH requires approval holders to place the approval number (e.g., TC 84A-XXXX) on the respirator facepiece or straps. Figure 1 shows an example of the correct markings on a NIOSH-approved FFR.

In addition to the approval number, NIOSH-approved respirators have an approval label located on or within the respirator packaging. The NIOSH approval label contains contact information for the manufacturer, cautions and limitations for use, and directions for proper use. Figure 2 shows an example of a NIOSH approval label.

Figure 1: Example of correct markings on NIOSH-approved filtering facepiece respirators.

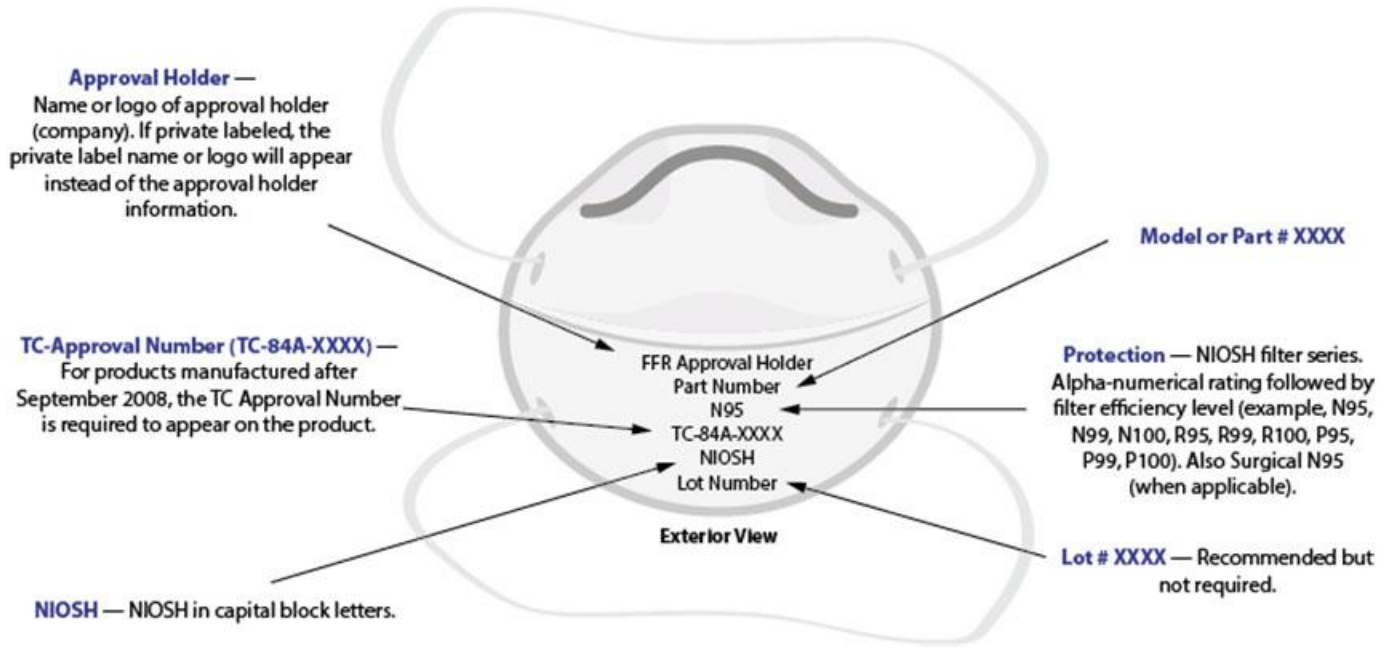


Figure 2: Example of an FFR NIOSH approval label on the respirator packaging



Respirator Manufacturing Company
Anytown, Anystate, USA
1-800-123-4567

This respirator is approved only in the following configuration:

TC-	Protection ¹	Respirator			Cautions and Limitations ²
		1000S	1000M	1000L	
TC-84A-0000	N95	X	X	X	ABCJMNO

1. Protection

N95 - Particulate Filter (95% filter efficiency level).
Effective against particulate aerosols free of oil; time use restrictions may apply.

