MIDWESTERN UNIVERSITY

RESPIRATORY PROTECTION PROGRAM

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1.0 Purpose

Midwestern University (MWU)[1] has determined that certain employees are exposed to respiratory hazards during routine operations. These hazards include dusts, mists, fumes, sprays, other airborne particles, and harmful levels of hazardous gases or vapors. Hazards may also consist of chemical, biological, or radioactive contaminants in sufficient concentration to harm the health of employees. The purpose of this program is to ensure that all MWU employees are protected from exposure to these respiratory hazards.

Engineering controls, such as ventilation (local or general), change in work or experimental procedures, and substitution of less toxic materials, are the first line of defense at MWU; however, engineering controls have not always been feasible for some of our operations, or have not always completely controlled the identified hazards. In these situations, respirators and other protective equipment must be used. Respirators are also needed to protect employees' health during emergencies. The work processes requiring respirator use at MWU are outlined in Table 1 in the Scope and Application section of this program.

In addition, some employees have expressed a desire to wear respirators during certain operations that do not require respiratory protection. As a general policy MWU will review each of these requests on a case-by-case basis. If the use of respiratory protection in a specific case will not jeopardize the health or safety of the worker(s), MWU will allow voluntary use. As outlined in the Scope and Application section of this program, voluntary respirator use is subject to certain requirements of this program.

2.0 Scope and Application

In 1971, the Occupational Safety and Health Administration (OSHA) established the Respiratory Protection Standard to protect workers. OSHA has issued a revised standard, which became effective on October 5, 1998. It updates and replaces the 1971 standard. The 1998 standard requires MWU to establish and maintain a respiratory protection program to protect their respirator-wearing workers. A respiratory protection program is a cohesive collection of work site-specific procedures and policies that addresses all respiratory protection elements required by the standard.

The Respiratory Protection Program includes respiratory protection elements required by the standard:

- A written Respiratory Protection Program which includes work-site specific procedures.
- A qualified "Program Administrator" to oversee the respiratory protection program, ensure appropriate implementation of the program and update the program as necessary.
- Definitions about terminology and how these terms apply to respirators and their use[1].
- Criteria for selecting respirators for use in the workplace.
- Clear language on the requirement for medical examinations of workers and the use of medical questionnaires to screen for employee health conditions which could affect most workers ability to use a respirator. It allows medical evaluations to be conducted either by a physician or by another licensed health care professional and it requires medical evaluations after the initial evaluation to be conducted only when specific conditions indicate a need for a reevaluation.
- Employers must perform a hazard determination to identify respiratory hazards and work conditions.
- Provide training on all aspects of respirator usage (donning, doffing, seal testing, usage, maintenance, [cleaning and disinfecting] storage, inspection, and repair) as applicable.

[1]Note that common Acronyms and Definitions are listed in section 7.0.

- Provide clear procedures for how individuals will use their assigned respirators in the workplace.
- Perform annual fit testing for all employees wearing tight-fitting respirators, including protocols for fit testing.
- It addresses the use of respirators in situations that OSHA characterizes as Immediately Dangerous to Life or Health (IDLH).
- Establish schedules for specific procedures describing how respirators will be maintained, stored, inspected, and repaired in a particular workplace. It also establishes flexible requirements for cleaning and disinfecting respirators issued to individual employees, as necessary, to be maintained in a sanitary condition.
- Allows tags or index cards to be used to document respirator inspections rather than written records.
- Ensure that the program is appropriately implemented.
- Update the program as necessary, revising only those elements of the program that have been affected by changes that relate to respiratory hazards in work areas.

This program applies to all employees who are required to wear respirators at specific times during normal work operations, and during some non-routine or emergency operations such as a spill of a hazardous substance. This includes certain employees in the Chicago College of Osteopathic Medicine, Pharmaceutical Sciences, the Animal Facility, and Campus Facilities departments. All employees working in these colleges or departments engaged in certain processes or tasks (as outlined in Table 1) must be enrolled in the respiratory protection program.

In addition, any employee who voluntarily wears a respirator when a respirator is not required (see Table 1) is subject to the medical evaluation, cleaning, maintenance, and storage elements of this program, and must be provided with certain information specified in the program (these individuals must receive Appendix D). [2] Employees who voluntarily wear filtering facepieces (e.g. dust masks), however, are not subject to the medical evaluation, cleaning, storage, or maintenance provisions of this program.

TABLE 1. VOLUNTARY AND REQUIRED RESPIRATOR USE AT MIDWESTERN UNIVERSITY*

Respirator**	**Process**
Filtering facepiece (dust mask)	Voluntary use to protect against developing allergies to animals or weighing or working with non-hazardous chemicals. Required for dry walling and duct cleaning.
Tight-fitting, half-facepiece air purifying respirator (APR) with P100 filter	Required for allergies to animals.
Tight-fitting, half-facepiece APR with the appropriate cartridge	Required for weighing or working with non-hazardous chemicals. Hazardous materials spills.

*Surgical masks are not covered in this program as they are designed to protect animals from surgical infections or tissue cultures from infection during processing. They afford minimal protection to the wearer from animal or tissue culture infections because they are loose-fitting.

**There are no situations at MWU where an atmosphere-supplying respirator is required.

[2] Employees required to participate in the respiratory protection program do so at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment will be borne by MWU.

3.0 Responsibilities

Program Administrator

The Program Administrator is responsible for administering the respiratory protection program. Duties of the Program Administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators.
- Recognizing, evaluating, and controlling hazards.
- Selection of respiratory protection options.
- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Arranging for and/or conducting training.
- Ensuring proper storage and maintenance of respiratory protection equipment.
- Conducting qualitative fit testing with an approved kit.
- Administering the medical surveillance program.
- Maintaining records required by the program.
- Evaluating the program.
- Updating the written program, as needed.

The Program Administrator for MWU is Richard A. Laddaga, Ph.D., Professor of Microbiology & Immunology.

Supervisors

Supervisors are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees under their charge. Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing, and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection plan.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

Employees

Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. No one can wear a respirator (dust mask/facepiece) or ½ or full face APR without being first assessed and approved by the Program Director. Once an employee/respirator wearer is approved by the Program Director, the wearer is approved solely for the conditions and mask specified, and no other.

Employees must also:

- Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
- Inform their supervisor if the respirator no longer fits appropriately and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.
- Participate in annual training.
- Participate in fit testing.

4.0 Program Elements

Selection Procedures

The Program Administrator will select respirators to be used on site, based on the hazards to which workers are exposed and in accordance with all OSHA standards. Appropriate respirators are selected based on the hazards to which MWU employees are exposed and will consider how workplace and user factors affect respirator performance and reliability. Workplace and user factors include:

- The size and configuration of the workspace.
- Ease of worker communication: Are employees wearing respirators able to communicate with one another and warn one another of hazards?
- Ease or difficulty of the work or rate of activity: Would a fast work pace lead to discomfort, causing the employee to move the respirator and, thus, affect the fit?
- Workplace conditions such as temperature and humidity or the location and movement of other personnel and equipment: Would the temperature and humidity affect the effectiveness of filters, cartridges, and other respirator parts as well as the comfort of the wearer?
- Identify the chemicals, biologicals or radioactive materials to which MWU employees are exposed and evaluate the hazards of those chemicals, biologicals or radioactive materials.
- Determine the state and physical form of the chemical: Are they solids, liquids, or gases? Do the liquids and solids give off vapors or do they form dusts or mists?
- Estimate or measure employee exposures to the hazards.

Respiratory hazards may be present in the workplace in the following physical forms

Dusts and fibers are solid particles that are formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading, etc.

Fumes are solid particles that are formed when a metal or other solid vaporizes and the molecules condense (or solidify) in cool air. Examples are metal fumes from smelting or welding. Fumes also may be formed from processes such as plastic injection or extrusion molding.

Mists are 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.

Gases are materials that exist as individual molecules in the air at room temperature. Examples are welding gases, such as acetylene and nitrogen, and carbon monoxide produced from internal combustion engines.

Vapors are the gaseous form of substances that are 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.

Biological hazards include bacteria, viruses, fungi, and other living organisms that can cause acute and chronic infections if inhaled.

