Environmental Health and Safety

Respiratory Protection Program
According to 29 CFR § 1910.134

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Purpose and application

Under the U.S. Department of Labor Occupational Safety and Health Administration, employers must establish and implement procedures for properly using respirators. The Respiratory Protection Standard, 29 CFR §1910.134, is designed to minimize employee exposure to hazardous contaminants in the workplace by providing a means by which employees are informed of potential hazards and made aware of what measures can be utilized to minimize or eliminate the potential for exposure.

Arizona State University's Department of Environmental Health and Safety, or EHS, has determined that some employees may be required to enter environments where airborne contaminants may be present, exposing them to respiratory hazards during routine or non-routine operations. These hazards include dust, particulates, vapors and, in some cases, represent Immediately Dangerous to Life or Health, or IDLH conditions. This program aims to establish procedures to protect all ASU employees from exposure to these respiratory hazards.

Permissible Exposure Limits, or PEL, for airborne contaminants have been established and are enforceable through OSHA. A citation may be incurred when a PEL is exceeded for a substance listed in Table Z of 29 CFR § 1910.1000. Therefore, ASU must provide respiratory protection when engineering controls, work practices or administrative controls are not feasible to protect employees from airborne contaminants.

Engineering controls like enclosure of the operation or local exhaust ventilation, work practice controls like training and housekeeping and administrative controls like scheduling or substituting hazardous material with a less toxic material are the first line of defense when controlling occupational diseases caused by breathing air contaminated with harmful dust, fogs, fumes, mists, gases, smokes, sprays or vapors. These controls may not always be feasible for some operations or cannot always completely control the identified hazards. In these situations, respirators and other protective equipment must be used.
Respirators are also needed to protect employees' health during emergencies.

Respiratory protection is available through EHS for individuals on the university payroll, e.g., faculty, staff, teaching assistants, university-paid graduate research assistants and university-paid work-study students.

This program applies to all ASU employees who may be required to wear respirators during routine work operations and non-routine or emergency operations, such as during the clean-up of a hazardous substance spill. In addition, requirements for voluntary use of respiratory protection for ASU employees are identified within the program.

ASU's policy is that employees participating in the respiratory protection program do so at no cost to them. The participating employee's department will carry the expenses associated with training, medical evaluations and respiratory protection equipment.

A written respiratory protection program is required to protect employees from airborne workplace contaminants. The program must include medical evaluations, workplace-specific procedures, selection of respirators, training and use during routine and emergency situations, fit testing, donning, in-use monitoring, doffing, inspection, storage, maintenance and regular evaluation of the program. See OSHA Respiratory Protection Standard 29 CFR §1910.134(c)(1)(vi) for additional information.

Once a supervisor determines that respiratory protection is necessary to protect employees from harmful airborne contaminants, those employees will participate in the respiratory protection program. Employees using respiratory protection voluntarily are not required to participate in the respiratory protection program but must follow instructions for voluntary respiratory protection, including medical clearance. Employees shall select respirators from models and sizes so that the respirator is acceptable and fits the user correctly. The chart in Appendix VII, Air Purifying Respirators Canister Color Codes, will aid in appropriately selecting canisters for specific air contaminants.

Responsibilities

Environmental Health and Safety

EHS is the Program Administrator responsible for administering the respiratory protection program and has the authority to make decisions and implement changes as necessary. Duties include:

- Arrange or conduct required training and fit testing.
- Develop procedures to ensure adequate air quality, quantity and flow of breathing air for atmosphere supplying respirators.
- Ensure standard operating procedures meet the requirements of this program, including proper storage and maintenance of respiratory protection equipment.
- Establish periodic inspection schedules of those workplaces or conditions that require respiratory protection to determine exposure and changing situations.
- Evaluate hazards to determine the type of respirators and level of protection required and approve each department's standard operating procedures for respiratory protection.
- Evaluate the program for effectiveness.
- Identify work areas, processes or tasks that require employees to wear respirators. Maintain records, except medical records, required by the program.
- Monitor respirator use to ensure that respirators are used per their approval.
- Provide technical assistance to university departments and units to address the mandates established by the OSHA Respiratory Protection Standard.
- Update the written program as needed.
- Verify the medical evaluation program for employees required to wear respiratory equipment.

ASU Employee Health

ASU Employee Health offers job-related screening related to biological, chemical and other workplace exposures, including respirator medical clearance and fit testing for N95, full-face and half-face respirators. ASU Employee Health will retain employees' medical records if they have an established contract with a third-party company.

Departments and supervisors

Supervisors are responsible for implementing the respiratory protection program for their respirator program participants. Duties include:

- Be aware of tasks requiring hazard evaluation and the use of respiratory protection.
- Conduct initial hazard assessment and revise and update the hazard assessment if there are changes to hazardous materials or processes.
- Coordinate with EHS to address respiratory hazards or other concerns regarding this program.
- Determine appropriate discipline for employees who fail to observe any portion of the ASU Respiratory Protection Program.
- Ensure employees under their supervision, including new hires, have received appropriate medical evaluations, training and fit testing.
- Ensure respirators fit employees well and do not cause discomfort.
- Ensure that respirators are properly cleaned, maintained and stored.
- Ensure the availability of respirators and accessories.
- Monitor and enforce proper use of respiratory protection.
- Notify employees of respiratory protection changes whenever they are needed.

Employees

Each employee has the responsibility to wear their respirator as they were trained. The employee shall ensure that nothing interferes with the facial seal for tight-fitting respirators, including facial hair. Duties include:

- Attend training and fit test before initially using a respirator.
- Be familiar with the ASU Respiratory Protection program and their specific respiratory protection devices. Complete medical evaluation questionnaires and hazard evaluation as required before the initial use of the respiratory protection device.
- Employees who voluntarily use a respirator will read and understand the voluntary use notification in Appendix III.
- Inform their supervisor if the respirator no longer fits well, is damaged or compromised and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards they feel are not adequately addressed in the workplace or any other program-related concerns.
- Use, care for, maintain and store their respirators per their training.

Respiratory protection program elements

As part of this program, OSHA requires the following elements within the ASU Respiratory Protection Program. This ensures that workers know about the safe operation and use of respirators. Specific elements of the program include:

1. Selection of respirators.
2. Medical evaluations.
3. Fit testing.
4. Respirator use.
5. Maintenance and care.
6. Training.
7. Record keeping.

Selection procedures

The Program Administrator will select respirators to be used on-site based on the hazards to which workers are exposed and under all OSHA standards. The supervisor will conduct a hazard evaluation for each operation, process or work area where airborne contaminants may be present in routine operations or during an emergency and contact the Program Administrator. Choosing the correct respiratory protection equipment involves several steps:

1. Determine the hazard.
2. Choose equipment that is certified for the hazard.
3. Ensure the device is performing as it is intended to do.

Proper selection of respirators must be made according to the OSHA requirements outlined in 29 CFR 1910.134 (d). All respiratory protective devices must be certified by the National Institute for Occupational Safety and Health, or NIOSH, for the contaminant or situation to which employees may be exposed. The respirator shall be used in compliance with the conditions of the NIOSH certification. In addition to those above, substance-specific OSHA standards require additional criteria for respirator selection — for example, 29 CFR 1910.1001 (g) Asbestos. All such requirements of each applicable OSHA standard must be observed.