2. Cautions and Limitations

- A Not for use in atmospheres containing less than 19.5% oxygen.
- B Not for use in atmospheres immediately dangerous to life or health.
- C Do not exceed maximum use concentrations established by regulatory standards.
- J Failure to properly use and maintain this product could result in injury or death.
- M All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations.
- N Never substitute, modify, add, or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer.
- O Refer to User Instructions and/or maintenance manuals for information on use and maintenance of these respirators.
- P NIOSH does not evaluate respirators for use as surgical masks.

Limitations - Filtering facepieces offer limited protection due to poor sealing characteristics inherent in their design. Since they provide no protection against gases and vapors and supply no oxygen, they cannot be used in atmospheres with gases or vapors or in oxygen deficient areas. Neither can they be worn for protection against toxic contaminants, nor when facial hair extends under the face-piece sealing area.

Policy - N95 filtering facepieces (single-use respirators) fall under the category of “respirators” by definition and should be treated as such for worker protection.

It is important to note that any filtering facepiece containing the “NIOSH” label is considered a respirator, and falls under the same requirements as half-face and full-face respirators for medical clearance and fit tests, when the N95 is required for the job.

If the N95 is being worn as an extra precaution, on a voluntary basis for protection against nuisance, it can be worn as a ‘voluntary’ status. See the *Voluntary Respirator Use* section of the KSU RPP for more information.



There are some “dust masks” that do not contain a NIOSH label and have no requirements at all, however these have not been tested or certified, and users should be mindful of this.

Procedure - To put on and adjust an N95 respirator:

HOW TO WEAR YOUR FILTERING FACEPIECE RESPIRATOR

For your filtering facepiece respirator (FFR) to work as effectively as possible, you must wear it correctly. This includes the process of putting it on (donning) and taking it off (doffing). FFRs must form a seal to the face. Fit testing is the best way to confirm that a respirator fits you.

Donning Your FFR

Before Donning

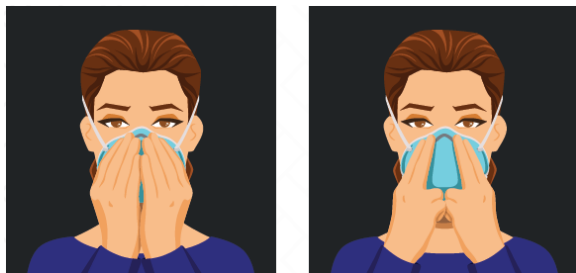
- Always use a new FFR.
- Clean and thoroughly dry your hands.
- Inspect your FFR. If it appears damaged, dirty, damp, or the straps are stretched, do not use it. Replace it with a new one.

Donning Step by Step

1. Hold the FFR in your hand with the nose piece bar (or foam) at your fingertips. (If you don't see a nose piece, check that the text is right side up.)
2. Place the FFR under your chin with the nose piece bar at the top.
3. Pull the top strap over your head, placing it near the crown and just above your ears. Then, pull the bottom strap over and place it at the back of your neck, below your ears. Make sure to lay the straps flat and that they are not twisted.
4. Place your fingertips from both hands at the top of the nose piece. Press down on both sides of the nose piece bar to mold it to the shape of your nose.
5. Perform a user seal check.



User Seal Check*



Positive Check

Negative Check

For a good seal, your breath must pass through your FFR and not around its edges. Doing a user seal check every time you wear an FFR tells you if gaps exist between your FFR and your face, which would allow contaminated air in. A user seal check can be a positive or negative pressure check.

Positive User Seal Check

To check for gaps with a positive pressure user seal check, gently place your hands over the FFR, covering as much as possible, then **breathe out**. If you feel air leaking out from the edges, or if you are wearing glasses and they fog up, the FFR is not snug. Adjust the FFR

and try again.

Negative User Seal Check

To check for gaps with a negative pressure user seal check, gently place your hands over the FFR. **Breathe in** sharply and use the bottoms of your hands to block the paths where air could enter the facepiece. If the FFR is sealed tightly, the facepiece will slightly collapse under the negative pressure. If the facepiece does not collapse, or you feel air leaking beneath, the FFR is not snug. Adjust the FFR and try again.

Doffing Your FFR



1. **Do not touch** the front of your FFR. It may be contaminated.
2. Remove by first pulling the bottom strap over the back of your head, followed by the top strap—all **without touching the respirator**.
3. Discard the used respirator in a waste basket.
4. Thoroughly wash your hands.