NIOSH Certification

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed, obscured or defaced while it is in use. Marking the initial date of use is acceptable as long as the marking does not obscure the information on the label.

Information on the label:

- The class of contaminants covered by the filters, cartridges, and canisters.
- NIOSH number.
- Any limitations or precautions.

An advantage of NIOSH approved filters, cartridges, and canisters are their color coding. This allows the respirator wearer, co-workers, the supervisor and the Program Administrator to readily determine that the wearer is using the appropriate filter.

Cartridge Types:

To determine the proper cartridge for air-purifying respirators, either contact a safety professional or consult the Material Safety Data Sheet of the substance that needs to be filtered. All cartridges are assigned a color designating the type of contaminant they will filter:

Cartridge Color – Contaminant:

Olive: Multi-Contaminant
White: Acid gas
Black: Organic vapors
Green: Ammonia gas
Yellow: Acid gas and organic vapors
Purple/Magenta: Any particulates - P100
Orange: Any particulates - P95, P99, R95, R99, R100
Teal: Any particulates free of oil - N95, N99, or N100

The medium used as the filter is usually activated carbon. The adsorption capacity of the filter is limited.

Filter types:

There are nine (9) filter types for use in non-powered APRs based on three (3) levels of filter efficiency and three (3) levels of resistance to degradation by oil.

- The three (3) levels of filter efficiency are 95%, 99% and 99.97%. The filters are referred to as 95, 99, and 100 filters, respectively.
- The three (3) levels of oil resistance are **N** (non-oil resistant), **R** (oil resistant) and **P** (oil-proof).
- The most common commercially available cartridges are “N95” (not oil resistant and 95% efficient) and “P100” (oil proof and 99.97% efficient). The P100 is comparable to the HEPA filter that is used on Powered Air Purifying Respirators (PAPRS).
- All nine classes filter the same particle size (0.3 micrometers aerodynamic mass median diameter).

Respirator Selection:

The respirator selected shall be appropriate for the chemical state and physical form of the contaminant.

- **For protection against particulates**, MWU shall provide an APR equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter or an APR equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or for contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an APR equipped with any filter certified for particulates by NIOSH.

- **For protection against gases and vapors**, MWU shall provide an air-purifying respirator, provided that the respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or if there is no ESLI appropriate for conditions in the employer's workplace, the employer implements 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. The employer shall 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.

The Program Administrator has determined that there are <u>no</u> areas presenting potential IDLH conditions.

- ***Assigned Protection Factors (APFs)*** Employers must use the assigned protection factors listed in Table I to select a respirator that meets or exceeds the required level of employee protection.

Table I: Assigned Protection Factors[5]

Type of Respirator[1, 2]	Quarter mask	Half mask	Full facepiece	Helmet/Hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	10[3]	50	—	—

Notes:
1 Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.
2 The assigned protection factors in Table I are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.
3 This APF category includes filtering facepieces, and half masks with elastomeric facepieces.
5 These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134(d)(2)(ii).

- MWU will select a respirator for employee use that maintains the employee's exposure to the hazardous substance, when measured outside the respirator, at or below the ***Maximum use concentration (MUC)***.

    - ***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.

    - MWU must not apply MUCs to conditions that are immediately dangerous to life or health (IDLH).

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

Selection:

To select the correct respirator for protection against particulates, the following conditions must be known:

1. The identity and concentration of the particles in the workplace air.
2. The OSHA or MSHA permissible exposure limit (PEL), NIOSH-recommended exposure limit, or other occupational exposure limit for the contaminant.
3. The hazard ratio (HR) (i.e. the airborne particulate concentration divided by the exposure limit).
4. The Assigned Protection Factor (APF) for the class of respirator (the APF should be greater than the HR).
5. The immediately dangerous to life or health (IDLH) concentration, including oxygen deficiency (NIOSH 1994).
6. Any service life information available for combination cartridges or canisters.

Designations dictate usage of the filter:

N, R and P designations dictate usage of the filter. N-series filters are "not resistant to oil," R-series filters are "resistant to oil" and P-series filters should be selected if there are oil aerosols (e.g. lubricants, cutting fluids, etc.) or non-oil aerosols in the workplace. N-series filters should be used only for non-oil aerosols (e.g. solid and water-based). The service life of all three filter categories (N, R and P) is limited by considerations of hygiene, damage and breathing resistance. All filters should be replaced whenever they are damaged, soiled or causing noticeable increased breathing resistance.

N-Series Filters:

Generally, the use and repeated use of N-series filters is limited only by hygiene, damage and increased breathing resistance. However, when working in very dirty or dusty workplaces that may result in high filter loading (200 mg), service time should be limited to continuous or intermittent use of 8 hours unless an evaluation is done of the specific workplace setting to prove that extended use will not degrade the efficiency below the efficiency level of the specific respirator or that total mass loading of the filter does not exceed 200 mg.

R-Series Filter:

The R-series should be only used for one working shift (or for 8 hours of continuous or intermittent use) when oil is present. Service time for R-series respirators can be extended using the same criteria as stated above (by doing an evaluation of the specific workplace setting and proving that extended use will not degrade the efficiency below the efficiency level of the specific respirator or that total mass loading does not exceed 200 mg).
These determinations for both N and R series would need to be repeated whenever conditions change or modifications are made to processes that could change the type of particulate being generated.

P-Series Filters:

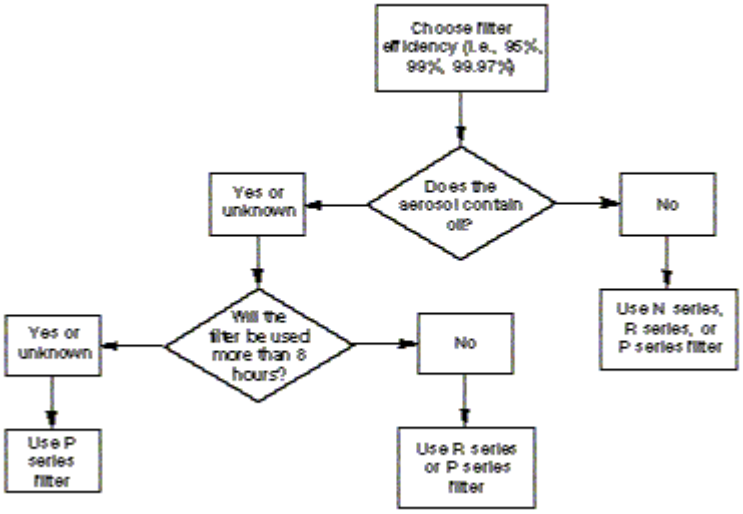
Use and reuse of the P-series filters is subject only to considerations of hygiene, damage and increased breathing resistance.

***Maximum use concentration (MUC)*:**

Multiplying the occupational exposure limit by the APF for a respirator gives the maximum workplace concentration in which that respirator can be used. For example, if the commonly accepted APF for a half-mask respirator is 10 and the PEL is 5 milligrams per cubic meter, then 50 milligrams per cubic meter is the highest workplace concentration in which a half-mask respirator can be used against that contaminant. If the workplace concentration is greater than 50 milligrams per cubic meter, a more protective respirator (with a higher APF) should be used.

In no case should an air-purifying respirator be used in IDLH atmospheres or in areas that are oxygen deficient, and you should never exceed the manufacturer's guidelines.

The selection flow chart below is from NIOSH:



Hazard evaluation

The Program Administrator 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. The hazard evaluation will include:

- Identification and development of a list of hazardous substances used in the workplace, by department, or work process.
- Review of 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.
- When necessary, exposure monitoring to quantify potential hazardous exposures will be either contracted out or performed by the MWU Respiratory Protection Program.

Updating the Hazard Assessment

The Program Administrator will revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure).

If an employee feels that respiratory protection is needed during a particular activity, he/she is to contact his or her supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard, arranging for outside assistance as necessary. The Program Administrator will then communicate the results of that assessment back to the employee(s). 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.

Voluntary Usage

This section applies to MWU employees who voluntarily use a respirator other than a filtering facepieces (e.g. dust masks) respirator.

