WAYNE STATE UNIVERSITY

Respiratory Protection Program

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

CBRN means chemical, biological radiological and nuclear. In this document the term applies to specific respirators and canisters designed to protect against these potential threats.

Demand respirator means 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 means 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 means 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) means 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 means a respirator intended to be used only for emergency exit.

Filter or air purifying element means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering facepiece (dust mask) means 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.

Fit factor means 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 means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

High efficiency particulate air (HEPA) filter means 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 means 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) means 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 means a respiratory inlet covering that is designed to form a partial seal with the face.

Maximum use concentration (MUC) means the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the assigned protection factor 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.

MIOSHA means Michigan Occupational Safety and Health Administration

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

NIOSH means the National Institute for Occupational Safety and Health

OEHS means the Wayne State University Office of Environmental Health and Safety

OSHA means the Occupational Safety and Health Administration

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

Physician or other licensed health care professional (PLHCP) means 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 means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

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

Pressure demand respirator means 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) means 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) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory inlet covering means 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.

Self-contained breathing apparatus (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Service life means 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 means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Respiratory Protection Program

Introduction

This respirator program lays out standard operating procedures to ensure the protection of all Wayne State University employees from respiratory hazards through proper selection and use of respirators. Respirators are to be used only where engineering control of respirator hazards is not feasible, while engineering controls are being installed, or in emergencies. This program is in accordance with the requirements of OSHA 29 CFR 1910.134 Respiratory Protection Standard and MIOSHA Part 451, Respiratory Protection Standard. Michigan incorporates by reference the federal regulations for respiratory protection therefore; the state requirements are identical to the federal requirements.

Administrative Duties

At Wayne State University our Respiratory Protection Program Administrator is the Office of Environmental Health and Safety (OEHS) Environmental Health and Safety Manager. This person is solely responsible for all facets of the program and has full authority to make necessary decisions to ensure success of this program. The Program Administrator has authority to purchase equipment necessary to implement and operate the program. The Program Administrator will develop written detailed instructions covering each of the basic elements in this program, and is the sole person authorized to amend these instructions.

The Program Administrator is qualified, by appropriate training and experience that is commensurate with the complexity of the program, to administer or oversee our Respiratory Protection Program and conduct the required evaluations of program effectiveness.

Employees may review a copy of our Respiratory Protection Program. It is located in the Office of Environmental Health and Safety (OEHS) at 5425 Woodward Ave, Suite 300 or online at www.oehs.wayne.edu. Our Program Administrator reviews this program periodically to ensure its effectiveness. Only the Program Administrator may amend the written program.

Respirator Selection

Respirators are selected on the basis of respiratory hazards to which the worker is exposed and workplace and user factors that affect respirator performance and reliability. All selections are made by the Program Administrator.

The Program Administrator will develop detailed written standard operating procedures governing the selection of respirators using 29 CFR 1910.134(d) and the following guidelines: Wayne State University follows the respirator selection guidelines as specified by the MIOSHA/OSHA respiratory protection standards. Detailed procedures will be included as appendices to this respirator program. Outside

consultation, manufacturer's assistance, and other recognized authorities will be consulted if there is any doubt regarding proper selection.

Our institution selection procedures include coverage of the following OSHA requirements:

Respirator Selection Procedure Checklist

When selecting any respirator in general:

- Select and provide respirators based on respiratory hazards to which a worker is exposed and workplace and user factors that affect respirator performance and reliability.
- Select a National Institute for Occupational Safety and Health (NIOSH)-certified respirator.
- Identify and evaluate the respiratory hazards in the workplace, including a hazard analysis that reasonable estimates employee exposures to respiratory hazards and an identification of the contaminant's chemical state and physical form. Consider the atmosphere to be immediately dangerous to life or health (IDLH) if you cannot identify or reasonably estimate employee exposure.
- Select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

When selecting respirators for IDLH atmospheres:

Provide these respirators:

- A full facepiece pressure demand self-contained breathing apparatus (SCBA) certified by NIOSH for a minimum service life of thirty minutes, or
- A combination full facepiece pressure demand supplied-air respirator Self-contained breathing apparatus (SAR) with auxiliary self-contained air supply.
- Provide respirators NIOSH-certified for escape from the atmosphere in which they will be used when they are used only for escape from IDLH atmospheres.
- Consider all oxygen-deficient atmospheres to be IDLH. Exception: If we can demonstrate that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Table II of 29 CFR 1910.134 (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator may be used.