Tips for a Good Fit

- Fit testing provides the best way to ensure proper respirator fit. Find out more from the person in charge of your workplace respiratory protection program.
- Jewelry, glasses, and facial hair can cause gaps between your face and the edge of an FFR. Your FFR will fit better if you are clean shaven. Gaps can also exist if the FFR is too big or too small.
- Your FFR may look different than shown. If your FFR has two head straps, basic donning instructions apply.
- You can find manufacturer's instructions for your respirator model on the manufacturer's website.

*Not every respirator can be checked using positive or negative pressure. Refer to the manufacturer's instructions for conducting a user seal check on any specific respirator.

2. Air-Purifying Half-Face (Elastomeric) Respirators

Reusable half-face respirators are the most commonly used type of respirator. Half-face respirators are air-purifying devices that cover the nose, mouth, and chin. The facepiece is equipped with either cartridges that capture gases and vapors, and/or filters which capture particles, filtering the air as the user breathes. Each cartridge or filter is made for a specific gas, vapor, or particle hazard, with some offering protection against a combination of hazards.



Limitations - Since this type of respirator does not supply air, it cannot be used in oxygen deficient atmospheres, in IDLH atmospheres, or in confined spaces. It can only be used for protection against the contaminants listed on the cartridge or the manufacturer's cartridge selection chart at known concentrations. The half-face has a protection factor of 10, allowing the wearer to only be exposed to a specific contaminant at concentrations less than 10 times the allowable limits (PEL). It cannot be used against natural gas or vapors with poor warning properties. The wearer should leave an area immediately if the smell of gas or vapor is detected inside the mask or if the breathing resistance increases.

The half-face respirator cannot be worn when facial hair extends under the face-mask sealing area.

Procedure - To put on and adjust a half-face respirator:

1. Inspect your respirator: Make sure both inhalation and exhalation valves are in place on the mask. Check for any signs of wear or deterioration.
2. Hold the mask so the narrow nose-cup points upward.
3. Grasp both of the lower mask straps and hook them behind the neck; place the top cradle straps on the top of and behind the head.
4. Before using your respirator, check for leaks by performing both positive- and negative pressure *checks*:



Positive Pressure and Negative Pressure User Seal checks:

Positive-Pressure (User Seal) Check - Block the exhaust port with the heel of your hand and exhale with enough force to cause a slight positive pressure inside the face-piece. If the face-piece bulges slightly and no air leaks between the face and face-piece are detected, a proper fit has been obtained.



Negative-Pressure (User Seal) Check - Block the intake port(s) with your palms and inhale for five to ten seconds. If the face-piece collapses slightly and no air leakage is detected between your face and the face-piece, a proper fit has been obtained.

Notify your supervisor for maintenance or for replacement if it becomes damaged or shows signs of wear. Defective respirators must be immediately taken out of service and not used until repaired by trained personnel or replaced.

3. Air-Purifying Full-Face (Elastomeric) Respirators

Full-face respirators provide more protection than half-face because their shape allows a better mask-to-face seal. The addition of a facepiece protects the eyes from irritating chemicals, splashes, or particulate atmospheres. Full-face respirators are equipped with selective types of air-purifying cartridges or filters - dependent upon the protection required - to capture dust, mists, fumes, or gas and vapor hazards.



Limitations – Air-purifying full-face respirators have the same limitations for use as half-face respirators. Since they do not supply air, they cannot be used in oxygen deficient atmospheres or temperature extremes, in IDLH atmospheres, or in confined spaces. The full-face respirator has a protection factor of 50, only allowing the wearer to be exposed to a specific contaminant at concentrations less than 50 times the allowable limits (PEL).

Standard eyeglasses interfere with the mask-to-face seal; therefore, the wearer should obtain an additional pair of prescription lenses attached to a spectacle mount kit for installation into the mask.

Procedure - To put on a full-face respirator:

1. Inspect your respirator. Check for any signs of wear or deterioration. Make sure the appropriate cartridges or filters are securely attached and that the expiration date of the filters has not passed.
2. Loosen all straps; pull the harness over the head and place the chin in the chin cup.
3. Pull the head harness well down on the back of the head.
4. Tighten the harness gently, starting with the bottom straps and then the middle and top straps.
5. Before using your respirator, check for leaks by performing the [positive and negative pressure checks](#) described in the half-face section above.