The Program Administrator will assess each employee's request to voluntarily use respiratory protection on a case by case basis, depending on specific workplace conditions and the results of the medical evaluations. The Program Administrator shall authorize an employee to use their own or an MWU supplied respirator only after MWU has determined that such voluntary respirator use will not in itself create a hazard.

MWU is ***not*** required to provide respirators for voluntary respirator users, but may provide respirators at the request of an employee on a case by case basis.

MWU is ***not*** required to perform fit testing for employees who voluntarily wear tight-fitting elastomeric facepiece respirators (including a negative pressure, air-purifying respirator or a filtering facepiece) in a worksite environment where such equipment is ***not*** necessary.

The Program Administrator will provide all employees who voluntarily choose to wear respirators with the information contained in Appendix D to this section ("Information for Employees Using Respirators When Not Required Under the Standard").

Employers are not required to include in a written respiratory program those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks).

Summary of Voluntary Usage:

Dust Mask (filtering face piece)

- No medical evaluation provided.
- Employee will be provided with material in Appendix D.
- MWU Respiratory Protection Program will not pay for masks.
- No fit testing required.

Tight Fitting ½ or Full Face air-purifing Respirator (APR)

- MWU will provide the medical evaluation.
- Employee will be provided with material in Appendix D.
- MWU Respiratory Protection Program will not pay for masks.
- Appropriate facilities and time to clean, disinfect, maintain and store respirators will be given, but these supplies are not provided by the program.
- No fit testing required.

Required Usage:

This section applies to MWU employees who are ***required*** to use/wear negative pressure respirators (including tight-fitting facepiece, elastomeric APRs or filtering facepieces [dust masks]).

The Program Administrator will assess each employee's need for respiratory protection on a case by case basis, depending on specific workplace conditions and the results of the medical evaluations. The Program Administrator shall authorize an employee to use an MWU supplied respirator only after MWU has determined that such respirator use will not in itself create a hazard.

Summary of Required Usage:

Dust Mask (filtering face piece)

- MWU will provide the medical evaluation.
- *Annual* Fit testing is provided.
- *Annual* training video on all aspects of respirator usage (donning, doffing, seal testing, usage, maintenance, storage, inspection, and repair), as applicable, is provided.
- Schedules for specific procedures on all aspects of respirator usage are provided.
- Clear procedures on all aspects of respirator usage, including how individuals will use their assigned respirators in the workplace is provided.
- MWU Respiratory Protection Program will pay for masks.

Tight Fitting ½ or Full Face air-purifing Respirator (APR)

- MWU will provide the medical evaluation, and if necessary, the follow-up medical examination.
- *Annual* Fit testing is provided.
- *Annual* training video on all aspects of respirator usage (donning, doffing, seal testing, usage, maintenance, storage, inspection, and repair) as applicable is provided.
- Schedules for specific procedures on all aspects of respirator usage are provided.
- Clear procedures on all aspects of respirator usage, including how individuals will use their assigned respirators in the workplace is provided.
- A cartridge change schedule will be provided.
- MWU Respiratory Protection Program will pay for masks and cartridges.

Medical Evaluation

All employees (including seasonal or temporary workers) who are either required to wear to use/wear negative pressure respirators (including tight-fitting facepiece, elastomeric APRs or filtering facepieces [dust masks]), or who choose to wear an APR voluntarily, must pass a medical evaluations before being permitted to wear a respirator on the job. ***Employees who are required to wear a respirator are <u>not</u> permitted to wear a respirator until a physician or other qualified health care provider has determined that they are medically able to do so***. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

Using a negative pressure respirator may place a burden on a worker's health. The burden varies according to a number of factors, including:

- the type of respirator worn.
- the job and workplace conditions in which the respirator is used.
- and the medical status (medical conditions) of the employee.

Specific medical conditions that may place an employee at increased risk of illness, injury, or death include:

- Cardiovascular or respiratory disease such as high blood pressure, asthma, chronic obstructive pulmonary disease, etc.
- Cardiovascular damage such as heart attack or stroke.
- Reduced lung function caused by such factors as smoking or prior exposure to respiratory hazards.
- Neurological disorders like epilepsy.
- Psychological disorders like claustrophobia or anxiety.

A licensed physician or another licensed health care provider (PLHCP) will provide the medical evaluations. MWU is using Advocate Occupational Health for medical evaluations. Advocate Occupational Health is located at 3551 Highland Ave., Downers Grove, in the Health & Wellness Center at Good Samaritan Hospital.

Medical evaluations may consist either of a medical questionnaire or a medical examination:

- If a medical questionnaire is used, it must be the questionnaire specified in the Respiratory Protection Standard (Appendix C; Sections 1 and 2). The language in Appendix C of the Respiratory Protection Standard is mandatory and cannot be altered. The PLHCP determines if Part B of the questionnaire needs to be administered and the PLHCP can alter the questions in Part B in any manner he/she thinks appropriate.
- If a medical examination occurs in place of the medical questionnaire, the PLHCP must obtain the same information from the worker that is contained in the questionnaire.

Medical evaluation procedures are as follows:

- The medical evaluation will be conducted using the questionnaire provided in Appendix C of the respiratory protection standard. The Program Administrator will provide a copy of this questionnaire to all employees requiring medical evaluations.
- Each employee must understand the questions on the medical questionnaire, if the questionnaire is used.
- To the extent feasible, MWU will assist employees who do not speak English or are unable to read the questionnaire (by providing help in reading the questionnaire. When this is not possible, the employee will be sent directly to the PLHCP for medical evaluation. For non-English speakers, an interpreter should be present, the interpreter may be a family member, friend or co-worker who speaks both English and the employee's language or a professional interpreter (but a professional is not required by the standard) to aid the PLHCP in filling out the non-English speaker's questionnaire.
- All involved employees will be given a copy of the medical questionnaire to fill out, along with a stamped and addressed envelope for mailing the questionnaire to the physician. Employees will be permitted to fill out the questionnaire on MWU time or at a time and place convenient to the employee.
- MWU will pay for the medical evaluation and any related expenses incurred by MWU employees during the evaluation.
- The information on the medical evaluation is strictly confidential. The only access MWU will have to the information is that provided in the PLHCP's written recommendation. No one at MWU can obtain a copy of any employee's completed questionnaire. PLHCP's written recommendation must be kept strictly confidential.
- *All employees will be granted the opportunity to speak with the PLHCP about their medical evaluation and the follow-up medical examination (if needed), if they so request*. Employees may want to clarify questions asked on the questionnaire or to explain answers they provided. The contact information will either be posted in an area or areas accessible to all employees or included on a separate sheet of paper in the questionnaire.

- The Program Administrator will provide the PLHCP with:

    - a copy of this program,
    - a copy of the OSHA Respiratory Protection Standard,
    - the list of hazardous substances by work area,
    - for each employee requiring evaluation:
        - his or her work area or job title,
        - proposed respirator type and weight,
        - length of time required to wear respirator (duration and frequency of use),
        - expected physical work load (light, moderate, or heavy),
        - potential temperature and humidity extremes,
        - any additional protective clothing required.

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

    - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
    - The PLHCP or supervisor informs the Program Administrator that the employee needs to be reevaluated;
    - Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;
    - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

- Medical evaluations will terminate when an employee is no longer required to wear a respirator.

Follow-up Medical Examinations:

- Follow-up medical exams will be provided to employees as required by the standard, and/or as deemed necessary by the PLHCP. Specifically, follow-up medical exams will be provided to employees:

    - who give positive answers to any of the questions 1 through 8 in Appendix C, Part A, Section 2.
    - who wear a full face respirator and who answer positively to any of questions 10 through 15 in Appendix C.
    - Whose answers on the questionnaire or the initial medical examination given in place of the questionnaire indicates a follow-up medical examination is necessary.

- The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination about the employee's ability to use a respirator.
- The PLHCP may investigate a medical condition that is not addressed in the questionnaire if the PLHCP has reason to believe the condition could effect the employee's ability to wear a respirator.
- If the PLHCP is not a physician, some issues may arise during the medical evaluation process and/or follow-up medical examination that is beyond the scope of the PLHCP's license. In such cases, a physician must be involved.
- The medical examination shall be administered confidentially during the employee's normal working hours (on MWU time) or at a time and place convenient to the employee.
- MWU will pay for the medical examination and any related expenses incurred by MWU employees during the examination.