The chemical and physical properties of the contaminant, the toxicity and concentration of the hazardous material, and the amount of oxygen present must be considered when selecting the proper respirator. The nature and extent of the hazard, the work rate, the area to be covered mobility, length of exposure time, work requirements and conditions, and the limitations and characteristics of the available respirators are also selection factors that must be considered.

There are two typical types of respirator protection: air-purifying and atmosphere-supplying respirators:

Air-purifying respirators, or APR, are respirators with an air-purifying filter, cartridge or canister that removes specific air contaminants by passing ambient air through the air-purifying element. Air-purifying respirators may not be used in an oxygen-deficient atmosphere or within conditions immediately dangerous to life and health.

Atmosphere-supplying respirators, or ASR, are respirators that supply the respirator user with breathing air from a source independent of the ambient atmosphere and include Supplied Air Respirators, or SAR and Self-Contained Breathing Apparatus, or SCBA units.

A self-contained breathing apparatus provides respiratory protection for a relatively short period. An airline respirator protects if the facepiece is supplied with adequate respirable air and the contaminated material has not penetrated other personal protective equipment. Particulate filter respirators can provide protection as long the filter does not experience a “breakthrough” of contaminant through the filter. For longer use, ASR respirators offer the advantage of longer use in high contaminant concentrations and reduce the concern regarding chemical warning properties of the airborne toxic material. Those respirators also cause less discomfort than air-purifying respirators because the wearer does not need to overcome filter resistance to inhale air.

Air-purifying respirators present minimal interference with the wearer's movement. Supplied air respirators with trailing hoses restrict the wearer's moving area and present a potential hazard where the trailing hose can come into contact with machinery. A self-contained breathing apparatus presents a size and weight constraint that may restrict climbing and movement in tight places.

The wearer's work rate determines the volume of air breathed per minute, maximum respiratory flow rate and tolerable inhalation and exhalation breathing resistance. The respiratory minute volume is significant in self-contained and airline respirators operated from air-supplied cylinders since it determines their operating life.

Peak airflow rate is important in the use of constant low airline equipment. The air supply rate should always be greater than the peak respiratory flow rate to maintain the respiratory enclosure under positive pressure. High breathing resistance of air-purifying respirators under heavy work conditions can result in distress. Stress resulting from a respirator’s use should be minimized using a respirator with minimum weight and breathing resistance. Unless a specific OSHA standard exists containing specific requirements, respirators shall be selected according to 1910.134 (d), and the following table may be used for reference:

Hazard	Respirator
Oxygen deficiency	• IDLH condition — full face pressure demand SCBA with a minimum of 30 minutes of air.
Gas and vapor contaminants	• IDLH condition — positive-pressure SCBA. Combination positive pressure supplied-air respirator and auxiliary self-contained air supply. • Not IDLH condition — supplied-air respirator or APR with proper chemical cartridge.
Particulate contaminants	• Supplied-air respirator, including abrasive blasting respirator. • Powered air-purifying respirator equipped with high-efficiency filters. • Air-purifying respirator with particulate filter.
Gaseous and particulate contaminants	• IDLH condition — positive pressure, self-contained breathing apparatus. Combination positive pressure, supplied-air respirator and auxiliary self-contained air supply. • Not IDLH condition — Supplied-air respirator or APR.
Escape from contaminated atmospheres that may be immediately dangerous to life or health.	• Self-contained breathing apparatus or combination airline respirator with escape self-contained breathing apparatus.
Exposure or potential to unknow concentrations of chemical mixtures or carcinogens	• Full facepiece self-contained breathing apparatus respirator operated in a positive-pressure mode or • Full-facepiece supplied-air respirator operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in a pressure-demand or other positive-pressure mode.

Hazard assessment and area identification

It is mandatory that employees wear the appropriate respirator when working where engineering controls are not feasible or cannot completely control the airborne concentrations of regulated substances below the OSHA permissible exposure limit, or PEL.

The hazard evaluation will include:

- Exposure monitoring to quantify potential hazardous exposures. Monitoring will be coordinated and performed by EHS when needed.
- Identify and develop a list of hazardous substances used in the workplace by department or work process.
- Review work processes to determine where potential exposures to these hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing process records and talking with employees and supervisors.

The supervisor must revise and update the hazard assessment as needed. i.e., any time work process changes may potentially affect exposure. Employees needing respiratory protection during a particular activity should contact their supervisor or the ASU Program Administrator. The supervisor will evaluate the potential hazard and arrange for outside assistance as necessary. The ASU Program Administrator is available to aid. The supervisor will then communicate the results of that assessment back to the employees. If it is determined that respiratory protection is necessary, all other elements of this program will be in effect for those tasks, and this program will be updated accordingly.

Certification

All respirators must be certified and labeled by the National Institute for Occupational Safety and Health, NIOSH, Mine Safety and Health Administration, or MSHA, and shall be used under the terms of that certification. Also, all filters, cartridges and canisters must be labeled with the appropriate NIOSH or MSHA approval label. The label must not be removed or defaced while it is in use.

Voluntary respirator use

The Program Administrator may authorize the voluntary use of respiratory protective equipment at the request of employees, managers or supervisors. The employer may provide or permit employees to use their respirators if the Program Administrator determines that any voluntary use will not create a hazard. The employer shall provide employees voluntarily using respirators the information in Appendix D of the OSHA Respirator Protection Standard 29 CFR 1910.134. Please see Appendix III of this program to view the OSHA requirements for employees' voluntary use of respirators. Employees choosing to voluntarily wear a respirator other than a filtering facepiece — N95 or dust mask — must comply with the ASU Respiratory Protection Program for the medical evaluation, selection of respirators and respirator training.

Volunteers in non-high-risk positions requesting volunteer use of respirators must follow these steps:

- Contact the EHS Department to evaluate the volunteer concern and determine the next steps along with the ASU Faculty or Staff member sponsoring the volunteers and their representatives. If it is determined the volunteer may voluntarily use a respirator, ASU EHS or ASU Employee Health determines required provisions and instructions to the ASU Faculty or Staff member sponsoring the volunteers and their representatives for completing the Respirator Medical Evaluation, OSHA CFR 1910.134 Respiratory Protection Standard Appendix “D” and Training.

Medical evaluation

Employees who are either required to wear respirators or who choose to wear a respirator voluntarily must pass a medical evaluation using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire before the employee is fit tested or required to use the respirator at ASU. The fitness requirement will be at the discretion of the examining Healthcare Provider. Still, if any respirator user's physical ability changes, they must notify their supervisor immediately and cease respirator use until medical approval for resuming respirator use has been obtained. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

ASU Employee Health will provide medical evaluations. Medical evaluation procedures are as follows:

Administration of the medical questionnaire

The medical evaluation will be conducted confidentially using the medical questionnaire provided in Appendix II. A medical questionnaire will be provided to all employees requiring a medical evaluation. The complete medical questionnaire will be reviewed, and ASU Employee Health will maintain additional medical records.