Notify your supervisor for maintenance or for replacement if it becomes damaged or shows signs of wear. Defective respirators must be immediately taken out of service and not used until repaired by trained personnel or replaced.

4. Powered Air-Purifying Respirators (PAPR); Loose and Tight Fitting Facepieces



Powered Air-Purifying Respirators (PAPR) are belt-mounted, battery-operated blower respirators. Contaminated air is filtered through a cartridge, filter, or cartridge/filter combination, while a constant supply of purified/filtered air is delivered to the facepiece. Since the blower has rechargeable batteries, it can be reused with the addition of a freshly charged battery. Tight and loose fitting facepieces are approved by NIOSH.



One advantage of using a PAPR is that it supplies air at a positive pressure within the facepiece, so that leaks are from inside to outside. PAPRs must deliver at least four cubic feet of air per minute (CFM) to a tight-fitting facepiece and at least seven CFM to a loose fitting hood or helmet/hood.

Limitations - A PAPR with a belt-mounted blower and selected cartridges cannot be used in oxygen-deficient atmospheres, in IDLH atmospheres, or for protection against gases or vapors. The protection factor varies depending upon the facepiece. It cannot be used in emergency situations. The batteries will only last a limited amount of time and so must be recharged after use or during use depending upon the total work time and the particular model of the PAPR.

Procedure - To use a powered air-purifying respirator, each time:

1. Inspect your equipment. Check for any signs of wear or deterioration. Make sure the appropriate cartridge(s)/filter(s) are securely attached.
2. Ensure that appropriate airflow is achieved by using a manometer and following manufacturer’s guidelines.
3. Mount the unit on your waist and adjust the belt until it is comfortable.
4. Put on the face mask.
5. Turn the blower on. Air will flow into the mask.

Note: There are certain brands that have the fan motor/blower and filter at the center nosepiece of the mask instead of on the belt.

Atmosphere-Supplying Respirators (ASRs)

ASRs provide clean breathing air from a separate source. These respirators protect workers from many types of airborne contaminants (particles, gases, and vapors) and, in certain cases, oxygen-deficient atmospheres. Tight-fitting ASRs require fit testing prior to use. Below are the different types of ASRs.

Supplied-Air Respirators (SARs)



Photo courtesy of Honeywell International Inc.



SARs are connected to a separate source that supplies breathing air via a hose. This source is located outside of the work area.

- Facepiece is connected to a separate source that supplies clean compressed air through a hose
- Available in demand, pressure-demand, and continuous-flow configurations

Can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH)

Self-Contained Breathing Apparatus (SCBA)



Photo courtesy of 3M Scott



Figure 5. Example of an Open-Circuit SCBA



Figure 6. Example of an SCSR

SCBAs have their own breathing air supply that the user carries. This makes these devices portable. SCBAs are either open circuit or closed circuit.

- Used for entry into or escape from environments considered to be IDLH
- Two types: **Open-Circuit** and **Closed-Circuit**
- **Open-Circuit SCBAs** User carries pressurized cylinder on back to supply breathing air
 - Supplies breathing air for 30-90 minutes
 - Exhausts exhaled air instead of recirculating it
 - Can be either continuous-flow (escape-only), demand, or pressure-demand configurations
- **Closed-Circuit SCBAs** Approved for both entry and escape, or escape only
 - Rated for up to 4 hours of use
 - Recycles exhaled air, removing carbon dioxide and replacing oxygen
 - Closed-circuit escape respirators (CCERs) can be used to escape from IDLH environments
 - CCERs are sometimes referred to as self-contained self-rescuers (SCSRs), especially in mining

Combination SAR/SCBA Respirators



Photo courtesy of Survivair

This combination unit has a small self-contained air supply. The SCBA provides air if the airline supply fails.