Medical determination:

The PLHCP will provide the Program Administrator with a recommendation about the employee's ability to use a respirator in writing. The following information must be included:

- A determination that the employee is medically able to use the respirator.
- Any limitations on respirator use related to medical conditions or to workplace conditions in which the respirator is used.
- The need, if any, for follow up medical evaluations.
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation. **The PLHCP must provide the employee with a copy of the PLHCP's written recommendation**.

The Program Administrator makes the final decision about the employee's ability to wear a respirator. The PLHCP's opinion will obviously be an important factor that the Program Administrator will consider when making the final determination.

MWU will provide its employees with a medical reevaluation annually or in accordance with the PLHCP's recommendations.

Fit Testing

All MWU employees required to wear a negative pressure, respirators (including tight-fitting facepiece, elastomeric APRs or filtering facepieces [dust masks]) must be qualitatively fit tested. Qualitative fit testing (QLFT) is a non-numeric pass/fail test that relies on the respirator wearer's response to a substance ("test agent") used in the test to determine respirator fit.

Employees who are required to wear negative pressure respirators will be fit tested:

- Prior to initial use -- being allowed to wear any negative pressure respirator.
- At least annually (i.e., every 12 months) thereafter.
- When there are changes in the employee's physical condition that could affect respirator fit (e.g., obvious change in body weight, facial scarring, extensive dental work, facial hair, cosmetic surgery, etc.). This requirement is triggered by physical changes:
    - reported by the respirator user.
    - observed by his/her supervisor, the Program Administrator, or the PHLCP.
- Whenever an employee switches to a different negative pressure respirator (e.g., a different size, make, model, or type).

Fit tests are ***not*** needed for employees who voluntarily wear negative pressure respirators, including ½ or full face, tight-fitting APRs or filtering facepieces (dust masks).

Importance of a tight-fitting facepiece/tight-fitting respirator: See instructions on seal-testing on page 21 under "**Respirator Use --** *General Use Procedures*:*"*

Protocol for fit testing:

Detailed protocols for qualitative fit testing are provided as part of the standard, but the procedure is outlined below. The Program Administrator will conduct fit tests with an OSHA approved kit as outlined in the Aerosol QLFT Protocol in Appendix A of the Respiratory Protection standard.

Procedure:

1. The respirator wearer will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit.
2. The respirator wearer performs a user seal check.
3. The respirator wearer stands in an enclosure and a test agent is introduced, such as:
   Banana oil (isoamyl acetate) – **QLFT can only be done if organic vapor cartridges are used**.
   Saccharin
   Bitrex, etc.
4. If the respirator wearer can smell the test agent, this indicates that the agent leaked into the facepiece and that the respirator has failed the test because a good facepiece-to-face seal has not been achieved.
5. If the respirator wearer cannot successfully complete the qualitative test with a particular respirator, the employee must then be tested with another make, size, or brand of respirator.
6. If, after fit testing, an employee reports that his or her respirator does not fit properly, we will allow the employee a reasonable opportunity to select a different tight-fitting facepiece respirator. After another respirator is selected, a new fit test on the employee's replacement equipment must be conducted.

Possible reasons why an employee might determine that the facepiece does not establish an effective facepiece-to-face seal include:

- The employee may determine this upon smelling a worksite contaminant while wearing the respirator with new cartridges or might hear or feel air leaking around the facepiece-to-face seal.
- The employee's determination also can be based on factors unrelated to the particular worksite. For example, the employee might find that he or she can't wear the respirator for extended periods without experiencing irritation or pain.

Goal of a QLFT on negative pressure APRs:

The negative pressure APR on QLFT must achieve a fit factor of 100 or less. Dividing the fit factor of 100 by a standard safety factor of 10 indicates that the negative pressure APRs that have successfully completed a QLFT can be relied on to reduce a worker's exposure by a protection factor of 10. The safety factor of 10 is used because protection factors that workers achieve at work sites tend to be much lower than the fit factors achieved during fit testing.

In practice, this means that any negative pressure APR may be qualitatively fit tested if the APR is to be used in workplace atmospheres where the level of the hazardous contaminant is 10 times or less than the permissible exposure limit (PEL) and lower than the level that is IDLH. For example, if the PEL for a specific workplace contaminant is 5 ppm, you could use a qualitative fit test to fit test a negative pressure APR to be used in the workplace at exposure levels up to 50 ppm (ten times the PEL or less). If the workplace exposure level is greater than 50 ppm, however, a quantitative fit test (QNFT) must be used.

Both half-facepiece APRs and full-facepiece APRs may be qualitatively fit tested if they are to be worn in work areas where the concentration of contaminant is no more than ten times the PEL.

- OSHA PELs establish the maximum level of a specific contaminant that a worker can be exposed to, averaged over an 8-hour work day (8-hour time-weighted average) or over a specified portion of a work day (for example, a 15 minute short-term exposure limit; PELs are listed in 29 CFR 1910.1000, and 1926.55).

The Program Administrator has determined that QNFT is not required for the respirators used under current conditions at MWU. If conditions affecting respirator use change, the Program Administrator will evaluate on a case-by-case basis whether QNFT is required.

Respirator Use

General Use Procedures:

Employees will use their respirators under conditions specified by this program, and in accordance with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

Each manufacturer provides a procedure for donning (putting on a respirator) and doffing (removing a respirator) each model of respirator produced by the manufacturer. It is critical to utilize the specified procedure each time the respirator is donned. Failure to follow the procedure may result in a failed seal test. ***Inspection of the respirator before donning is a crucial step in this procedure; See***

*Inspection and Maintenance***.**

A tight-fitting facepiece is intended to form a complete seal with the respirator wearer's face. This seal must be sufficiently tight to prevent any contaminants in the work environment from leaking around the edges of the facepiece into the user's breathing air. *This is especially true with negative pressure respirators but is also required for filtering facepieces*. A negative pressure respirator must maintain a tight fitting facepiece so that there will be a lower air pressure inside the facepiece than outside during inhalation. If the facepiece-to-face seal leaks on these types of respirators, air contaminants will be drawn into the breathing air.

- The manufacturer's recommended procedures for checking the facepiece seal may be used if the employer demonstrates that the manufacturer's procedures are as effective as those described in Appendix B-1 of the Respiratory Protection standard, e.g., these procedures are effective in identifying respirators that fit poorly when put on or adjusted.
- ***Please note that a user seal check is <u>not</u> a substitute for a qualitative fit test. Fit testing is a more rigorous procedure that is used to determine whether the respirator fits the face of the worker. A seal test must also be performed each time a worker "dons" a respirator.***

All employees shall conduct user seal checks each time that they wear their respirator. If using a *filtering facepieces* employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the Respiratory Protection Standard or procedures recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B-1 of the Respiratory Protection Standard. If using a *half-face negative pressure respirator,* employees shall use *both* the positive or negative pressure check specified in Appendix B-1 of the Respiratory Protection Standard or procedures recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B-1 of the Respiratory Protection Standard**.** ***If a respirator fails a seal test, the worker cannot perform the procedure that requires the respirator and not enter a hazardous area that requires a respirator***.

- To conduct a user seal check, the worker performs either one or both, a negative pressure ~~fit~~ and a positive pressure seal check. The worker covers the respirator inlets (cartridges, canisters, or seals) or the entire filtering facepiece and gently inhales, and holds breath for 10 seconds. The facepiece should collapse on the worker's face and remain collapsed. For the positive seal check, the worker covers the respirator outlet or the entire filtering facepiece and exhales, the facepiece should bulge out on the worker's face and remain bulging out.

All employees shall be permitted to leave the work area to go to a “designated safe area” to maintain their respirator for the following reasons:

- clean their respirator if the respirator is impeding their ability to work.
- to wash his or her face or the respirator facepiece to prevent eye or skin irritation associated with respirator use.
- to change filters or cartridges, replace parts, or to inspect the respirator if it stops functioning as intended, because:
    - vapor or gas breakthrough occurred (the cartridges or canister is saturated with contaminants and needs to be changed).
    - the facepiece is leaking.
    - a change in breathing resistance is occurring (filter is full of dust/particles and needs to be changed).
    - the respirator or parts such as valves or straps, are not working properly.