The questionnaire will be administered in a way that ensures that the employee understands the content. To the extent feasible, assistance for employees who cannot read the questionnaire will be provided by providing help in reading the questionnaire. All affected employees will be given a copy of the medical questionnaire to fill out and are permitted to complete it during their normal working hours or at a time and place convenient to the employee.

Follow-up examinations

A follow-up medical examination shall include any medical tests, consultations or diagnostic procedures that the Healthcare Provider at ASU Employee Health deems necessary to make a final determination. If requested, all employees can speak with ASU Employee Health about their medical evaluation.

Supplemental information for ASU Employee Health:

The Program Administrator has provided AS Employee Health with a copy of this program and a copy of the Respiratory Protection Standard.

Medical determination

If the employee’s respirator is a negative pressure respirator and ASU Employee Health finds a medical condition that may place the employee's health at increased risk if the respirator is used, the employee may be provided a PAPR if ASU Employee Health medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the employee is no longer required to use a PAPR.

Additional medical evaluations
After an employee has received medical clearance and begun to use their respirator, additional medical evaluations will be provided under the following circumstances:

- A change occurs in workplace conditions, e.g., physical work effort, protective clothing and temperature that may substantially increase the physiological burden placed on an employee.
- A PLHCP, supervisor or program administrator informs the employee supervisor that an employee needs to be reevaluated.
- An employee reports medical signs or symptoms related to the ability to use a respirator.

- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation.
- Medical clearances will be performed at regular intervals.

Fit testing

Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style and size of respirator used by the employee. Employees voluntarily wearing half-facepiece APRs may also be fit-tested upon request. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit. Fit testing of positive pressure respirators will be conducted in the negative pressure mode. Fit testing is required:

- Annually.
- Before being allowed to use any respirator with a tight-fitting facepiece.
- When there are changes in the employee's physical condition that could affect respiratory fit — e.g., obvious change in body weight, facial scarring.

ASU Employee Health will conduct tests following an OSHA-Accepted Fit Test Protocol and Procedure. Qualitative Fit Testing, or QLFT, involves the introduction of a harmless, odorous or irritating substance into the wearer's breathing zone. A proper fit is indicated if the wearer cannot detect the irritating substance within the respirator. Quantitative fit testing, or QNFT, offers more detailed information on respirator fit. It involves the introduction of an aerosol to the wearer while they are wearing the respirator. Both fit testing methods are conducted while the employee performs exercises that could induce facepiece leakage; the air inside the facepiece is measured for the presence of the aerosol.

Each respirator user will receive fitting instructions that include demonstrations and practice on how the respirator should be worn, how to adjust it and how to determine if it fits properly. Although respirators are designed for maximum efficiency, they cannot protect the wearer without a tight seal between the facepiece and the wearer. Beards and other facial hair can substantially reduce the effectiveness of a respirator. The absence of dentures can seriously affect the fit of a facepiece. Ensure proper protection for a facepiece by having the wearer check it each time the respirator is donned. See user seal check procedures below.

Corrective lenses worn by employees also present a problem when fitting respirators. Special mountings to hold corrective lenses inside full-facepieces are available. If corrective lenses are needed, the facepiece and lens must be fitted by a qualified individual to provide good vision, comfort and proper sealing. Full-facepiece and half-facepiece respirators have different fitting characteristics. Employees who cannot obtain a proper fit with their respirator must notify their supervisor immediately. Upon notification by any worker of any respirator's improper fit, the supervisor shall not permit the employee to work in any area where respiratory protection is required until the employee is equipped with a proper-fitting respirator. The supervisor of each respirator wearer is responsible for ensuring that the appropriate facepiece fit test has been conducted and that the result of such testing has indicated a proper fit.

Respirator use

Respiratory protection will be required for the personnel conducting specific tasks identified in Department-specific SOPs (see Appendix IV). The department-specific SOP is provided to EHS or medical staff during training or fit testing. Contact the Supervisor or ASU Program Administrator for a copy of the SOP. Employees will use their respirators under conditions specified by this program, according to the applicable SOP and the training they receive on using each model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH, MSHA or its manufacturer.

All employees must conduct positive and negative seal checks each time they wear their respirator. Special mountings to hold corrective lenses inside full-facepieces should be available if corrective lenses are needed.

All employees shall be permitted to leave the work area to go to the locker room to maintain their respirator for the following reasons: to clean their respirator if the respirator is impeding their ability to work, change filters or cartridges, replace parts or to inspect respirator if it stops functioning as intended. Employees should notify their supervisor before leaving the area.

Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair or missing dentures that may prevent them from achieving a good seal. Employees are prohibited from wearing headphones, jewelry or other articles that may interfere with the facepiece-to-face seal. Additionally, ASU's policy is that employees may not use respirators with tight-fitting facepieces if they have facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function. Employees with beards may use types of respirators that do not require a face seal and can be worn by bearded employees.

User seal check procedures

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

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 inside the facepiece without evidence of outward air leakage at the seal. For most respirators, this leak testing method requires the wearer to remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

Negative pressure check

Close off the inlet opening of the canister or cartridges by covering it with the palm or by replacing the filter seals, inhale gently so that the facepiece collapses slightly and hold your breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitride 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.

Manufacturer's recommended user seal check procedures

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

Emergency procedures

Employees should refer to their Department SOPs or ASU Emergency Response Guide for emergency procedure descriptions, including proper evacuation routes.

Respirator malfunction

APR respirator malfunction:

For any malfunction of an APR, e.g., a breakthrough, facepiece leakage, or improperly working valve, the respirator wearer should go to the designated safe area to maintain the respirator and inform his or her supervisor that the respirator no longer functions as intended. The supervisor must ensure the qualified employee receives a new respirator.

Atmosphere-supplying respirator malfunction:

All workers wearing atmosphere-supplying respirators will work with a buddy. Buddies shall assist workers who experience a SAR malfunction as follows: If a worker experiences a malfunction of a SAR, they should signal to the buddy that they have had a respirator malfunction. The buddy shall don an emergency escape respirator and immediately help the worker exit the area.

Defective respirators

Respirators that are defective or have defective parts shall be taken out of service immediately, disposed of and replaced with proper working equipment.

IDLH procedures

Employees using self-contained breathing apparatus or supplied-air respirators where the atmosphere may be Immediately Dangerous to Life and Health, or IDLH, must be medically qualified, trained and fit-tested before they may wear an appropriate respirator for IDLH situations. Only authorized ASU employees with this additional training and fit testing can participate in these situations.

Air quality

Only Grade D breathing air shall be used in the cylinders and compressors for supplied-air respirators. The Program Administrator will establish testing and documentation requirements for each system supplying supplied air for respiratory protection in each affected department's SOPs.
Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI or Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

- Carbon dioxide content of 1,000 ppm or less.
- Carbon monoxide content of 10 ppm or less.
- Condensed Hydrocarbon content of 5 milligrams per cubic meter of air or less.
- Lack of noticeable odor.
- Oxygen content (v/v) of 19.5-23.5%.