- Pressure-demand combinations, suitable for IDLH environments, can be used to enter confined spaces
- Has a self-contained air supply
- SCBA provides air if airline supply fails or becomes interrupted
- Generally used for entry into and escape from IDLH environments

Mention of any company or product does not constitute endorsement by NIOSH, CDC

Atmosphere-supplying respirators are used to provide breathing air from a source independent of the ambient atmosphere. Respirators that supply breathing air are generally used in highly hazardous work environments. It is critical that such respirator systems provide breathing air of optimal quality and that the equipment operates reliably. Compressed air must meet at least the requirements for Grade D breathing air as described by the Compressed Gas Association (CGA)213 to include:

- Carbon monoxide content of 10 parts per million (ppm) or less
- Carbon dioxide content of 1,000 ppm or less
- Oxygen content of 19.5-23.5%
- Oil (condensed) & particulates content of 5 milligrams per cubic meter (mg/m³) normal temperature and pressure (NTP)
- No noticeable odor

5. Self-Contained Breathing Apparatus (SCBA)

Self-Contained Breathing Apparatus (SCBA) units provide the user with air that is supplied from a cylinder of compressed breathing air that is designed to be carried by the respirator user. SCBAs may be used in atmospheres unsuitable for air-purifying respirators. This includes use in IDLH atmospheres and for emergencies where breathing hazards may exist and mobility is essential. SCBA units may be used in IDLH atmospheres only in conjunction with a positive-pressure full-face mask, and a five minute escape breathing air apparatus. SCBAs are most commonly used by fire fighters, emergency maintenance personnel or HAZMAT Personnel. Use of a SCBA requires specialized training. Contact EHS for assistance.



Limitations - The bulk and weight (up to 35 lbs) of most SCBA's make them unsuitable for strenuous work or use in a constricted space. The air supply in a standard SCBA cylinder is normally rated for between a 30 and 60 minute duration; however, heavy exertion and stress will increase breathing rates and deplete the air in less than the original available time; usually in half the time. *When the alarm bell on the unit sounds and the light flashes, the wearer has a quarter of*



the air supply remaining. No one should work alone in hazardous atmospheres, a standby with SCBA and proper communications equipment should always be nearby.

The positive-pressure full-face mask used with the SCBA unit cannot be worn when facial hair extends under the facepiece sealing area of the mask.

Procedure -To use a Self-Contained Breathing Apparatus (SCBA):

1. Remove the unit from its case or cabinet and inspect it carefully to ensure that it is operating properly before putting it on. Follow the instructions specified by the SCBA manufacturer for air-cylinder operation.
 - a. Check the cylinder gauge for a “full” indication.
 - b. Check the connection between the cylinder and the regulator.
2. Put on the SCBA unit and adjust the harness.
3. Check hoses and overall condition of the mask (straps, lens, etc.).
4. Put the mask on and adjust it. Start with the bottom straps, and then the top straps (pull the top strap snug, not tight).
5. Place your palm over the inhalation opening of respirator and inhale slowly until the mask is drawn toward your face; hold your breath for 10 seconds to see whether there is any leakage in the mask-to-face seal.
6. With your palm still over the opening of the exhalation valve, exhale, noting whether there is any leakage around the face-piece. This step also clears the exhalation valve.
7. Make the air connection to the regulator.
8. Always switch the regulator to positive-pressure mode (up) before entry into an IDLH atmosphere.

Inspect the SCBA unit at least monthly to ensure proper operation for emergency use and document your inspections.

Pressure Demand Regulator - The pressure demand regulator minimizes any chance of contaminants leaking into the mask during inhalation because the entire face mask is kept at positive pressure in relation to the surrounding atmosphere. A special full-face mask equipped with a positive pressure exhalation valve is held closed by air pressure to prevent contaminants from leaking into the facepiece during inhalation. Because proper performance of the pressure demand regulator is essential to the wearer’s protection, any problems with the regulator must be immediately reported to your supervisor.

6. Air Supplied Airline Respirators

Air supplied airline respirators are used when fresh supplied air from a tank is necessary during work operations. Typical applications for these units would be working in an environment that would require clean air with fresh oxygen that an Air-Purifying Respirator could not provide. When using these devices, it is important to ensure that the location of the air tank is not near a source of carbon monoxide or any other air contaminant, and that the tank has appropriate Grade D air as described by the compressed gas association.