Employees should notify their supervisor before leaving the area (if appropriate).

The designated safe area must be located in a place that is free of respiratory hazards or contamination. As long as these conditions are met, the safe area can be in a location that minimizes interruptions to work flow.

Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the facepiece-to-face seal or valve function.

If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall 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.

Continuing respirator effectiveness:

The Program Administrator, Faculty and Supervisors must be aware of conditions in work areas where employees are using respirators. This means conducting "appropriate surveillance" of both the work place and the respirator wearer.

Work place surveillance means that the Program Administrator, Faculty and Supervisors must routinely look for any changes that may affect the effectiveness of a respirator. You must look for changes in the work area which includes changes:

- In work tasks or processes that can result in changes in the hazard or the time period of exposure, or that put the employee in closer proximity to the hazard.
- Like the addition of new machinery that would cause an employee to exert more energy and breathe harder.

Respirator wearer surveillance means that the Program Administrator, Faculty and Supervisors must routinely observe employees as they work while wearing respirators. By observing respirator use under actual workplace conditions, you can determine:

- Whether other protective equipment is interfering with respirator use.
- Whether a change in working conditions may result in exposure to new contaminants.
- Whether workers are experiencing discomfort, such as skin irritation or breakthrough of contaminants through cartridges and canisters.

If any of these conditions exist, the Program Administrator will make adjustments, such as providing a more protective respirator or a different size or style of respirator, or alter work practices to reduce the stress on workers, to ensure that workers continue to receive adequate respiratory protection.

Emergency Procedures:

The following work areas have been identified as having foreseeable emergencies:

Labs or other rooms containing hazardous materials (chemicals, biological agents, radioactive materials or hazardous materials in any form). Buildings with such labs or rooms include:

- Prabhu hall
- Centennial hall.
- Alumni hall.
- Central plant

Protocols for spills of hazardous biological, chemical or radioactive materials are detailed in the MWU Lab safety manual and the MWU Radiation safety manual.

Only MWU faculty and staff, never students, will conduct clean-ups of hazardous materials spills. Those faculty and staff members designated to handle clean-ups will be fit tested and provided with APRs with appropriate cartridges.

In the event of a spill, all non-essential personnel in the spill area will be assessed for contamination and if not contaminated, directed to leave the area. Any person contaminated will be decontaminated and then directed to leave the area. If anyone is injured, procedures to provide first aid or other action to take care of the injuries will be done first, then contamination issues will be addressed.

Designated MWU faculty and staff will evaluate the spill. If the spill is minor (i.e. the designated personnel can handle the clean-up themselves) and the clean–up does not put the designated personnel at risk of physical harm to themselves, they should proceed with the clean-up. If any or all of these conditions is not applicable, the personnel need to contact MWU authorities and a professional HAZMAT team will be called in to handle the clean-up. All other employees must immediately evacuate the building.

Respirator Malfunction

1. APR Respirator Malfunction:

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

2. IDLH Procedures:

The Program Administrator has determined that there are no areas presenting potential IDLH conditions.

Air Quality

MWU employees do not utilize supplied-air respirators, therefore, we are not required to address issues of compressed air quality.

Cleaning, Inspection and Maintenance, Defective Respirator, Change Schedules and Storage

Cleaning:

- Each respirator wearer is responsible for cleaning his/her own respirator.
- Each respirator wearer will be trained and receive the necessary equipment and supplies to maintain their respirator.
- Respirators are to be regularly cleaned and disinfected in a location where no respiratory protection is required.
- Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary.
- Emergency use respirators are to be cleaned and disinfected after each use.
- The frequency of cleaning, sanitizing, and disinfecting respirators will depend in part on several issues:
    - ⇒ Are respirators issued for the exclusive use of an employee or are they shared?
    - ⇒ Worksite conditions: Is the worksite a dirty environment that will require more frequent cleaning, especially the facepiece?

The following procedure is to be used when cleaning and disinfecting respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the facepiece and associated parts in a mild detergent with warm water. Do not use organic solvents.
- Rinse completely in clean warm water.
- Wipe the respirator with disinfectant wipes (70% Isopropyl Alcohol) to kill germs.
- Air-dry in a clean area.
- Reassemble the respirator and replace any defective parts.
- Place in a clean, dry plastic bag or other air tight container.

Note: The Program Administrator will ensure an adequate supply of appropriate cleaning and disinfecting materials. If supplies are low, employees should contact their supervisor, who will inform the Program Administrator.

Inspection and Maintenance

Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee.

Maintenance involves a thorough visual inspection for cleanliness and defects. The frequency of and procedures for inspection depend upon whether the respirator is intended for non-emergency or both emergency and non-emergency situations. Visual inspection of the respirator should:

- Identify any parts that may be missing, distorted, blocked, loose, worn, deteriorated or otherwise interfere with proper performance and replacement prior to use.
- Identify deterioration and pliability of elastomeric (rubber or silicon) parts.

No components will be replaced or repairs made beyond those recommended by the manufacturer.

Inspect **non-emergency** APRs:

- *Before* each use.
- *During* cleaning and disinfection.

The following checklist will be used when inspecting respirators:

- Facepiece:
  - cracks, tears, or holes
  - facemask distortion
  - cracked or loose lenses/faceshield
- Headstraps:
  - breaks or tears
  - broken buckles
- Valves:
  - residue or dirt
  - cracks or tears in valve material
- Filters/Cartridges:
  - approval designation
  - gaskets
  - cracks or dents in housing
  - proper cartridge for hazard

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards. Situations when this is permitted include:

- to wash their face and respirator facepiece to prevent any eye or skin irritation,
- to replace the filter, cartridge or canister,
- if they detect vapor or gas breakthrough or leakage in the facepiece
- if they detect any other damage to the respirator or its components.

Defective Respirators

Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his or her supervisor. Supervisors will give all defective respirators to the Program Administrator. The Program Administrator will decide whether to:

- Temporarily take the respirator out of service until it can be repaired.
- Perform a simple fix on the spot such as replacing a headstrap.
- Dispose of the respirator due to an irreparable problem or defect.

When a respirator is taken out of service for an extended period of time, the respirator will be tagged "out of service", and the employee will be given a replacement of similar make, model, and size. All tagged "out of service" respirators will be kept in a site to be determined.

Change Schedules

The following statements are a synopsis of the some of the requirements of the standard on cartridge or canister change schedules:

- MWU will develop cartridge/canister change schedules based on available data or information. Such information includes the exposure assessment and information based on breakthrough test data, mathematically based estimates, and/or reliable use recommendations from MWU's respirator and/or chemical suppliers.

- Reliance on odor thresholds and other warning properties will not be permitted as the primary basis for determining the service life of gas and vapor cartridges and canisters.

- OSHA emphasizes that a conservative approach is recommended when evaluating service life testing data. Temperature, humidity, air flow through the filter, the work rate, and the presence of other potential interfering chemicals in the workplace all can have a serious effect on the service life of an air-purifying cartridge or canister.

- It is suggested that a safety factor is incorporated to the service life estimate to assure that the change schedule is a conservative estimate.

- The standard requirements for change schedules are found in: 29 CFR 1910.134(d)(3)(iii)(B)(2)

- For enforcement policy and guidance, see the OSHA Directive for Inspection procedures for the Respiratory Protection Standard.

- For additional background material, see the OSHA Preamble to Final Rules for Respiratory Protection.

Development of a Documented Change Schedule Protocol for Respirator Cartridges

***Respirator cartridges don't last forever*!**

A change schedule is the part of the written respirator program which says how often cartridges should be replaced and what information was relied upon to make this judgment. A cartridge's useful service life is how long it provides adequate protection from harmful chemicals in the air. The service life of a cartridge depends upon many factors, including:

- environmental conditions, breathing rate,
- cartridge filtering capacity,
- The amount of contaminants (*See* "***When? What? How Much?*** *below*") in the air.

