

UNIVERSITY OF TOLEDO

SUBJECT: RESPIRATORY PROTECTION PROGRAM

Procedure No: S-08-034

PROCEDURE STATEMENT

Safe procedures, as defined by this policy, shall be followed by all University of Toledo personnel who utilize respiratory protection in the course of their job duties.

PURPOSE OF PROCEDURE

These procedures have been established to comply with Ohio's Public Employee Risk Reduction Act, OSHA Respiratory Protection Standard (29CFR 1910.143) and Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas (10CFR 20 Subpart H). The Respiratory Protection Program provides the University community with the necessary information to understand respiratory protection requirements and the means to obtain proper respiratory protection from the Safety and Health Department.

DEFINITIONS

- *Assigned Protection Factor (APF)* – Means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by the regulations.
- *Air-Purifying Respirator (APR)* – 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 user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.
- *Authorized Users of SCBA* – Persons who have been medically certified to wear SCBA units and have received training in the use and maintenance of SCBA equipment as per this Guideline.
- *Breakthrough* – The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing is often referred to as the percentage of the input concentration.
- *Canister or Cartridge* – A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
- *CBRN* – Chemical, biological, radiological, and nuclear agents that NIOSH has certified some respirators for protection from.
- *Dust Mask* – 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, e.g., a disposable particulate respirator rated as N95 (at least 95% efficient to remove particles greater than 0.3 microns (μm) in diameter).
- *End-of-Service-Life Indicator (ESLI)* – A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective.
- *Escape Self-Contained Breathing Apparatus (ESCBAs)* – An atmosphere-supplying respirator in which the source of air is contained with the respirator independent of any other source used only for emergency evacuation, emergency equipment shutdown, or emergency patient evacuation/extrication.
- *Filtering Facepiece* – A negative pressure particulate respirator with a filter as the integral part of the facepiece or entirely composing the facepiece that is commonly known as a “dust mask” (see definition above). Filtering facepieces are available through Safety and Health or purchased through Central Distribution on the Health Science Campus, or purchased through your department on the Main Campus.
- *Fit Test* – Means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also [Qualitative fit test-QLFT](#) and [Quantitative fit test-QNFT](#).)

- *High Efficiency Particulate Air (HEPA) Filters* – Filters capable of trapping and retaining at least 99.97% of all particles of 0.3 micrometers (μm) in diameter. The equivalent [NIOSH 42 CFR 94](#) particulate filters are the N100, R100, and P100 filters.
- *Immediately Dangerous to Life and Health (IDLH)* – An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
- *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 (APF) of the respirator or class of respirators and the exposure limit of the hazardous substance.
 - The MUC can be determined mathematically by multiplying the APF specified for a respirator by the required OSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no OSHA exposure limit is available for a hazardous substance, an employer must determine an MUC on the basis of relevant available information and informed professional judgment.
- [National Institute of Occupational Safety and Health \(NIOSH\)](#) – A research group within the U.S. Department of Health and Human Services. NIOSH is an agency that was established to help assure safe and healthful working conditions for working men and women by providing research, information, education, and training in the field of occupational safety and health. NIOSH is the responsible organization for testing and certifying respirators.
- *Negative Pressure Respirator* – A tight-fitting respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.
- *Occupational Health Manager (OHM)* - An electronic recordkeeping system used by the Safety and Health and the University Health departments.
- *Oxygen Deficient Atmosphere* – An atmosphere which contains an oxygen partial pressure of less than 148 millimeters of mercury (19.5% by volume) at sea level.
- *Powered Air-Purifying Respirator (PAPR)* – An air-purifying respirator that uses a blower to deliver air through the air-purifying element to the wearer's breathing zone.
- *Pressure Demand Respirator* – A respirator in which the pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.
- *Program Administrator* – Person who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of the program's effectiveness.
- *Physician or other Licensed Health Care Professional (PLHCP)* – An individual whose legally permitted scope of practice, i.e., license, registration, or certification, allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services at the site.
- *Qualitative Fit Test (QLFT)* – A pass/fail test to assess the adequacy of respirator fit that relies on the individual's response to a 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.
- *Respirator* – Device worn by an individual that is intended to provide respiratory protection against inhalation of airborne contaminants or oxygen deficient air. All respirators must be certified by NIOSH.
- *Supplied-Air Respirator (SAR)* – An atmosphere-supplying respirator in which the source of breathing air is not designed to be carried by the user.
- *Self-Contained Breathing Apparatus (SCBA)* – An atmosphere-supplying respirator in which the source of air is contained within the respirator independent of any other source used primarily for emergency response.