When selecting respirators for atmospheres that are not IDLH:

- Provide a respirator that is adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

- Select a respirator that meets or exceeds the required level of employee protection by using the assigned protection factors (APFs) listed in §1910.134 Table 1. [Effective Nov. 22, 2006]
- For combination respirators (e.g., airline respirators with an air-purifying filter), ensure that the APF is appropriate to the mode of operation in which the respirator is being used. [Effective Nov. 22, 2006]
- Select a respirator for employee use that maintains the employee's exposure to the hazardous substance at or below the maximum use concentration (MUC), when measured outside the respirator. [Effective Nov. 22, 2006]
- Do not apply MUCs to conditions that are immediately dangerous to life or health (IDLH); instead use respirators listed for IDLH conditions in §1910.134(d)(2). [Effective Nov. 22, 2006]
- Set the MUC at the lower limit when the calculated MUC exceeds the IDLH level for a hazardous substance or the performance limits of the cartridge or canister. [Effective Nov. 22, 2006]
- Select respirators appropriate for the chemical state and physical form of the contaminant.

For protection against gases and vapors, provide:

- An atmosphere-supplying respirator, or
- An air-purifying respirator, provided that:
    1. The respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or
    2. If there is no ESLI appropriate for conditions in our workplace, implement a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. Describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.

For protection against particulates, provide:

- An atmosphere-supplying respirator; or
- An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR 84; or
- For contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH.

Respirator Types and Uses

The following types of respirators are in use in this facility for the following uses:

Only NIOSH-certified respirators are selected and used. Where practicable, the respirators will be assigned to individual workers for their exclusive use. This table is not all inclusive of the potential respirator applications.

Respirator Types	Situation used:
Survivair 2000 Series Half Face Mask	Influenza pandemic
Survivair 4000 Series Full Face Mask	Formaldehyde decontamination, hazardous material spill response
MSA Ultraelite SCBA	Hazardous material spill response
MSA Millenium CBRN	WSU Police -chemical, biological, radiological, nuclear
MSA Advantage Half Face Mask	Paint shop, carpenter shop, metal shop, foundry operations, HVAC filter changes and other trade, maintenance or building engineer operations
MSA Ultraelite Full Face Mask PAPR	Hazardous material spill response
MSA Comfo Half Face Mask	Paint shop, carpenter shop, metal shop, foundry operations, HVAC filter changes and other trade, maintenance or building engineer operations
North	Art/Theatre -solvents, paints
3M 1860 Disposable N-95	Influenza pandemic

Medical Evaluations

A medical evaluation to determine whether an employee is able to use a given respirator is an important element of an effective Respiratory Protection Program and is necessary to prevent injuries, illnesses, and even, in rare cases, death from the physiological burden imposed by respirator use.

At Wayne State University, persons will not be assigned to tasks requiring use of respirators nor fit tested unless it has been determined that they are physically able to perform the work and use the respirator.

The occupational medicine physician or other licensed health care professionals of DMC Occupational Health Services at the University Health Center will perform medical evaluations using a medical questionnaire found in Sections 1 and 2, Part A of Appendix C of 29 CFR 1910.134.

All medical questionnaires and examinations are confidential and handled during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire is administered so that the employee understands its content. All employees are provided an opportunity to discuss the questionnaire and examination results with their physician or other licensed health care professional (PLHCP).

Before any initial examination or questionnaire is given, we supply the PLHCP with the following information so that he/she can make the best recommendation concerning an employee's ability to use a respirator:

- Type and weight of the respirator to be used by the employee;
- Duration and frequency of respirator use (including use for rescue and escape);
- Expected physical work effort;
- Additional protective clothing and equipment to be worn;
- Temperature and humidity extremes that may be encountered.