Factors that can Reduce Cartridge Service Life:

*The service life of a cartridge depends upon many factors***:**

- **Worker Exertion Level.**
- **Respirator Cartridge Variability: some cartridges contain more activated charcoal than others**
- **Temperature: the hotter it is, the shorter the service life.**
- **Relative Humidity: water vapor will compete with organic vapors for active sites on the adsorbent.**
- **Multiple Contaminants: predictions should be derived from the least well adsorbed compound.**

Worker Exertion Level: a worker breathing twice as fast as another will draw twice the amount of contaminant through the respirator cartridge:

The service life of a cartridge or canister respirator depends upon the total amount of contaminant captured by the absorbent. The total amount of captured contaminant is directly related to the work rate or breathing rate; i.e., a worker breathing twice as fast as another will draw twice the amount of contaminant through the respirator cartridge. Most cartridge studies have used a breathing rate, 50-60 liters per minute, that approximates a high end of moderate work rate. For work rates that exceed this level (e.g., heavy shoveling, running) a correction factor may be needed when determining a service life.

*Respirator Cartridge Variability: some cartridges contain more activated charcoal than others***:**

The service life of a respirator cartridge is directly related to the amount of active material in the cartridge. For instance, most dual cartridge organic vapor respirators contain between 35-50 grams of activated charcoal in each cartridge. If the specific cartridge being evaluated can be reproducibly determined to have a certain amount of active material, then modifications to the service life may be justified. Information on cartridge specifications can be obtain from manufacturers.

*Temperature; the hotter it is, the shorter the service life***:**

High temperatures can adversely affect the adsorptive capacity of respirator cartridges and canisters. The high temperature may act by thermally loosening the attractive forces that make adsorption happen or may act in concert with humidity by increasing the moisture carrying capacity of air. This latter mechanism may represent the greatest likely effect on service lives of cartridges. Temperature effects alone have been reported to reduce the service life 1-10% for every 10 degrees Celsius rise depending on the specific solvent (Nelson, et. al., 1976). *Corrections to cartridge estimated service life for this effect alone are probably not necessary under normal working temperatures.*

*Relative Humidity; water vapor will compete with the organic vapors for active sites on the adsorbent***:**

Relative Humidity is a measure of the amount of water vapor the air will hold at a specified temperature and is expressed in percentage values. Since warmer air will hold more water than colder air, the same relative humidity at a higher temperature represents a significantly greater amount of moisture. High relative humidity is a significant negative factor in the capacity of organic vapor cartridges since the large quantity of water vapor will compete with the organic vapors for active sites on the adsorbent. *Most of the laboratory work determining adsorbent capacity has been performed at a low relative humidity of 50% at approximately 70 degrees F.*

If the actual use of the organic vapor respirators will take place in a significantly more humid environment, then you may need to apply or take into account a safety factor when determining a service life. The exact magnitude of the humidity effect is complex, dependent in part upon chemical characteristics and concentrations of both the contaminant and the water vapor. Based upon relatively few studies, a reduction by a factor of 2 in the cartridge service life originally estimated based upon 50 % relative humidity, may be made when the relative humidity reaches 65% (Nelson, et. al., 1976; Werner, 1985).

Multiple Contaminants; predictions should be derived from the least well adsorbed compound:

Multiple contaminants introduce a great deal of variability into the prediction of service life for respirator cartridges. Much of the laboratory testing and the mathematical models have utilized a single contaminant to determine service lives. Only a limited number of multiple contaminant situations have been studied and reported in the literature (e.g. Yoon, 1996; Jonas et. al., 1986). It is not anticipated that a situation involving multiple contaminants will occur at MWU.

When? What? How Much?

MWU will characterize the nature and magnitude of employee exposures to respiratory hazards before selecting respiratory protection equipment. Paragraph (d)(1)(iii) of the final rule requires the employer to identify and evaluate the respiratory hazard(s) in the workplace. *Employers must make a "reasonable estimate" of the employee exposures anticipated to occur as a result of those hazards, including those likely to be encountered in reasonably foreseeable emergency situations, and must also identify the physical state and chemical form of such contaminant(s).* The final rule does not specify how the employer is to make reasonable estimates of employee exposures for the purposes of selecting respirators.

When must an employer conduct an exposure assessment?

An exposure assessment must be conducted when employees are exposed to a respiratory hazard and/or require them to wear respirators. Examples of when you should consider assessments may include but are not limited to:

- When OSHA has a substance specific standard (e.g., lead, methylene chloride).
- When employees notice symptoms (e.g., irritation, odor) or complain of respiratory health effects.
- When the workplace contains visible emissions (e.g., fumes, dust, aerosols).

*What is the identity and nature of the airborne contaminant***?**

Specific characteristics of the airborne hazard must be established in order to select an appropriate respirator:

- Is the airborne contaminant a particulate (dust, fumes, mist, aerosol) or a gas/vapor?
- Is the airborne contaminant a chemical and are material safety data sheets available?
- Is the airborne contaminant a biological (bacteria, mold, spores, fungi, virus)?
- Are there any mandatory or recommended occupational exposure levels for the contaminant?

How much employee exposure is there in the workplace?

MWU may use many approaches for estimating worker exposures to respiratory hazards.

Sampling:

Personal exposure monitoring is the "gold standard" for determining employee exposures because it is the most reliable approach for assessing how much and what type of respiratory protection is required in a given circumstance:

- Sampling should utilize methods appropriate for contaminants(s).
- Sampling should present the worst case exposures;
- Sampling should represent enough shifts and operations to determine the range of exposure.

Objective Information:

You may rely on information and data that indicate that use or handling of a product or material cannot, under worst-case conditions, release concentrations of a respiratory hazard above a level that would trigger the need for respirator use or require use of a more protective respirator.

You can use data on the physical and chemical properties of air contaminants, combined with information on:

- room dimensions,
- air exchange rates,
- contaminant release rates,
- other pertinent data, including exposure patterns and work practices,

to estimate the maximum exposure that could be anticipated in the workplace.
Data from industry-wide surveys by trade associations for use by their members, as well as from stewardship programs operated by manufacturers for their customers, are often useful in assisting employers, particularly small-business owners, to obtain information on employee exposures in their workplaces.

Variation:

Potential variation in exposure should be accounted for by 1) using exposure data collected with a strategy that recognizes exposure variability, ***or*** 2) by using worst-case assumptions and estimation techniques to evaluate the highest foreseeable employee exposure levels. The use of safety factors may be necessary to account for uneven dispersion of the contaminant in the air and the proximity of the worker to the emission source.

Safety factors:

Safety factors are reductions to an estimated service life to ensure that the actual service life will not be exceeded. They are generally applied to the estimate for non-correctable conditions such as:

- presence of unknown contaminants.
- variations in work rate.
- emergency situations.

Thus the change schedule will end before the cartridge service life expires. The safety factor reduction depends in part upon the accuracy of estimation methods and in part upon workplace variables.

3 valid ways for you to estimate a cartridge's service life

If you know what the chemical is and how much of it you are exposed to, then you are ready to estimate out how long your respirator cartridges will work and apply the safety factor.

There are 3 valid ways for you to estimate a cartridge's service life:

- **Experimental Tests:**
- **Manufacturer's Recommendation:**
- **Math Model:**

Experimental work can allow for a generalization or "rule of thumb"

Experimental work can allow for a generalization or "rule of thumb" that broadly defines the service life of cartridges exposed to chemicals. One such Rule of Thumb for estimating organic vapor cartridge service life is found in chapter 36 of the American Industrial Hygiene Association (AIHA) publication "The Occupational Environment – Its Evaluation and Control."

It suggests that:

> **If the chemical's boiling point is > 70 °C and the concentration is less than 200 ppm you can expect a service life of 8 hours at a normal work rate.**
>
> **Service life is inversely proportional to work rate.**
>
> **Reducing concentration by a factor of 10 will increase service life by a factor of 5.**
>
> **Humidity above 85% will reduce service life by 50%**

These generalizations should only be used in concert with one of the other methods of predicting service life for specific contaminants.

Storage

Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own APR in accordance with the provisions of this program and will store their respirator in a plastic bag. Each employee will have his/her name on the bag and that bag will only be used to store that employee's respirator.