- *Service Life* – The length of time required for an air-purifying element to reach a specific effluent concentration. Service life is determined by the type of substance being removed, the concentration of the substance, the ambient temperature, the specific element being tested (cartridge or canister), the flow rate resistance, and the selected breakthrough value. The service life for a self-contained breathing apparatus (SCBA) is the period of time, as determined by the NIOSH certification tests, in which adequate breathing gas is supplied.

RESPONSIBILITIES

Safety and Health

- Document and administer the respirator program.
- Assess the degree of hazard associated with respiratory exposures and the need for respiratory equipment.
- Coordinate respirator purchasing, fit testing, and training for respirators (other than for initial fit tests for N-95 respirators).
- Provide University's medical provider with information on individual type of respirator, duration and frequency of use, physical work effort, other Personal Protective Equipment (PPE) worn and if any temperature or humidity extremes exist in work environment for the purposes of employee medical clearance and surveillance related to this program.
- Provide technical assistance upon request.
- Evaluate and recommend cartridge change-out schedules.
- Maintain records of hazard evaluations including the maintenance of employee exposure data collected.
- Review and revise the Respirator Protection Program/Guideline including the assurance that the necessary program evaluations are performed as necessary.
- Identify a Program Administrator.

University Health

- Coordinate initial respirator fit testing and training for N-95's respirators used for infectious disease control.
- Schedule and maintain records of all medical surveillance services in Occupational Health Manager software.

Program Administrator

- Establish respiratory protection policies, overseeing required evaluations of program effectiveness, and for coordinating the overall respirator protection program.
- The current Respirator Program Administrator is Tim Niederkorn, Safety and Health Specialist, Safety and Health Department, (383-5089 or timothy.niederkorn@utoledo.edu).

Supervisors

- Identify jobs requiring respiratory protection and informing their employees of these requirements;
- Assure that employees are issued respiratory protection through the procedures outlined in this guideline as well as ensuring that all employees engaged in such work use the appropriate respirators when required, and for ensuring that their employees follow the elements of this program;
- Perform periodic work site inspections to determine whether or not the respirators are still necessary; and
- Ensure compliance with respirator change-out schedules.

Employees

- Wear the appropriate respiratory protective equipment and wear it in the manner in which they were trained.
- Report any malfunction of their respirator to the Safety and Health department immediately.
- Attend scheduled training and fit testing.

PROCEDURES

GENERAL – The following elements are necessary to comply with the Respiratory Protection Guideline:

1. Hazard determination and equipment selection;
 2. Employment status and medical clearance;
 3. Fit Testing and Fit Checking;
 4. Maintenance, care, and use of respiratory equipment;
 5. Assurance of appropriate air quality for air supplying respirators;
 6. Annual training on respirator use;
 7. Program evaluation; and
 8. Recordkeeping.
1. *HAZARD DETERMINATION AND EQUIPMENT SELECTION* – A respiratory hazard assessment is required for jobs in which employees may be exposed to breathing air contaminated with harmful levels of dusts, fumes, sprays, mists, fogs, smokes, vapors, gases or radioactive materials in order to ensure selection of appropriate respiratory equipment.
- A. Hazard Determination
- Safety and Health can assist in the determination of the degree of hazard and the need for respiratory protection. These evaluations are based on the identification of the contaminants, the estimated airborne concentration of the contaminants, the toxicity of the contaminants, the warning properties of the contaminant, and the oxygen content of the atmosphere.
 - Managers and/or supervisors shall contact Safety and Health prior to any non-routine work that may expose employees to hazardous substances where exposure determinations have not been made. This will allow for the proper evaluation of the job's exposures and the selection of the appropriate level of respiratory protection during and after the evaluation.
- B. Equipment Selection
- For each potential respiratory hazard, a NIOSH approved respirator will be designated by a Safety and Health Representative that will be appropriate for the hazard involved. These respirator selections will include consultation with the applicable employee(s) and will be based on, but not limited to, the following factors:
 - The nature of the hazardous operation or process;
 - The type of respiratory hazard (including physical properties, physiological effects on the body, concentration of toxic material or airborne radioactivity level, and established IDLH concentration for the material);
 - The warning properties of the respiratory hazard;
 - The oxygen levels in the work area;
 - The period of time for which respiratory protection must be provided and the potential stresses associated with the work activities during usage;
 - The physical characteristics and limitations of the various types of respirators;
 - Respirator assigned protection factors (APFs), maximum use concentrations (MUCs) and an individual's fit test results; and
 - All applicable laws, regulations, and safety reference materials relating to the potential hazard.
 - Proper respirator selection depends on the particular work situation and selection should be based on the hazard determination. To ensure proper equipment selection and to ensure that the above listed factors are properly considered, the Safety and Health Representative making the equipment selection is encouraged to use the selection process noted in the "[NIOSH Respirator Selection Logic](#)". Also refer to [Appendix A](#) "OSHA Respirator Assigned Protection Factors" and [Appendix B](#), "Respirator Equipment Selection Guidance and the NIOSH Respirator Selection Logic Process."
2. *EMPLOYMENT STATUS AND MEDICAL CLEARANCE* – Personnel must meet the criteria for employment status and Medical Surveillance to be included in the respiratory protection program.