If used, compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen. Compressed oxygen is not to be used in atmosphere-supplying respirators that have previously used compressed air.

Cylinders will be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178). Cylinders of purchased breathing air should have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air and the moisture content in the cylinder does not exceed a dew point of -50 deg. F (-45.6 deg. C) at 1 atmosphere pressure.

Compressors used to supply breathing air to respirators will be constructed and situated to prevent entry of contaminated air into the air-supply system. Minimize moisture content so that the dew point at 1-atmosphere pressure is 10 degrees F (5.56 deg. C) below the ambient temperature and will have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters will be maintained, replaced or refurbished periodically following the manufacturer's instructions.
Each system will have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag shall be maintained at the compressor.
For compressors that are not oil-lubricated, the department shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm by using continuous carbon monoxide monitors calibrated per the manufacturer’s instructions.

For oil-lubricated compressors, a high-temperature and carbon monoxide alarm will prevent carbon monoxide in the breathing air from exceeding 10 ppm.

Breathing air couplings are incompatible with outlets for non-respirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

Maximum use concentrations

The Maximum Use Concentration, or MUC is a term used by OSHA for the upper limit at which the class of respirators is expected to provide protection. The MUC can be calculated by multiplying the Assigned Protection Factor, or APF, by PEL, short-term exposure limit or ceiling limit of the contaminant.

APF × PEL = MUC

APF is a term used by OSHA to determine how well a respirator and filter combination will protect an individual from external contaminants. It is an estimate of the level of protection a respirator provides. Permissible Exposure Limit — PEL or OSHA PEL is a legal limit in the United States for an employee's exposure to a chemical substance or physical agent, such as high-level noise. OSHA establishes permissible exposure limits.

If an exposure ever approaches the MUC, the employer should select the next highest level of respirator. The respirator can be used up to this concentration if the MUC does not exceed the IDLH level. When no OSHA PEL is available for a hazardous substance, the MUC must be determined using available information and professional judgment.

Cleaning, maintenance and storage

Cleaning and disinfection
The respirator shall be regularly cleaned and disinfected by the respirator user. This shall be done as frequently as necessary to ensure proper protection is provided to the wearer.

A cleaning and disinfecting solution shall be provided, with respirators issued for the exclusive use of an employee that shall be cleaned and disinfected as often as necessary. No one should ever use a respirator that another person has previously used without first cleaning and disinfecting the respirator. Respirators maintained for emergency use shall be cleaned and disinfected after each use. Before putting a respirator on, the user shall inspect the respirator for defects and cleanliness. This must be done every time a respirator is put on.

Atmosphere supplying and emergency-use respirators must be cleaned and disinfected after each use. The following procedure is to be used when cleaning and disinfecting respirators:

1. Disassemble the respirator, removing any filters, canisters or cartridges.
2. Wash the facepiece and associated parts in a mild detergent with warm water or approved cleaner or sanitizer. Do not use organic solvents.
3. Rinse completely in clean, warm water.
4. Wipe the respirator with disinfectant wipes — isopropyl alcohol — to kill germs.
5. Air-dry in a clean area.
6. Reassemble the respirator and replace any defective parts.
7. Place in a clean, dry plastic bag or other airtight container.
8. Do not store items on top of the respirator.

Note: The supervisor will ensure an adequate supply of appropriate cleaning and disinfection materials is available to employees. If supplies are low, employees should contact their supervisors.

Inspections

Each respirator user must inspect their respirators before each use. Inspections shall include a check of respirator function, tightness of connections and the condition of various parts, including but not limited to the facepiece, head straps, valves, connecting tube, cartridges, canisters or filters and batteries. In addition, the elastomeric parts must be evaluated for pliability and signs of deterioration.
Regulators and warning devices on SCBAs must be inspected monthly to ensure they function properly. The monthly inspection will also ensure that cylinders are fully charged, i.e., 90% of the manufacturer's recommended pressure level.

Respirators maintained for use in emergencies will be certified by documenting the inspection date, the inspector's name or signature, the inspection's findings, any required corrective action, and a serial number or other means of identifying the inspected respirator. This information will be provided on the tag or label attached to the respirator's storage compartment. Inspection information for emergency respirators will be maintained in the immediate work area until it is replaced following subsequent certification.

Respirators should be inspected on the frequencies below:

Respirator	Frequency of inspection
Used for non-emergencies, including daily or infrequent use.	Before use and during cleaning.
A SCBA in use	Before use and during cleaning or monthly if not used.
Used for escape-only purposes	Before carrying it into a workplace for use.
Used only for emergencies	Check for proper function before and after each use and at least monthly as the manufacturer instructs.

Repairs

The supervisor will ensure that respirators that fail to pass inspection or are otherwise found defective will be removed from service and discarded.

Maintenance

Respirators must always be properly maintained to ensure they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated respirators shall be disposed of, and a new respirator shall be issued to the employee.

The following checklist will be used when inspecting respirators:

- Air supply systems: breathing air quality or grade, condition of supply hoses, hose connections and settings on regulators and valves.
- Facepiece: cracks, tears or holes, facemask distortion, cracked or loose lenses and face shield.
- Filters or cartridges: approval designation, gaskets, cracks or dents in housing and proper cartridge for hazard.
- Foam seal is not degraded.
- Head straps: breaks or tears, broken buckles.
- No discoloration or odors.
- No rust on staples or nosepieces. Valves: residue or dirt, cracks or tears in valve material.

Respirators that fail an inspection or are otherwise found defective shall be removed from service and discarded.

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area free of respiratory hazards.

Situations when this is permitted include:

- To replace the filter, cartridge or canister if vapor or gas breakthrough or leakage in the facepiece is detected.
- Washing the face and respirator facepiece to prevent any eye or skin irritation.

Storage

When not in use, each respirator shall be stored in a manner to protect it against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals and must be stored per the manufacturer's recommendations. The respirator should be inspected after taking it off and before storing it. Each employee will clean and inspect their air-purifying respirator following the provisions of this program and will store their respirator in a plastic bag in a designated area. Each employee will have their name on the bag, which will only be used to store that employee's respirator.

All respirators must be stored so the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position. Respirators shall never be stored in such places as lockers or toolboxes unless they are in clean carrying cases or cartons, and the cleaning and storage conditions listed above can be assured. No employee shall remove a respirator from the premises unless directed to do so by his or her immediate supervisor.

Each respirator, not routinely used but kept ready for emergency use, shall be inspected after each use and at least monthly to ensure it is in satisfactory working condition.

N95 Storage

Filtering facepieces — i.e., dust masks — that have been purchased and stockpiled for public health emergencies shall be stored per the manufacturer's recommendations and be used before the filtering facepiece expiration date. Due to the degradation of the electrostatic filters, manufacturers have established a 5-year shelf-life when respirators are stored in their original packaging within climate-controlled conditions ranging from - 4°F (-20°C) to +86°F (+30°C) and not exceeding 80% RH. Filtering facepiece — i.e., dust mask respirators — must be stored in a clean paper or plastic bag. Each employee who has finished wearing a disposable respirator or a respirator to be used only once shall place the respirator in the appropriate trash or disposal container. It shall not be taken from the premises for additional use under any circumstances. Filtering facepieces, including N95 filtering facepieces, may be used multiple days following the ASU EHS N95 reuse protocols.