Respirators must be stored in such a way that:

- Protects them from contamination, dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals or other destructive conditions.
- Prevents the facepiece or valves from becoming deformed.
- Follows storage precautions issued by the respirator manufacturer.

If the respirator is intended for emergency use, it must be:

- Kept accessible in the work area in which it might be needed, but not in an area that may itself become involved in an emergency and become contaminated.
- Stored in a compartment or with a cover that is clearly identified as containing emergency equipment.

The Program Administrator will store MWU's supply of respirators and respirator components in their original manufacturer's packaging in a site to be determined.

Training

The Program Administrator will provide training to respirator users and their supervisors on the contents of the MWU Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

The training course will cover the following topics:

- the MWU Respiratory Protection Program
- the OSHA Respiratory Protection standard
- respiratory hazards encountered at MWU and their health effects
- proper selection and use of respirators
- imitations of respirators
- respirator donning and user seal (fit) checks
- fit testing
- emergency use procedures
- maintenance and storage
- medical signs and symptoms limiting the effective use of respirators

Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

5.0 Program Evaluation

The Program Administrator will conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring if and when necessary, and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to MWU's Institutional Official, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

6.0 Documentation and Recordkeeping

A written copy of this program and the OSHA standard is kept in the Program Administrator's office and is available to all employees who wish to review it.

Also maintained in the Program Administrator's office are training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The RP program administrator will document respirator fit test records must include:

- Name or Identification of the employee tested.
- The type of fit test performed.
- The make, model and size of respirator tested.
- The date of the fit test.
- Pass/Fail results of a qualitative fit test.

Fit test records must be retained until the next fit test is done. Once an employee is no longer using a respirator, fit test records will be destroyed. RP program administrator will retain these records

The RP program administrator will document respirator training which must include:

- The type, model, and size of respirator for which each employee has been trained and fit tested.
- The topics covered in training.
- Documentation of the training materials utilized for each trainee.
- The fact that the employee has demonstrated his/her understanding of the topics covered in the training through hands-on exercises or a written test.

The completed medical questionnaire, the physician's documented findings and all information from the medical evaluation/questionnaire and/or the medical exam are confidential and will remain only at the PLHCP (currently Advocate Occupational Health). MWU will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

Human Resources (HR) will maintain a PHI (Personal Health Information HIPPA file) for each employee that will be kept confidential and ***separate*** from other records (e.g., timesheets, training) of the employee and will contain following information:

- Medical determination letter.
- The waiver for employees who are allergic to animals but refuse a respirator.
- The original "Animal Questionnaire Form" for employees.

The original "Animal Questionnaire Form" for students will be kept in AF director's office.

All medical records (including the medical determination) must be kept and made available by MWU as required by 1910.134(m)(1) and 1910.1020. Specially, MWU must retain and make available to the employee, his/her records of medical evaluations (including medical determinations and the questionnaires) in accordance with 29 CFR 1910.1020, Access to Employee Medical and Exposure Records.

Records should be kept for 10 years but 30 years after the individual has left MWU is recommended.

7.0 Acronyms and Definitions.

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
APF	Assigned Protection Factor
APR	Air Purifying Respirators
ESLI	End-of-Service-Life Indicator
Ci	Concentration measured inside the respirator facepiece
Co	Concentration measured outside the respirator
DOP	Dioctylphthalate
DFM	Dust, fume, and mist filter
EPF	Effective Protection Factor
HEPA	High Efficiency Particulate Air
IDLH	Immediately Dangerous to Life or Health
LANL	Los Alamos National Laboratory
LASL	Los Alamos Scientific Laboratory
LLNL	Lawrence Livermore National Laboratory
MMAD	Mass Median Aerodynamic Diameter
MWU	Midwestern University
MSHA	Mine Safety and Health Administration
MUC	Maximum Use Concentration
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
OSH Act	Occupational Safety and Health Act of 1970 (29 U.S.C. 655, 657, 665).
PAPRS	Powered Air Purifying Respirators
PELs	Permissible Exposure Limits
PPF	Program Protection Factor
PLHCP	Physician or another Licensed Health Care Provider
QLFT	Qualitative fit test
QNFT	Quantitative Fit Test
RDL	Respirator Decision
REL	Recommended Exposure Limit
SAR	Supplied-air (or airline) respirator
SCBA	Self-contained breathing apparatus (
WPF	Workplace Protection Factor
TLV	Threshold Limit Value
SWPF	Simulated Workplace Protection Factor.

Definitions

The following definitions are important terms used in the respiratory protection standard **CFR 1910.134** and the MWU Respiratory Protection Program.

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.

Atmosphere-supplying respirator: A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes SARs and SCBA units.

Biological hazards include bacteria, viruses, fungi, and other living organisms that can cause acute and chronic infections if breathed in. Examples include Legionnaire's Disease, flour, and animal products (dander, excreta).

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.

Continuous flow respirator: An atmosphere-supplying respirator that provides a continuous flow of breathable air to the respirator facepiece.

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.

Dusts and fibers are solid particles that are formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading or blasting. Examples are lead, silica, and asbestos.

Dioctylphthalate (DOP): An aerosolized agent used for quantitative fit testing.

Elastomeric: A respirator facepiece made of a natural or synthetic elastic material such as natural rubber, silicone, or EPDM rubber.

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.)

Fumes are solid particles that are formed when a metal or other solid vaporizes and the molecules condense (or solidify) in cool air.

Gases are materials that exist as individual molecules in the air at room temperature. Examples are welding gases, such as acetylene and nitrogen, and carbon monoxide produced from internal combustion engines

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.

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

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 a MUC on the basis of relevant available information and informed professional judgment.

Mists are tiny droplets of liquid suspended in the air.

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.

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

Permissible Exposure Limit (PEL): An occupational exposure limit specified by OSHA.

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 the Small Entity Compliance Guide for the Revised Respiratory Protection Standard.

Protection factor study: A study that determines the protection provided by a respirator during use. This determination generally is accomplished by measuring the ratio of the concentration of an airborne contaminant (e.g., hazardous substance) outside the respirator (Co) to the concentration inside the respirator (Ci) (i.e., Co/Ci). Therefore, as the ratio between Co and Ci increases, the protection factor increases, indicating an increase in the level of protection provided to employees by the respirator. Four types of protection factor studies are:

> **Effective Protection Factor (EPF) study** - a study, conducted in the workplace, that measures the protection provided by a properly selected, fit tested, and functioning respirator when used intermittently for only some fraction of the total workplace exposure time (i.e., sampling is conducted during periods when respirators are worn and not worn). EPFs are not directly comparable to WPF values because the determinations include both the time spent in contaminated atmospheres with and without respiratory protection; therefore, EPFs usually underestimate the protection afforded by a respirator that is used continuously in the workplace.
>
> **Program Protection Factor (PPF) study** - a study that estimates the protection provided by a respirator within a specific respirator program. Like the EPF, it is focused not only on the respirator's performance, but also the effectiveness of the complete respirator program. PPFs are affected by all factors of the program, including respirator selection and maintenance, user training and motivation, work activities, and program administration.
>
> **Workplace Protection Factor (WPF) study** – a study, conducted under actual conditions of use in the workplace, that measures the protection provided by a properly selected, fit tested, and functioning respirator, when the respirator is worn correctly and used as part of a comprehensive respirator program that is in compliance with OSHA's Respiratory Protection standard at 29 CFR 1910.134. Measurements of Co and Ci are obtained only while the respirator is being worn during performance of normal work tasks (i.e., samples are not collected when the respirator is not being worn). As the degree of protection afforded by the respirator increases, the WPF increases.
>
> **Simulated Workplace Protection Factor (SWPF) study** - a study, conducted in a controlled laboratory setting and in which Co and Ci sampling is performed while the respirator user performs a series of set exercises. The laboratory setting is used to control many of the variables found in workplace studies, while the exercises simulate the work activities of respirator users. This type of study is designed to determine the optimum performance of respirators by reducing the impact of sources of variability through maintenance of tightly controlled study conditions

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.

Recommended Exposure Limit (REL): An occupational exposure level recommended by NIOSH.

Respirator Decision Logic (RDL): Respirator selection guidance developed by NIOSH that contains a set of respirator protection factors.