Once the PLHCP determines whether the employee has the ability to use or not use a respirator, he/she sends Wayne State University a written recommendation containing only the following information:

- Limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
- The need, if any, for follow-up medical evaluations; and
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

Follow-up medical examination:

A follow-up medical examination will be provided if a positive response is given to any question among questions 1 through 8 in Section 2, Part A of Appendix C of 29 CFR 1910.134 or if an employee's initial medical examination demonstrates the need for a follow-up medical examination. Our follow-up medical examination includes tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, our company will provide a powered air-purifying respirator (PAPR) if the PLHCP's 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 we are no longer required to provide a PAPR.

Additional medical examinations:

- Our institution provides additional medical evaluations if:
- An employee reports medical signs or symptoms that are related to ability to use a respirator;

- A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Contact DMC Occupational Health Services at the University Health Center for a copy of your confidential medical evaluation or questionnaire.

Fit Testing Procedures

Respirators must fit properly to provide protection. If a tight seal is not maintained between the facepiece and the employee's face, contaminated air will be drawn into the facepiece and be breathed by the employee. Fit testing seeks to protect the employee against breathing contaminated ambient air and is one of the core provisions of our respirator program.

In general, fit testing may be either qualitative or quantitative. Qualitative fit testing

(QLFT) involves the introduction of a gas, vapor, or aerosol test agent into an area around the head of the respirator user. If that user can detect the presence of the test agent through subjective means, such as odor, taste, or irritation, the respirator fit is inadequate.

In a quantitative respirator fit test (QNFT), the adequacy of respirator fit is assessed by measuring the amount of leakage into the respirator, either by generating a test aerosol as a test atmosphere, using ambient aerosol as a test agent, or using controlled negative pressure to measure the volumetric leak rate. Appropriate instrumentation is required to quantify respirator fit in QNFT.

Wayne State University makes sure those employees are fit tested at the following times with the same make, model, style, and size of respirator that will be used:

- Before any of our employees are required to use any respirator with a negative or positive pressure tight-fitting facepiece
- Whenever a different respirator facepiece (size, style, model, or make) is used
- At least annually
- Whenever the employee reports, or our company, PLHCP, supervisor, or Program Administrator makes visual observations of changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight
- When the employee, subsequently after passing a QLFT or QNFT, notifies the institution, Program Administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable. That employee will be retested with a different respirator facepiece.

Employees must pass one of the following fit test types that follow the protocols and procedures contained in 29 CFR 1910.134 Appendix A:

- **Qualitative fit testing (QLFT):** This test method is used to fit test negative pressure air purifying respirators that must only achieve a fit factor of 100 or less. This test method may also be used to test tight fitting atmosphere supplying respirators and tight fitting powered air purifying respirators if tested in the negative pressure mode

- **Quantitative respirator fit test (QNFT):** This test method is used to fit test a tight fitting half facepiece respirator that must achieve a fit factor of 100 or greater OR a tight-fitting full facepiece respirator that must achieve a fit factor of 500 or greater OR tight-fitting atmosphere supplying respirators and tight-fitting powered air purifying respirators if tested in the negative pressure mode .

Our workplace-specific fit testing procedures include the following:

TSI PORTACOUNT quantitative fit testing procedures

Proper Respiratory Use Procedures

Once the respirator has been properly selected and fitted, its protection efficiency must be maintained by proper use in accordance with 29 CFR 1910.134(g). Our company ensures with written procedures that respirators are used properly in the workplace. Our proper respirator use procedures are in compliance with the MIOSHA/OSHA respiratory standard requirements.

Our institution has used the following checklist to ensure that proper use procedures include coverage of OSHA requirements:

Facepiece Seal Protection

- Do not permit respirators with tight-fitting facepieces to be worn by employees who have:

    1. Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or

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

- If an employee wears corrective glasses or goggles or other personal protective equipment, ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

- For all tight-fitting respirators, ensure that employees perform a user seal check each time they put on the respirator using the procedures in 29 CFR 1910.134 Appendix B-1 (User Seal Check Procedures) or procedures recommended by the respirator manufacturer that you can demonstrate are as effective as those in Appendix B-1.