Users of N95 filtering facepieces must ensure they use the units before expiration. Methods to maintain storage of non-expired filtering facepieces may include:

- Contact and follow manufacturer shelf-life recommendations.
- Rotate stock.

Change schedules

For SCBA, a warning of service life is available. It may be a pressure gauge or timer with an audible alarm or a window indicator for canisters. The respirator user must understand the operation and limitations of each type of warning device.

Some new cartridge or canister air-purifying respirators are equipped with an End-of-Service-Life Indicator, or 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 (US DOL OSHA, 1998). If there is no ESLI appropriate for conditions in the employer's workplace, the canisters and cartridges must be replaced according to a changing schedule for canisters and cartridges based on objective information or reliable data to ensure that canisters and cartridges are changed before the end of their service life. The canister and cartridge manufacturer will provide information about the recommended change schedule determination.

In the places where air-purifying respirators are routinely used, filters and cartridges shall be replaced regularly.

- Chemical cartridges shall be replaced.
    - After being exposed to the contaminant hazard for eight hours.
    - When the end-of-service-life indicator indicates replacement.
    - When odor or irritant properties show that a contaminant has broken through the filtering parts, the chemical cartridges will be replaced immediately.
- The filters shall be replaced whenever it becomes difficult to breathe.

Employees wearing APRs or PAPRs with P100 filters for protection against dust and other particulates shall change the cartridges on their respirators when they first begin to experience resistance in breathing while wearing their respirator. The following guidelines will be utilized for determining change-out schedules for canisters and cartridges:

Availability of objective data

Determine if respirator manufacturers, industry organizations, trade associations, professional societies, chemical manufacturers or academic institutions can provide objective data for the particular make and model of the respirator canisters or cartridges and if this data is sufficient to develop change-out schedules.

Use of inappropriate respirator cartridge or canister

Determine if APRs are appropriate for the conditions in the workplace. Some chemicals break through canisters and cartridges so quickly that canisters and cartridges may not be appropriate for the workplace. In this case, employers should consult with respirator manufacturers and Safety Data Sheets for instruction.

Change schedule for mixtures

Chemical mixtures can present a difficult task when developing change schedules. This is best determined by experimental methods, not predictive mathematical models. Schedules should be calculated by assuming the mixture stream behaves as a pure system of the most rapidly migrating component or compound with the shortest breakthrough time, i.e., sum up the concentration of the components. A margin of safety for the user should be included.

Chemical contaminant migration

When organic materials with a boiling point below 65 degrees Centigrade are embedded in a carbon filter, some may migrate through the sorbent material during storage periods or when unused. This can rapidly increase breakthroughs and could present additional exposure to the user. Whenever migration is possible, canisters and cartridges should be changed after every work shift.

Training

ASU Employee Health will train respirator users on the contents of the ASU Respiratory Protection Program, their responsibilities and the OSHA Respiratory Protection Standard. Workers must be trained before using a respirator at ASU.

The training course will cover the following topics:

- Department Specific SOPs.
- Emergency use procedures.
- Fit testing.
- Limitations of respirators. Maintenance and storage.
- Medical signs and symptoms limiting the effective use of respirators.
- Proper selection and use of respirators.
- Respirator donning and user seal checks.
- Respiratory hazards encountered at ASU and their health effects.
- The ASU Respiratory Protection Program.
- The OSHA Respiratory Protection Standard.

Employees will be retrained annually or as needed — e.g., if they change departments —roles or need to use a different respirator. Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises. The Program Administrator will document respirator training, and the documentation will include the type and model of respirator for which each employee has been trained and fit tested. Each supervisor will provide their employees with supplemental respirator training and instruction, as necessary for their area of supervision, to protect the health and safety of employees.

Program evaluation

The Program Administrator will conduct workplace evaluations to ensure the written respiratory protection program is being properly implemented and to consult employees to ensure they use the respirators properly.

Documentation and record-keeping

A written copy of this program and the OSHA standards are kept in EHS and available to all employees. Additionally, employees may access the written program through the ASU EHS website.

EHS will manage training records. Employee Health will manage and maintain medical and fit test records according to the Health Insurance Portability and Accountability Act, or HIPAA requirements. These records will be updated as new employees are trained, as existing employees receive refresher training and as fit tests are conducted.

The Program Administrator will ensure copies of the medical records for all employees covered under the respirator program are properly maintained. The completed medical questionnaire and the PLHCP's documented findings are confidential and will be managed per HIPAA requirements. Employee Health will retain the Healthcare Provider's written recommendation regarding each employee's ability to wear a respirator. Employees shall retain a copy of the Healthcare Provider's respirator medical clearance form, and fit test records shall be retained for respirator users as a permanent part of the employee's medical record.

Appendix I
Definitions

Definitions

ACGIH: American Conference of Governmental Industrial Hygienists.

Adsorption: The condensation of gases, liquids or dissolved substances on the surfaces of solids.

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

Atmosphere-supplying respirator: Respirator that supplies the user with supplied air, including Supply Air Respirators, or SARs, and Self-Contained Breathing Apparatus, or SCBA units.

Breakthrough: When a gas or vapor passes through the canister or cartridge and into the respirator.

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

CDC: Centers for Disease Control and Prevention.

Ceiling limit: Airborne concentration of a toxic substance in the work environment, which should never be exceeded.

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

Dust: Solid particles formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading or blasting.

Electrocardiogram, or ECG: Tracing made by an instrument for recording electrical potential changes occurring during the heartbeat used to diagnose heart action abnormalities.

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, or ESLI: 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: The respirator is intended only for emergency exit.

Filter or air purifying element: Component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering facepiece (dust mask): Negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit factor: 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: Use of a protocol to evaluate the fit of a respirator qualitatively or quantitatively on an individual. See the Qualitative fit test and Quantitative fit test.

Fumes: Solid particles that form when a metal or other solid vaporizes, and the molecules condense or solidify in cool air.

Gases: Formless fluids that occupy space or enclosures and can be changed to liquid or solid only by increased pressure and decreased temperature. Examples are welding gases such as acetylene, nitrogen and carbon monoxide produced by internal combustion engines.

Health care provider: Individual whose legally permitted scope of practice, i.e., license, registration or certification, allows them to independently provide or be delegated the responsibility to provide some or all of the health care services required by the Respiratory Protection Standard.

High-efficiency particulate air, or HEPA filter: Filter that is at least 99.97% efficient in removing mono-disperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR § 84 particulate filters are the N100, R100 and P100 filters.

Immediately dangerous to life or health (IDLH): An atmosphere that poses an immediate threat to life would cause irreversible adverse health effects or impair an individual's ability to escape from a dangerous atmosphere.

Interior structural firefighting: Physical activity of fire suppression, rescue or both inside buildings or enclosed structures involved in a fire situation beyond the incipient stage.