Appendix A: PAPR User Fact Sheet

Proper use of a powered air purifying respirator (PAPR) is critical to ensuring that PAPR users do not acquire illnesses from their potential exposure(s) at KSU. Contact EHS for assistance in proper PAPR use.

PAPRs are capable of using a variety of filters/cartridges to remove different contaminants from the air. Users must know what the contaminant is and select the proper filter/cartridge to be protected. This must be included in the *Worksite-Specific Respiratory Protection Plan*.

PAPRs equipped with high efficiency particulate air (HEPA) filters provide 99.97% particulate filtration efficiency. Each PAPR unit should include: 1) Hood, helmet, or headpiece, 2) Breathing tube, 3) PAPR blower/filtration unit with battery pack and belt.

Battery Charging: Continuous charging for longer than 1 week may decrease battery life. As such, all PAPRs must be charged based on the manufacturer's instructions; this will vary among PAPR units. Many units require a minimum of 16 hours charging for a fully-charged battery.

Airflow Testing: Each PAPR must be tested prior to use.

1. Connect the airflow indicator tube to the PAPR; for some units (Breathe Easy, TR-600) this will require removing the breathing tube; for others (GVP, Primair) the airflow indicator connects to the breathing tube. Ensure the airflow indicator tube is perpendicular to the floor.
2. Attach appropriate filter/cartridge and REMOVE any filter/cartridge caps; turn on the PAPR.
3. If the floating ball inside the airflow indicator tube does not rise above the appropriate marking (typically 6 CFM), the airflow is insufficient. Do not use the PAPR until the unit is serviced.

Decontamination Procedures:

1. While wearing gloves, remove the filters/cartridges if applicable (some units do not require filter removal, e.g., Air-Mate). Do NOT clean cartridges/filters; this may damage them. Refer to the *Worksite-Specific Respiratory Protection Plan* for the cartridge/filter change-out schedule.
2. Wipe the external surfaces (headpiece, blower/filtration unit, and battery pack) with an approved disinfectant for the contaminant of concern by applying the disinfectant to a cloth/rag, or use a pre-wetted wipe. Do not spray the PAPR blower/filtration unit directly.
3. If the hood/helmet is shared, wipe the inside of the hood/helmet with an alcohol wipe.
4. Wipe the outside of the breathing tube with the approved disinfectant. The breathing tube may be submerged and soaked in a mild cleaning solution as necessary, then rinsed with water.
5. Allow PAPR blower/filtration unit, breathing tube, battery pack, and hood/helmet to air dry.
6. Store on a shelf in a cool, dry, dark space, out of sunlight.



PAPR Use Checklist:

1. Inspection PRIOR to use
 - Helmet/hood, breathing tube, and/or fittings are correct for the pump being used (must be same manufacturer)
 - Filter/cartridge is in place (wear gloves if installing previously used filters)
 - Filter/cartridge is adequate for contaminant
 - Air flow is adequate (typically 6 CFM)
2. Donning (putting on the PAPR) and In-Use Procedure
 - Fittings and connections are tight and hose is not leaking
 - Air flow is adequate (6 CFM)
 - PAPR is turned on before entering exposure
 - Exit area and check battery if you notice a variance in airflow or the sound of the motor
3. Doffing (taking off the PAPR):
 - For potentially infectious exposures (BSL-3 agents, Q Fever in the PRF, etc.), cleaning of the PAPR should take place BEFORE the PAPR is removed from the immediate area
 - Infectious exposures: the wearer, or a SECOND PERSON/HELPER (if possible) must wipe the exterior surface with a disinfectant capable of inactivating the contaminant of concern while the PAPR is still being worn
 - PAPR may then be removed and must be cleaned/disinfected outside of the hazard area in a dedicated decontamination area or ante-room
 - Do NOT take PAPRs to a clean area such as offices for disinfection – this will spread contaminants
4. Cleaning and Disinfection:
 - Disconnect all component parts of PAPR
 - Blower unit AND all its component parts (blower/filtration unit, battery, breathing tube, and hood/helmet) should be cleaned and disinfected
 - Non-infectious exposures: use a mild cleaning solution or disinfectant cleaning wipes (70% Isopropyl Alcohol) to wipe down all parts
 - Infectious exposures (BSL-3, PRF): typical cleaning agents WILL NOT WORK for some agents; instead use bleach or Virkon
 - Do NOT submerge the battery, blower/filtration, or hood/helmet in liquid
 - Do NOT clean filters/cartridges
 - Dispose of filters/cartridges after service life has expired; special steps may be required (e.g., for infectious exposures, perform change-out in a BSC)
5. Storage:
 - AFTER disinfection and drying, store on a shelf in a cool, dry, dark space, out of sunlight.