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.

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

Threshold LimitValue (TLV): An occupational exposure level recommended by ACGIH.

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

Vapors are the gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure. They are formed by evaporation. Most solvents produce vapors. Examples include toluene and methylene chloride.

8.0 Appendices

Fit Testing Procedures (Mandatory) I

Part I. OSHA-Accepted FitTest Protocols

Insert here

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.

[63 FR 1152, Jan. 8, 1998]

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. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B, 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.

[63 FR 1152, Jan. 8, 1998]

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

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 (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, and 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).

1. Today's date:_____

2. Your name:_____

3. Your age (to nearest year):_____

4. Sex (circle one): Male/Female

5. Your height: _____ ft. _____ in.

6. Your weight: _____ lbs.

7. Your job title:_____

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____

9. The best time to phone you at this number: _____

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

11. Check the type of respirator you will use (you can check more than one category):
a. _____ N, R, or P disposable respirator (filter-mask, non- cartridge type only).
b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s):_____
_____

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

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 symptoms of pulmonary or lung illness?

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, check the following space and go to question 9:)

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 who will review this questionnaire about your answers to this questionnaire: Yes/No

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

10. Have you **ever lost** vision in either eye (temporarily or permanently): 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. Color blind: 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 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.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No

If "yes," name the chemicals if you know them:_____
_____
_____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: Yes/No
b. Silica (**e.g.**, in sandblasting): Yes/No
c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
d. Beryllium: Yes/No
e. Aluminum: Yes/No
f. Coal (for example, mining): Yes/No
g. Iron: Yes/No
h. Tin: Yes/No
i. Dusty environments: Yes/No
j. Any other hazardous exposures: Yes/No

If "yes," describe these exposures:_____
_____
_____

4. List any second jobs or side businesses you have:_____
_____

5. List your previous occupations:_____
_____

6. List your current and previous hobbies:_____
_____

7. Have you been in the military services? Yes/No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

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

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

If "yes," name the medications if you know them:_____

10. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes/No
b. Canisters (for example, gas masks): Yes/No
c. Cartridges: Yes/No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

a. Escape only (no rescue): Yes/No
b. Emergency rescue only: Yes/No
c. Less than 5 hours **per week:** Yes/No
d. Less than 2 hours **per day:** Yes/No
e. 2 to 4 hours per day: Yes/No
f. Over 4 hours per day: Yes/No

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

a. **Light** (less than 200 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of a light work effort are **sitting** while writing, typing, drafting, or performing light assembly work; or **standing** while operating a drill press (1-3 lbs.) or controlling machines.

b. **Moderate** (200 to 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of moderate work effort are **sitting** while nailing or filing; **driving** a truck or bus in urban traffic; **standing** while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; **walking** on a level surface about 2 mph or down a 5-degree grade about 3 mph; or **pushing** a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. **Heavy** (above 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of heavy work are **lifting** a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; **shoveling; standing** while bricklaying or chipping castings; **walking** up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No

If "yes," describe this protective clothing and/or equipment:_____
_____

14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No

15. Will you be working under humid conditions: Yes/No

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

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

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the second toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the third toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
The name of any other toxic substances that you'll be exposed to
while using your respirator:
_____
_____
_____

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):
_____

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

Appendix D to Sec. 1910.134 (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

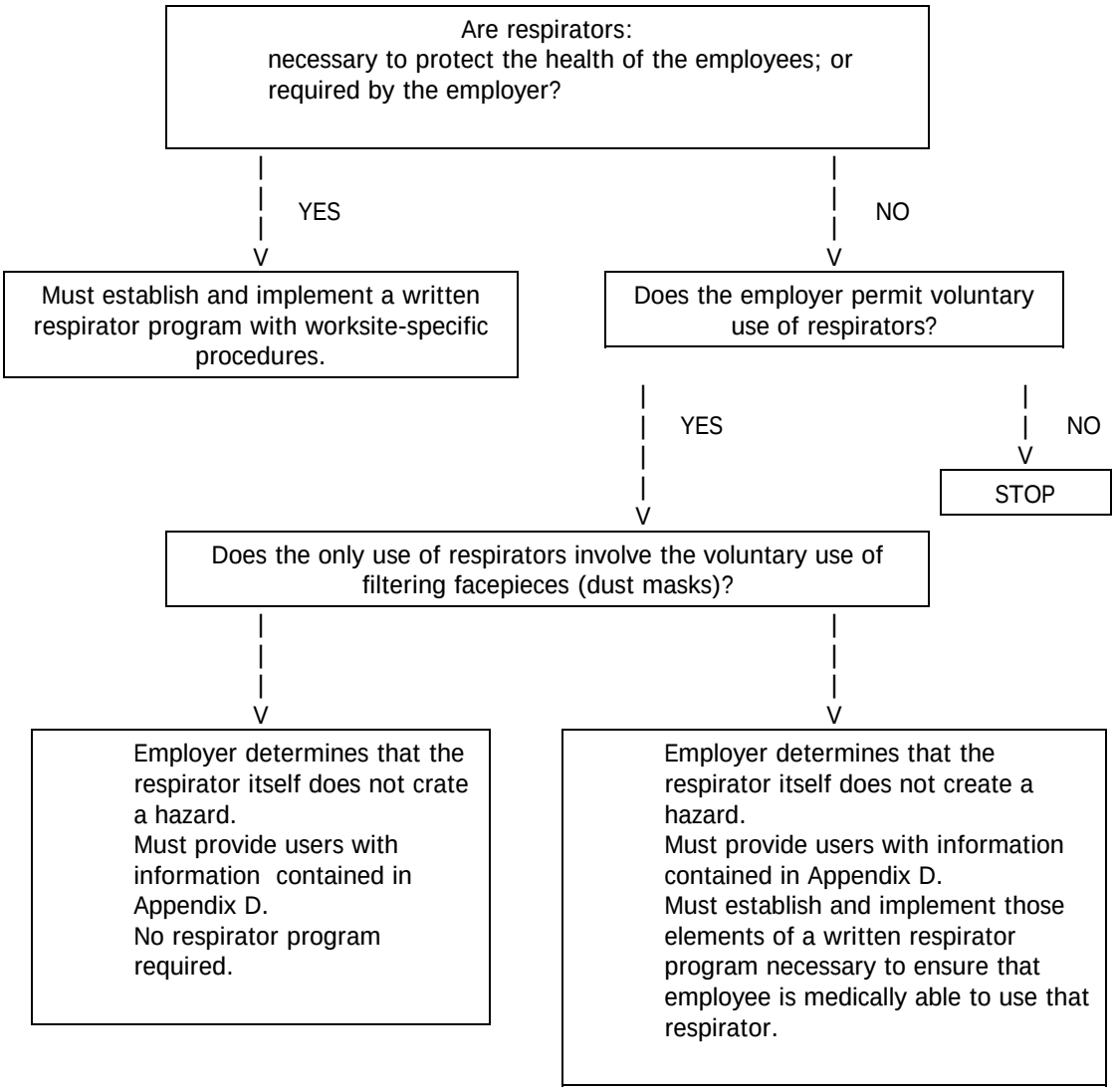
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.
[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

Appendix E

Respirator-Use Requirements Flow Chart
29 CFR 1910.134(c)



Use Limitations of Air-purifying, particulate, non-powered, respirators **(AKA Cartridge Change Schedule for Air-purifying particulate, non-powered, respirators):**

The Program Administrator shall determine the change schedules for APRs based on the presence of ESLI or if there is no ESLI, the change schedule for canisters and cartridges will be based on objective information that will ensure that the canisters and cartridges are changed before their end of service life. The Change schedule will be generated based on:

- The contaminant the respirator is to protect against.
- The concentration of contaminant in the work area.
- The frequency of use for the respirator (i.e., continuous or intermittently throughout the work day?).
- The temperature, humidity and air flow through the canister and cartridge.
- The employee's work rates.
- The presence of other potentially interfering chemicals.

Employees wearing APRs with P100 filters for protection against wood dust and other particulates shall change the cartridges on their respirators when they first begin to experience difficulty breathing (i.e., resistance) while wearing their masks. ESLI are not needed.