Continuing Respirator Effectiveness

Appropriate surveillance must be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, reevaluate the continued effectiveness of the respirator.

- Ensure that employees leave the respirator use area:
    1. To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
    2. If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece; or
    3. To replace the respirator or the filter, cartridge, or canister elements.
- If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece, replace or repair the respirator before allowing the employee to return to the work area.

Procedures for IDLH Atmospheres

Ensure that:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere;
- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;
- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;
- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;
- The employer or designee authorized to do so by the company, once notified, provides necessary assistance appropriate to the situation;
- Employee(s) located outside the IDLH atmospheres are equipped with:
    1. Pressure demand or other positive pressure self-contained breathing apparatuses (SCBAs), or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either:
    2. Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or

3. Equivalent means for rescue where retrieval equipment is not required under the bullet item above this one.

Procedures for Interior Structural Firefighting

Wayne State University employees are not qualified to perform interior structural firefighting and the university does not have a fire brigade. In the event of a fire, the Detroit Fire Department is notified through Public Safety.

Maintenance and Care Procedures

In order to ensure continuing protection from respiratory protective devices, it is necessary to establish and implement proper maintenance and care procedures and schedules. Proper maintenance and care of respirators is essential to maintain respirators in optimal working condition.

Cleaning & Disinfecting

Our company provides each respirator user with a respirator that is clean, sanitary, and in good working order. We ensure that respirators are cleaned and disinfected using the procedures as indicated in Appendix B of this document.

The respirators are cleaned and disinfected at the following intervals:

Respirator type	Cleaned and disinfected at the following intervals
Issued for the exclusive use of an employee	As often as necessary to be maintained in a sanitary condition
Issued to more than one employee	Before being worn by different individuals
Maintained for emergency use	After each use
Used in fit testing and training	After each use

In order to meet these intervals, we have created the following schedules to be used for each respirator:

Respirators will be cleaned and disinfected as often as needed to meet the above specifications.

Storage

Storage of respirators must be done properly to ensure that the equipment is protected and not subject to environmental conditions that may cause deterioration.

We ensure that respirators are stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they are packed or stored in a protective storage bag to prevent deformation of the facepiece and exhalation valve. In addition, emergency respirators are kept accessible to the work area; stored in compartments that are clearly

marked as containing emergency respirators; and stored in accordance with any applicable manufacturer instructions.

Inspection

In order to assure the continued reliability of respirator equipment, it must be inspected on a regular basis. The frequency of inspection is related to the frequency of use. Here are our frequencies for inspection:

Respirator type	Inspected at the following frequencies
All types used in routine situations	Before each use and during cleaning
Maintained for use in emergency situations	At least monthly and in accordance with the manufacturers recommendations, and checked for proper function before use

In order to meet these intervals, we have created the following schedule(s) to be used for each respirator: See attached schedule.

Any one of our respirator inspections includes a check:

- For respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; and
- Of elastomeric parts for pliability and signs of deterioration.
- For self-contained breathing apparatus, in addition to the above, monthly, we maintain air and oxygen cylinders in a fully charged state and recharge when the pressure falls to 90% of the manufacturer's recommended pressure level and determine that the regulator and warning devices function properly.

Also for respirators maintained for emergency use, we certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator. See attached documentation. This information shall be maintained until replaced following a subsequent certification.

Repairs

Respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:

- Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and only with the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- Repairs must be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and
- Reducing and admission valves, regulators, and alarms must be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Discarding of respirators

Respirators that fail an inspection or are otherwise not fit for use and cannot be repaired must be discarded. We use the following discarding procedures:

Respirators failing inspection and deemed unfit for use will be discarded.