Mists: Tiny droplets of liquid suspended in the air. Examples are oil mist produced from lubricants used in metal cutting operations, acid mists from electroplating and paint spray mist from spraying operations.

N series filter: Respirator filter cartridge that filters particulates but does not resist oil.

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

NIOSH: National Institute of Occupational Safety and Health is the research arm of OSHA. NIOSH performs testing and certification of personal protective equipment.

OSHA: Occupational Safety and Health Administration is responsible for promulgating, modifying and enforcing occupational safety and health standards.

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

P series filter: Respirator filter cartridge that is oil-proof.

Permissible Exposure Limit, or PEL: The exposure limit published and enforced by OSHA as a legal standard.

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

Powered air-purifying respirator, or PAPR: Air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

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

Protection factor, or PF: With respiratory protective equipment — the ratio of the ambient airborne concentration of the contaminant to the concentration inside the facepiece.

Qualitative fit test, or QLFT: Pass or fail fit test that assesses the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test, or QNFT: Assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

R series filter: Respirator filter cartridge that resists oil.

Radionuclides: Materials that spontaneously emit ionizing radiation.

Respiratory decision logic: To enhance technical accuracy and uniformity between substances in the selection of respirators and to provide necessary criteria to support this selection, the decision logic is a step-by-step elimination of inappropriate respirators until only those that are acceptable remain.

Respirable size particulate: Particulates in the size range that permits them to penetrate deep into the lungs upon inhalation.

Respiratory inlet covering: The 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 mouthpiece respirator with a nose clamp.

Self-contained breathing apparatus, or SCBA: Atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Service life: Time that a respirator, filter, sorbent or other respiratory equipment provides adequate protection to the wearer.

Short-term exposure limit, or STEL: A 15-minute TWA concentration, which should not be exceeded at any time during a workday, even if the 8-hour TWA is within the TLV. The duration of a STEL exposure should not be repeated more than four times per day, and there should be at least 60 minutes between successive exposures at the STEL.

Smoke: Aerosol formed from the combustion of organic material.

Spirometry: Measurement of lung capacity and function.

Supplied-air respirator, or SAR or airline respirator: Atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Threshold limit value, or TLV: A time-weighted average concentration under which most people can work consistently for eight hours daily, day after day, with no harmful effects.

Time-weighted average, or TWA: Refers to concentrations of airborne toxic materials that have been weighted for a certain time duration, usually eight hours.

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

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

Vapors: Gaseous substances normally in a solid or liquid state at room temperature and pressure. They are formed by evaporation. Most solvents produce vapors. Examples include toluene and methylene chloride.

Appendix II

OSHA respirator medical evaluation questionnaire

Cited from OSHA Regulations (Standards - 29 CFR)
OSHA Respirator Medical Evaluation Questionnaire (Mandatory). - 1910.134 Appendix C

- Standard Number: 1910.134 Appendix C.
- Standard Title: OSHA Respirator Medical Evaluation Questionnaire (Mandatory).
- Subpart Number: I.
- Subpart Title: Personal Protective Equipment.

To the employer: Answers to questions in Section 1 and to question 9 in Section 2 of Part A do not require a medical examination.

To the employee: Can you read? Yes / No

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 employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the healthcare professional who will review it.

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

1. Today's date: _____
2. Your name and ASU ID number: _____
3. Department: _____
4. Your age (to nearest year): _____
5. Sex: Male / Female
6. Your height: _____ ft _____ in.
7. Your weight: _____lbs.
8. Your job title: _____
9. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____
10. The best time to phone you at this number: _____
11. Has your employer told you how to contact the health care professional reviewing this questionnaire? Yes / No
12. 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.
        - Have you worn a respirator? Yes / No
        - If "yes," what types:
        -

Part A. Section 2. — Mandatory

Questions one through nine must be answered by every employee selected to use any type of respirator.

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month? Yes / No

2. Have you ever had any of the following conditions?
   a. Seizures - fits: Yes / No
   b. Diabetes - sugar disease: Yes / No
   c. Allergic reactions that interfere with your breathing: Yes / No
   d. Claustrophobia - fear of closed-in places: Yes / No
   e. Trouble smelling odors: Yes / No

3. Have you ever had any of the following pulmonary or lung problems?
   a. Asbestosis: Yes / No
   b. Asthma: Yes / No
   c. Chronic bronchitis: Yes / No
   d. Emphysema: Yes / No
   e. Pneumonia: Yes / No
   f. Tuberculosis: Yes / No
   g. Silicosis: Yes / No
   h. Pneumothorax - collapsed lung: Yes / No
   i. Lung cancer: Yes / No
   j. Broken ribs: Yes / No
   k. Any chest injuries or surgeries: Yes / No
   l. Any other lung problem that you've been told about: Yes / No

4. Do you currently have any of the following pulmonary or lung illness symptoms?
   a. Shortness of breath: Yes / No
   b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes / No
   c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes / No
   d. Have to stop for breath when walking at your own pace on level ground: Yes / No
   e. Shortness of breath when washing or dressing yourself: Yes / No
   f. Shortness of breath that interferes with your job: Yes / No
   g. Coughing that produces phlegm (thick sputum): Yes / No
   h. Coughing that wakes you early in the morning: Yes / No
   i. Coughing that occurs mostly when you are lying down: Yes / No
   j. Coughing up blood in the last month: Yes / No
   k. Wheezing: Yes / No
   l. Wheezing that interferes with your job: Yes / No
   m. Chest pain when you breathe deeply: Yes / No
   n. Any other symptoms that you think may be related to lung problems: Yes / No

5. Have you ever had any of the following cardiovascular or heart problems?
   a. Heart attack: Yes / No
   b. Stroke: Yes / No
   c. Angina: Yes / No
   d. Heart failure: Yes / No
   e. Swelling in your legs or feet (not caused by walking): Yes / No
   f. Heart arrhythmia - heart beating irregularly: Yes / No
   g. High blood pressure: Yes / No

h. Any other heart problem that you've been told about: Yes / No

6. Have you ever had any of the following cardiovascular or heart symptoms?
   a. Frequent pain or tightness in your chest: Yes / No
   b. Pain or tightness in your chest during physical activity: Yes / No
   c. Pain or tightness in your chest that interferes with your job: Yes / No
   d. In the past two years, have you noticed your heart skipping or missing a beat? Yes / No
   e. Heartburn or indigestion that is not related to eating: Yes / No
   f. Any other symptoms that you think may be related to heart or circulation problems: Yes / No

7. Do you currently take medication for any of the following problems?
   a. Breathing or lung problems: Yes / No
   b. Heart trouble: Yes / No
   c. Blood pressure: Yes / No
   d. Seizures - fits: 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, go to question nine)
   a. Eye irritation: Yes / No
   b. Skin allergies or rashes: Yes / No
   c. Anxiety: Yes / No
   d. General weakness or fatigue: Yes / No
   e. Any other problem that interferes with your use of a respirator: Yes / No