Appendix B: Respirator Cartridge Color Code

All cartridges are assigned a color designating the type of contaminant they filter:

Contaminant	Color Coding on Cartridge/Canister
Acid gases	White
Hydrocyanic acid gas	White with 1/2 inch green stripe completely around the canister near the bottom.
Chlorine gas	White with 1/2 inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia gas	Green
Acid gases and ammonia gas	Green with 1/2 inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue
Acid gases & organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 1/2 inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases	Brown
Radioactive materials, except tritium & noble gases	Purple (magenta)
Pesticides	Organic vapor canister plus a particulate filter
Multi-Contaminant and CBRN agent	Olive
Any particulates - P100	Purple
Any particulates - P95, P99, R95, R99, R100	Orange
Any particulates free of oil - N95, N99, or N100	Teal

Color codes on cartridges & filters are only a guide. Read the label to be sure you have the right kind. If a combination of elements is required, check to ensure you have the right combination on each side of the respirator.



Appendix C: Mandatory Fit Testing Procedures

Appendix A to §1910.134: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
 - (a) Position of the mask on the nose
 - (b) Room for eye protection
 - (c) Room to talk
 - (d) Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit:
 - (a) Chin properly placed;
 - (b) Adequate strap tension, not overly tightened;
 - (c) Fit across nose bridge;
 - (d) Respirator of proper size to span distance from nose to chin;
 - (e) Tendency of respirator to slip;
 - (f) Self-observation in mirror to evaluate fit and respirator position.
8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.
9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.
10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.
11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.
12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.
13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.



(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the



test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the

test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.



Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar



to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4 inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the num-



ber of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

5. Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

(a) General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of

irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.



(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.



(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent



penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where $ff_1, ff_2, ff_3,$ etc. are the fit factors for exercises 1, 2, 3, etc.

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.

The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A

probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Portacount Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) After the test exercises, the test subject shall be questioned by the test conductor regarding



the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. Controlled negative pressure (CNP) quantitative fit testing protocol.

The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Occupational Health Dynamics of Birmingham, Alabama also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and va-

lidity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

(2) The CNP system defaults selected for test pressure shall be set at - 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

(5) The employer must train the test subject to hold his or her breath for at least 10 seconds.

(6) The test subject must don the test respirator without any assistance from the test administrator who is conducting the CNP fit test. The respirator must not be adjusted once the fit-test exercises begin. Any adjustment voids the test, and the test subject must repeat the fit test.

(7) The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.



(b) CNP Test Exercises.

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be sub-

stituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

(c) CNP Test Instrument.

(1) The test instrument must have an effective audio-warning device, or a visual-warning device in the form of a screen tracing, that indicates when the test subject fails to hold his or her breath during the test. The test must be terminated and restarted from the beginning when the test subject fails to hold his or her breath during the test. The test subject then may be refitted and retested.

(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

5. Controlled negative pressure (CNP) REDON quantitative fit testing protocol.

(a) When administering this protocol to test subjects, employers must comply with the requirements specified in paragraphs (a) and (c) of Part I.C.4 of this appendix ("Controlled negative pressure (CNP) quantitative fit testing protocol"), as well as use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in paragraph (b) of Part I.C.4 of this appendix.

(b) Employers must ensure that each test subject being fit tested using this protocol follows the exercise and measurement procedures, including the order of administration, described below in Table A-1 of this appendix.



Table A-1. CNP REDON Quantitative Fit Testing Protocol		
Exercises(1)	Exercise procedure	Measurement procedure
Facing Forward	Stand and breathe normally, without talking, for 30 seconds.	Face forward, while holding breath for 10 seconds.
Bending Over	Bend at the waist, as if going to touch his or her toes, for 30 seconds.	Face parallel to the floor, while holding breath for 10 seconds
Head Shaking	For about three seconds, shake head back and forth vigorously several times while shouting.	Face forward, while holding breath for 10 seconds.
REDON 1	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask.	Face forward, while holding breath for 10 seconds.
REDON 2	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask again.	Face forward, while holding breath for 10 seconds.