Air Quality Procedures

When atmosphere-supplying respirators are being used to protect employees it is essential to ensure that the air being breathed is of sufficiently high quality. Our institution's procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators include coverage of the following OSHA requirements:

Compressed Air, Compressed Oxygen, Liquid Air, and Liquid Oxygen Used for Respirators:

- Compressed and liquid oxygen must meet the United States Pharmacopoeia requirements for medical or breathing oxygen.
- Compressed breathing air must meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:
    a. Oxygen content (v/v) of 19.5-23.5%;
    b. Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
    c. Carbon monoxide (CO) content of 10 parts per million (ppm) or less;
    d. Carbon dioxide content of 1,000 ppm or less; and
    e. Lack of a noticeable odor.
- Ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.
- Ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

Cylinders Used to Supply Breathing Air to Respirators:

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

Compressors:

- Ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:
    1. Prevent entry of contaminated air into the air-supply system;
    2. Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg. C) below the ambient temperature;
    3. Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters must be maintained and replaced or refurbished periodically following the manufacturer's instructions; and
    4. Have a tag containing the most recent change date and the signature of the person authorized by our company to perform the change. The tag must be maintained at the compressor.
- For compressors that are not oil-lubricated, ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.
- For oil-lubricated compressors, use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

Breathing Air Couplings:

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

Breathing Gas Containers:

- Use breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR 84.

Filters, Cartridges, and Canisters:

- Ensure that all filters, cartridges and canisters used in the workplace are labeled and color-coded with the NIOSH approval label and that the label is not removed and remains legible.

The following detailed procedures ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators:

Wayne State University follows the specified MIOSHA/OSHA air quality procedures.

Training

The most thorough respiratory protection program will not be effective if employees do not wear respirators, or if wearing them, do not do so properly. The only way to ensure that our employees are aware of the purpose of wearing respirators, and how they are to be worn is to train them. Employee training is an important part of the respiratory protection program and is essential for correct respirator use.

The training program provided by the Office of Environmental Health and Safety is two-fold; it covers both the:

1. Respiratory hazards to which our employees are potentially exposed during routine and emergency situations, and
2. Proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance.

Both training parts are provided prior to requiring an employee to use a respirator in our workplace. However, if an employee has received training within 12 months addressing the seven basic elements of respiratory protection (see "Seven basic elements" below) and Wayne State University and the employee can demonstrate that he/she has knowledge of those elements, then that employee is not required to repeat such training initially.

We do require all employees to be retrained annually and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or Any other situation arises in which retraining appears necessary to ensure safe respirator use.

Seven basic elements:

Our employees are trained sufficiently to be able to demonstrate knowledge of at least these seven elements:

1. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
2. What the limitations and capabilities of the respirator are.
3. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions. .
4. How to inspect, put on, remove, use, and check the seals of the respirator..
5. What the procedures are for maintenance and storage of the respirator..
6. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
7. The general requirements of 29 CFR 1910.134.

Voluntary Respirator Use

The basic advisory information on respirators, as presented below is provided by our Program Administrator in any written or oral format, to employees who wear respirators when such use is not required by the regulations or by our institution:

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.

See training curriculum/materials.

Program Evaluation

It is inherent in respirator use that problems with protection, irritation, breathing resistance, comfort, and other respirator-related factors occasionally arise in most respirator protection programs. Although it is not possible to eliminate all problems associated with respirator use, we try to eliminate as many problems as possible to improve respiratory protection and encourage employee acceptance and safe use of respirators. By having our Program Administrator, thoroughly evaluate and as necessary, revise our Respiratory Protection Program, we can eliminate problems effectively.

At Wayne State University, program evaluation, performed annually by our program administrator, involves the following:

- Conducting evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.
- Regularly consulting employees required to use respirators to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment must be corrected. Factors to assess include, but are not limited to:
    1. Respirator fit (including the ability to use the respirator without interfering with effective workplace performance)
    2. Appropriate respirator selection for the hazards to which the employee is exposed
    3. Proper respirator use under the workplace conditions the employee encounters
    4. Proper respirator maintenance

Appendix A

References

The following websites and documents are helpful references:

ANSI Z88.2, American National Standard for Respiratory Protection
http://www.ansi.org/

MIOSHA Part 451 Respiratory Protection
http://www.michigan.gov/documents/CIS_WSH_part451_54075_7.pdf

NIOSH
http://www.cdc.gov/niosh/topics/respirators/

OSHA 29 CFR 1910.134, Respiratory Protection, and Appendices,
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=standards