9. Would you like to talk to the health care professional reviewing this questionnaire about your answers? Yes / No

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

10. Have you ever lost vision in either eye (temporarily or permanently)? Yes / No

11. Do you currently have any of the following vision problems?
    a. Wear contact lenses: Yes / No
    b. Wear glasses: Yes / No
    c. Colorblind: Yes / No
    d. Any other eye or vision problem: Yes / No

12. Have you ever had an injury to your ears, including a broken ear drum? Yes / No

13. Do you currently have any of the following hearing problems?
    a. Difficulty hearing: Yes / No
    b. Wear a hearing aid: Yes / No
    c. Any other hearing or ear problem: Yes / No

14. Have you ever had a back injury? Yes / No

15. Do you currently have any of the following musculoskeletal problems?
    a. Weakness in any of your arms, hands, legs or feet: Yes / No
    b. Back pain: Yes / No
    c. Difficulty fully moving your arms and legs: Yes / No
    d. Pain or stiffness when you lean forward or backward at the waist: Yes / No
    e. Difficulty fully moving your head up or down: Yes / No
    f. Difficulty fully moving your head from side to side: Yes / No
    g. Difficulty bending at your knees: Yes / No
    h. Difficulty squatting to the ground: Yes / No
    i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes / No
    j. Any other muscle or skeletal problem that interferes with using a respirator: Yes / No

Part B.

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 (please complete this section).

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place with 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 home, have you ever been exposed to hazardous solvents or 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 these materials or under the conditions listed below?
    a. Asbestos: Yes / No
    b. Silica e.g., in sandblasting: Yes / No
    c. Tungsten or cobalt, e.g., grinding or welding this material: Yes / No
    d. Beryllium: Yes / No
    e. Aluminum: Yes / No
    f. Coal, e.g., 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:

7. Have you served in the military? 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 respirators?
    a. HEPA filters: Yes / No
    b. Canisters, e.g., gas masks: Yes / No
    c. Cartridges: Yes / No

11. How often are you expected to use the respirators? 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 respirators, is your work effort:

    a. Light, i.e., 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, i.e., 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.).

13. When using your respirator, will you wear protective clothing or equipment (other than the respirator)? Yes / No

    If “yes,” describe this protective clothing or equipment:

14. Will you work 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 will be doing while you are using your respirators:

17. Describe any special or hazardous conditions you might encounter when you're using your respirators, e.g., confined spaces, life-threatening gases or such conditions:

18. Provide the following information, if you know it, for each toxic substance that you will be exposed to when you're using your respirators:

    a. Name of the first toxic substance:
        - Estimated maximum exposure level per shift:
        - Duration of exposure per shift:

    b. Name of the second toxic substance:
        - Estimated maximum exposure level per shift:
        - Duration of exposure per shift:

    c. Name of the third toxic substance:
        - Estimated maximum exposure level per shift:
        - Duration of exposure per shift:

    d. The name of any other toxic substances that you will be exposed to while using your respirator:

19. Describe any special responsibilities you will have while using your respirators that may affect the safety and well-being of others, e.g., rescue and security:

Appendix III

Mandatory information for employees using respirators when not required by standard 1910.134 Appendix D

Mandatory information for employees using respirators when not required under standard 1910.134 Appendix D

Standard Number: 1910.134 app D
Standard Title: Mandatory information for employees using respirators when not required under standards.
Subpart Number: Subpart I, Appendix D
Subpart Title: Personal Protective Equipment

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 additional comfort and protection for workers. However, if a respirator is used improperly or not kept clean, it can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposure to hazards, even if the 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 respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

- 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.
- Do not wear your respirator into atmospheres containing contaminants that 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.
- Keep track of your respirator so you do not mistakenly use someone else's respirator.
- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care and warnings regarding the respirator’s limitations.

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

Appendix IV

Department-specific Respirator Standard Operating Procedure Form

Department-specific SOP form

Respirator standard operating procedure

Positions affected: Any ASU Researcher worker trained and respirator fit-tested.

1. **Job or task respirator is required for**:

   _____

   _____

   _____

   _____

   Wearing the selected respirator will prevent potential exposure to potential air contaminants that could reach or exceed the maximum recommended exposure levels in the air. Failure to follow this procedure could result in improper fitting, use or maintenance of respiratory protection and potential overexposure to these air contaminants.

2. **Material or substance involved**. List contaminants respirator is selected for:

   _____

   _____

3. **Type of respirator selected:** Including limitations, instructions on cartridge service life and settings if applicable. The respirators selected for these operations are:

   a. _____

   _____

   b. _____

   _____

   Filter should be changed out after respirator use or when instructed by the supervisor.

   Note: These respirators are not to be used for firefighting or entry into oxygen-deficient or other atmospheres considered Immediately Dangerous to Life and Health, or IDLH.

4. **Instructions for emergency situations**:

   If airflow stops or does not seem adequate, you experience a breakthrough of contaminants through the respirator filters and become dizzy or disoriented leave the area immediately and go to a location free from the source of air contaminants and remove the respirator. If you require medical attention, notify your supervisor immediately or ASU Police at 480-965-3456 if your supervisor is unavailable.

5. **Reason for selecting this type of respirator:**

   These respirators were selected based on their assigned protection factor addressing the levels of contaminants measured or anticipated to be present and for ease of use.

6. **Type of fit test required**:

   A respirator fit test is required annually. Conduct a positive and negative pressure test before each use of this respirator.

7. **Donning, doffing and example statements**

   To don the respirator: ensure you are wearing a clean pair of gloves or your hands are free of contamination before touching the interior of the respirator; check for and remove anything that may interfere with the facial seal of the respirator, connect the lower strap around the neck, position respirator on the face and connect and adjust remaining straps, conduct a positive or negative pressure test and adjust the fit until there is no leakage. Repeat these steps each time the respirator is donned.

   Note: For supplied air hoods, include instructions, such as inserting the breathing tube into the sleeve of the hood at one end and to the air control valve on the belt and securing with the clamp; ensure the headband or hard hat is inserted and properly seated; ensure panel pressure settings are within manufacturers recommended range and hose connection is clean; fasten and adjust the waist belt to be comfortable; connect airline into air control valve and ensure air is flowing. Lift the respirator overhead and lower the hood until the elastic collar has closed around the neck. Make sure the hose is not twisted or in your path of travel. Monitor the hose position such that it is not a trip hazard.

   To remove the respirator: First, move to a safe location. Disconnect or adjust straps to remove the respirator. Be careful not to touch the interior of the respirator with contaminated gloves or surfaces, and place the respirator in a designated storage location or clean and store as identified below.

   Note: For supplied air respirators, include instructions such as: “disconnect airline from temperature control system; carefully lift respirator off head exercising caution to avoid touching the inner surfaces or collar with contaminated coveralls, gloves or other PPE; and store on a hanger in an approved location.

8. **Respirator storage, cleaning and maintenance instructions:**

   Store in approved locations such as inside clean plastic bags or lockers outside of contaminated areas so that the interior of the respirator does not become contaminated. Do not put respirators away with the interior wet from sweat, condensation or rinsing. Either dry them off or allow them to air dry. You must be able to identify your respirator — sharing of respirators is prohibited. Do not use contaminated equipment. Lightly contaminated equipment can be cleaned by rinsing it in a designated area or wiping it with a wet cloth, provided you are protected from exposure.