¹ Exercises are listed in the order in which they are to be administered.

(c) After completing the test exercises, the test administrator must question each test subject regarding the comfort of the respirator. When a test subject states that the respirator is unacceptable, the employer must ensure that the test administrator repeats the protocol using another respirator model.

(d) Employers must determine the overall fit factor for each test subject by calculating the harmonic mean of the fit testing exercises as follows:

$$\text{Overall Fit Factor} = \frac{N}{[1/FF_1 + 1/FF_2 + \dots + 1/FF_N]}$$

Where:

N = The number of exercises;

FF₁ = The fit factor for the first exercise;

FF₂ = The fit factor for the second exercise; and

FF_N = The fit factor for the nth exercise.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.



Appendix D: Mandatory User Seal Check Procedures

Appendix B-1 to §1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. Positive pressure check. Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.



Appendix E: Mandatory Respirator Cleaning Procedures

Appendix B-2 to §1910.134: Respirator Cleaning Procedures (Mandatory)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 deg. C [110 deg. 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. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. 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. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

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



Appendix F: SCBA Inspections

Each Self-Contained Breathing Apparatus unit stored for emergency use shall be inspected monthly to ensure proper operation. The following items noted below are suggested inspection procedures. Since there are numerous types of SCBAs available from different manufacturers, refer to the instructions specified in the owner's manual for proper cleaning, maintenance and operating procedures.

The department shall assign a responsible person(s) to conduct a monthly (or more frequent) inspection of each SCBA unit and record the results on the proper form (See example on following page).

- Inspect the respirator as described in the KSU RPP or in accordance with manufacturers recommendations.
- Inspect all hoses by stretching them and looking for cracks or holes; check hose connections for deterioration. Place the mask in a new bag and seal it.
- Examine the air cylinder pressure gauge for proper air pressure; check the tightness of all hose connections. Examine the regulator
- Open the air cylinder valve to pressurize the regulator; check that the regulator pressure gauge has approximately the same pressure as the cylinder gauge. Then close the air cylinder valve to see whether the pressure goes down. A noticeable decrease in pressure (within one to two minutes) indicates a defective regulator or hose.
- Check the regulator for proper use.
- Open the purge valve slightly--air should flow. Then, close the purge valve and bleed the air out slowly using the "on-off" lever. Watch the regulator pressure gauge to see whether the alarm sounds when the pressure reaches $\frac{1}{4}$ of the tank capacity.
- Check the harness, back pack, and air cylinder for wear or damage.
- After inspecting the SCBA unit, fill out the *Monthly Inspection Form* on the following page. The records should be marked to reflect the month and day of inspection and the inspector's initials.
- Check the distress alarm. Ensure correct functioning in all modes.
- After the inspection, the case or cabinet shall be secured.
- Should defective equipment be found or servicing the unit is required, the inspector shall take immediate action to correct any deficiencies.



SCBA Monthly Inspection Form

Model # _____

Serial # _____

Year _____

Initial each box after item is inspected and deemed to be in an acceptable condition

Item	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mask and Hose-Examine for contamination, damage, and deterioration												
Examine Harness for wear and function of hardware												
Test Unit as Worn (Regulator attached to cylinder)												
Check cylinder gauge for "full" indication												
Close cylinder valve. Compare regulator gauge to cylinder gauge (+ or- 50 P.S.I. is allowable)												
Watch regulator gauge for drop in reading, which would indicate leakage. (One increment on gauge in 5 min is allowable)												
Breathe unit down until alarm starts. Check regulator gauge for indication of pressure. Alarm should start at about ¼ full.												
Close main line valve, open and close cylinder valve												
Slightly breathe on regulator to check shut off valve. Regulator should not flow.												
Open main line valve full and lock. Open by-pass and bleed off pressure												
Face piece. Inspect lens for cracks or large scratches												
Hydrostatic Test date on air cylinder(s)												