OSHA Small entity Compliance Guide
http://www.osha.gov/Publications/SECG_RPS/secgrev-current.pdf

Appendix B

OSHA Respiratory Protection Standard
29 CFR 1910.134

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 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 C

OEHS Monthly SCBA Inspection Checklist												
Model: MSA MMR												
SCBA Serial #												
Hydro test date:												
Flow test date:												
Inspector:												
2011	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Date of Inspection												
Inspector Initials												
Harness Check												
Straps/buckles/frame condition												
O ring in place												
High pressure hose & connections												
Low pressure hose & connections												
Mask regulator												
Operational check												
Cylinder condition												
Cylinder pressure (psi) >4000 psi												
Harness gauge pressure (psi)												
Pressure difference < than 10%												
Bypass function												
Mask Check												
Facepiece general condition												
Exhalation valves												
Headstraps												
Facepiece adapter												
Cleanliness												
P - Pass inspection												
F - Fail inspection												

Appendix D

Medical Evaluation Questionnaire

WAYNE STATE UNIVERSITY

Employee Respirator Medical Evaluation Questionnaire

HEALTH SAFETY ENVIRONMENTAL

Updated 1/05

To the employee: Can you read (circle one): 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.
- Your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

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).

Name _____ Date _____

Job Title _____

Age _____ Sex _____ Height _____ft. _____in. Weight _____lbs.

Where can you be reached by the health care professional who reviews this questionnaire?

Phone # (with area code) _____ Best time to call _____

Has your employer told you how to contact the health care professional who will review this questionnaire? (circle one): Yes No

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 in the past? (circle one): Yes No

If ‘‘yes,’’ what type(s): _____

_____

Part A Section 2 (Mandatory): Please check YES or NO	**YES**	**NO**
1. Do you currently smoke, or have you smoked in the last month?		
2. Have you ever had any of the following conditions?		
A. Seizures		
B. Diabetes		
C. Allergic reactions that interfere with your breathing		
D. Claustrophobia (fear of closed-in places)		
E. Trouble smelling odors		
3. Have you ever had any of the following pulmonary or lung problems?		
A. Asbestosis		
B. Asthma		
C. Chronic bronchitis		
D. Emphysema		
E. Pneumonia		
F. Tuberculosis		
G. Silicosis		
H. Pneumothorax (collapsed lung)		
I. Lung cancer		
J. Broken ribs		
K. Any chest injuries or surgeries		
L. Any other lung problem that you've been told about		
4. Do you have any of the following symptoms of pulmonary or lung illness?		
A. Shortness of breath		
B. Shortness of breath when walking on level ground or up a slight hill or incline		
C. Shortness of breath when walking with other people at a normal pace		
D. Have to stop for breath when walking at your own pace on level ground		
E. Shortness of breath when bathing or dressing yourself		
F. Shortness of breath that interferes with your job		
G. Coughing that produces phlegm (thick sputum)		
H. Coughing that wakes you early in the morning		
I. Coughing that occurs mostly when you are lying down		
J. Coughing up blood in the last month		
K. Weezing		

L.	Weezing that interferes with your job		
M.	Chest pain when you breathe deeply		
N.	Any other symptoms that you think may be related to your lungs		

		YES	NO
5. Have you ever had any of the following cardiovascular or heart problems?			
A.	Heart attack		
B.	Stroke		
C.	Angina		
D.	Heart failure		
E.	Swelling in your legs or feet (not caused by walking		
F.	Heart arrhythmia (irregular heartbeat)		
G.	High blood pressure		
H.	Any other heart problem that you've been told about		
6. Have you ever had any of the following symptoms of cardiovascular or heart problems?			
A.	Frequent pain or tightness in your chest		
B.	Pain or tightness in your chest during physical activity		
C.	Pain or tightness in your chest that interferes with your job		
D.	In the past two years have you noticed your heart skipping or missing a beat		
E.	Heartburn or ingestion that is not related to eating		
F.	Any other symptom that you think may be related to heart or circulation problems		
7. Do you curently take medication for any of the following problems?			
A.	Breathing or lung problems		
B.	Heart trouble		
C.	Blood pressure		
D.	Seizures		
8. If you've used a respirator, have you ever had any of the following problems? (If you've never used a respirator, skip this section and go to #9)			
A.	Eye irritation		
B.	Skin irritation, allergies, or rashes		
C.	Anxiety		
D.	General weakness or fatigue		
E.	Any other problem that has interfered with your use of a respirator		
9. Would you like to discuss this questionnaire further with a healthcare professional?			