   Each respirator may be disassembled and cleaned according to the manufacturer’s instructions. Do not use replacement parts from another type of respirator to make repairs. Use only approved replacement parts specified by the manufacturer.

The complete requirements of the Respiratory Protection Program, including general requirements, medical surveillance, fit testing, usage, maintenance and care, breathing air quality, training, program evaluation and record keeping are described in the Respiratory Protection Program available on the ASU Respiratory Protection Program webpage.

Name: **(Printed)**	**Name:** **(Signature)**
Trainer:	**Date:**

Appendix V

Seal check procedures

Seal check procedure for cartridge-style respirators

Important information for respirator users

You must conduct a seal check each time you put your respirator on before entering the respirator use area. The purpose of a seal check is to ensure your respirator — which was previously fit tested — is properly positioned on your face to prevent leakage during use and detect functional problems.

The procedure below has two parts: a positive and negative pressure check. You must complete both parts each time. It should only take a few seconds to perform once you learn it.

If you cannot pass both parts, your respirator is malfunctioning. Please see your supervisor for further instructions.

Positive pressure check

1. Remove the exhalation valve cover if it is removable.
2. Cover the exhalation valve completely with the palm of your hand **while** exhaling gently to inflate the facepiece slightly.
3. The respirator facepiece should remain inflated, indicating a positive pressure build-up and no outward leakage.
    a. If you detect **no** leakage, replace the exhalation valve cover, if removed and proceed to conduct the negative pressure check.
    b. If you detect evidence of leakage, reposition the respirator after removing and inspecting it and try the positive pressure check again.

Negative pressure check:

4. Completely cover the inhalation openings on the cartridges or canister with the palms of your hands **while** inhaling gently to collapse the facepiece slightly.
    a. If you cannot use the palms of your hands to cover the inhalation openings on cartridges or canisters effectively, you may use:
        i. Filter seals, if available **or** thin rubber gloves.
5. Once the facepiece is collapsed, hold your breath for 10 seconds while keeping the inhalation openings covered.
6. The facepiece should remain slightly collapsed, indicating negative pressure and no inward leakage.
    a. If you detect **no** evidence of leakage, the tightness of the facepiece is considered adequate, the procedure is completed, and you may now use the respirator.
    b. If you detect leakage, reposition the respirator after removing and inspecting it and repeat the positive and negative fit checks.

Appendix VI
Respirator cleaning procedure

Respirator cleaning procedure

Note: The procedure was authored for elastomeric respirators only.

1. Remove Filters, cartridges, canisters, speaking diaphragms, demand and pressure valve assemblies, hoses or any components the manufacturer recommends.
    a. Discard or repair any defective parts.

2. Wash components in warm (43 ˚C or 110 ˚F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer.
    a. A stiff bristle (not wire) brush may help remove the dirt.
    b. If the detergent or cleaner does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
        i. A bleach solution (concentration of 50 parts per million of chlorine). Make this by adding approximately one millimeter of laundry bleach to one liter of water at 43 ˚C or 110 ˚F.
        ii. Other commercially available cleansers of equivalent disinfectant quality when used as directed if their use is recommended or approved by the respirator manufacturer.

3. Rinse components thoroughly in clean, warm (43 ˚C or 110 ˚F maximum), preferably running water.

    Note: The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces could cause dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

4. Drain components.

5. Air dry components or hand dry components with a clean, lint-free cloth.

6. Reassemble the facepiece components.
    a. Replace filters, cartridges and canisters, if necessary, for testing.

7. Test the respirator to make sure all components work properly.

Appendix VII
Air-purifying respirator canister color code

Air-purifying respirator canister color codes

Atmospheric contaminants to be protected against.	Color Assignment.
Acid gases.	White.
Hydrocyanic acid gases.	White with ½ inch green stripe completely around the canister near the bottom.
Chlorine gas.	White with ½ inch yellow stripe completely around the canister near the bottom
Organic vapors.	Black.
Ammonia gas.	Green.
Acid gases and ammonia gases.	Green with ½ inch white stripe completely around the canister near the bottom.
Carbon Monoxide.	Blue.
Acid gases and organic vapors.	Yellow.
Hydrocyanic acid gas and chloropicrin vapor.	Yellow with ½ inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors and ammonia gases.	Brown.
Particulates.	Purple or magenta.
Radioactive materials, except tritium and noble gases.	Purple or magenta.
Particulates – dusts, fumes, mists, fogs or smoke in combination with any of the above gases or vapors.	Canister color for the contaminant, as designated above, with ½ inch gray stripe completely around the canister near the top.
All the above atmospheric contaminants.	Red with ½ inch gray stripe completely around the canister near the top.

Gray shall not be assigned as a main color for a canister that removes acids or vapors.

Plog, B. A., Niland, J., & Quinlan P. J. (1996). Fundamentals of industrial hygiene. United States: National Safety Council

Appendix VIII

Voluntary respirator uses for lab animal allergens

Voluntary respirator uses for lab animal allergens

EHS has made a statement that filtering facepiece respirators, such as the N-95 disposable particulate mask, may be used voluntarily specifically for protection from exposure to lab animal allergens. EHS recommends the voluntary use of N95 respirators for additional comfort and protection when working around animal allergens.

The voluntary use of an N-95 disposable particulate mask is a component of the university's strategy to reduce exposure to lab animal allergens. Additional information about lab animal allergies can be found in the National Institute for Occupational Safety and Health's publication for preventing asthma in animal handlers.

Employees may self-select to wear an N-95 respirator for lab animal allergen concerns. Alternatively, they may be suggested this course of action by the Animal Use Medical Screening, or AUMS, process. It should be noted that animal husbandry staff may be required to wear filtering facepiece respirators depending on their group's current activities and resulting hazard assessment.

If an employee requests to wear a respirator other than a filtering facepiece respirator for animal-allergen protection, they must contact their supervisor. The supervisor must contact EHS to initiate the appropriate respirator program procedures that cover medical evaluations, fit testing and maintenance.
Any employee who experiences any difficulties while wearing the filtering facepiece respirator must immediately inform his or her supervisor.

The employees and supervisors hold the following responsibilities regarding voluntary respirator use for lab animal allergens:

Employees
Notify your supervisor that you want to wear a filtering facepiece respirator. Your supervisor will provide you with a copy of advisory information for employees who voluntarily use respirators in Appendix III. Sign this form where indicated and give a copy to your supervisor.

Employees are responsible for properly using and caring for the respirator in compliance with the manufacturer's instructions.

Supervisors
Provide the respirator user with a copy of advisory information for employees who voluntarily use respirators in Appendix III; ensure that the employee understands the handout content and signs the form, maintain a copy of the signed form for your records and ensure the respirator user keeps their signed copy.

If you have questions, please email ASU Environmental Health and Safety at askehs@asu.edu or call 480-965-1823.