Part A Section 3:

Mandatory for employees who have been selected to use either a **full-facepiece respirator** or a **self-contained breathing apparatus (SCBA)**. *(Voluntary for employees who have been selected to use other types of respirators.)*

		YES	NO
10.	**Have you ever lost vision in either eye, temporarily or permanently?**		
11.	**Do you currently have any of the following vision problems?**		
A.	Wear contact lenses		
B.	Wear glasses		
C.	Color blind		
D.	Any other eye or vision problems		
12.	**Have you ever had any injury to your ears, including a broken ear drum?**		
13.	**Do you currently have any of the following hearing problems?**		
A.	Difficulty hearing		
B.	Wear a hearing aid		
C.	Any other hearing or ear problem		
14.	**Have you ever had a back injury?**		
15.	**Do you currently have any of the following musculoskeletal problems?**		
A.	Weakness in any of your arms, hands, legs, or feet		
B.	Back pain		
C.	Difficulty fully moving your arms or legs		
D.	Difficulty fully moving your head from side to side		
E.	Difficulty fully moving your head up and down		
F.	Pain or stiffness when you lean forward or backward at the waste		
G.	Difficulty bending at your knees		
H.	Difficulty squatting to the ground		
I.	Difficulty climbing a flight of stairs or a ladder carrying more than 25 pounds		
J.	Any other muscle or skeletal problem that interferes with using a respirator		

Part B: Please answer the following questions to the best of your ability.	**YES**	**NO**
1.At work or home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (gases, fumes, dust) or had skin contact with hazardous chemicals? If yes, please list them here to the best of your ability: _____		
2. Have you ever worked with any of the materials listed below?		
A. Asbestos		
B. Silica (e.g. in sandblasting)		
C. Tungsten/cobalt (grinding or welding this material)		
D. Beryllium		
E. Aluminum		
F. Coal (e.g. mining)		
G. Iron		
H. Tin		
I. Dusty environments		
J. Any other hazardous exposures (if yes, please describe)		
3. Have you ever been in the military services?		
4. If yes, were you ever exposed to biological or chemical agents?		
5. Have you ever worked on a HAZMAT team?		
6. Other than medications for problems mentioned earlier in this questionnaire, are you taking any medications? (please list, including over-the-counter medications) _____		
7. Will you be using any of the following items with your respirator(s)?		
A. HEPA Filters		
B. Canisters (e.g. gas masks)		
C. Cartridges		
8. How often are you expected to use the respirator(s)? (check yes or no for each)		
A. Escape only (no rescue)		
B. Emergency rescue only		
C. Less than 5 hours per week		
D. Less than 2 hours per day		
E. 2 to 4 hours per day		
F. Over 4 hours per day		
9. Will you be working under hot conditions? (temperatures exceeding 77 degrees F)		
10. Will you be working under humid conditions?		

11. List any second jobs or side businesses you have:

12. List your previous occupations:

13. List your current and previous hobbies:

14. Please list additional protective clothing and/or equipment you wear when you're using your respirator:

15. Describe the work you'll be doing while you're using your respirator(s):

16. Describe any special or hazardous conditions you might encounter when you're using your respirator(s:) (for example, confined spaces, life-threatening gases, etc)

17. 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, etc.)

18. During the period you are using the respirator(s), is your work effort:

_____ **A. Light** (less than 200 kcal per hour) 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.

If ‘‘yes,’’ how long does this period last during the average shift?_____

_____

_____ **B. Moderate** (200 to 350 kcal per hour) 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.

If ‘‘yes,’’ how long does this period last during the average shift? _____

_____

_____ **C. Heavy** (above 350 kcal per hour) 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.).

If ‘‘yes,’’ how long does this period last during the average shift? _____

_____

19. 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: _____

_____