- A. Employment status: The following personnel are eligible for respiratory protection once Medical Surveillance has been successfully completed:
- Faculty;
 - Staff;
 - Teaching Assistants;
 - University paid graduate research assistants (University paid is defined as anyone receiving a University of Toledo paycheck. Payment via grant monies does not qualify as University paid.);
 - University paid students.
- B. Respiratory protection is also available through Safety and Health for certain individuals not on the University payroll but otherwise involved in University business on a case by case basis. If other individuals wish to use respirators, but are not involved in University business, Safety and Health will provide a list of safety supply companies upon request.
- C. Medical Surveillance: Using a respirator may place a physiological and/or psychological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Therefore, all employees required to wear a respirator (including the required use of dust masks/filtering facepieces) will be medically cleared to do so by a University paid medical provider prior to initial fit testing.
- D. Employees shall not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. A PLHCP designated by the University will conduct medical surveillance. The evaluation can be accomplished by use of a medical questionnaire, by examination or a combination of both. Safety and Health works closely with the medical provider to ensure all required information is provided.
- E. Initial Medical Evaluation and Clearance
- The following is applicable to all required users of filtering facepieces and any other user of respirators:
 - Employees needing respiratory protection for infectious disease control on the Health Science campus will visit University Health on the Health Science Campus and complete a respirator clearance form during normal working hours. Safety and Health will provide to the PLHCP information on individual types of respirators, duration and frequency of use, physical work effort, other Personal Protective Equipment (PPE) worn and the temperature and humidity extremes that exist in the work environment for the PLHCP's determination consideration.
 - Employees needing respiratory protection for work other than infectious disease control will visit Safety and Health to obtain and complete a respirator clearance form during normal working hours. The completed respirator clearance form will be sent from Safety and Health to University Health on the Health Science Campus or the Student Medical Center on the Main Campus for review. Safety and Health will provide to the PLHCP information on individual types of respirators, duration and frequency of use, physical work effort, other Personal Protective Equipment (PPE) worn and the temperature and humidity extremes that exist in the work environment for the PLHCP's determination consideration.
 - Based on these medical reviews, the examining PLHCP will determine whether or not an employee can wear a respirator without physical or psychological risk or may request the employee be scheduled for a physical. The employee will be contacted directly by the clinic to schedule an appointment in this case.
 - Approval, non-approval, and any medical restrictions for an employee regarding respirator use will be communicated to the Safety and Health Department, as appropriate, by means of a PLHCP's written medical opinion that only includes information about any medical limitations on respirator use, the need, if any, for a follow-up exam, and that the employee has been provided with a copy of the physician's written recommendation. Clearance information will be maintained in the Occupational Health Manager Program
- F. Additional Medical Evaluations

- At the time of the physical, the physician will determine the frequency of any re-evaluations. University Health will contact users via OHM for any additional medical reevaluations
- Additional medical evaluations will also be provided when:
 - An employee reports medical signs or symptoms that are related to respirator use;
 - A physician, supervisor, or program administrator informs the employee of the need to be re-evaluated;
 - Information from the respiratory protection program including observations from fit testing and program evaluation indicates a need for re-evaluation; and
 - A change in workplace conditions that results in substantial physiologic or exposure burden placed upon the employee.

G. Medical Surveillance for Voluntary Respirator Use

- Those employees that choose to voluntarily wear a respirator other than one that qualifies as a “[dust mask](#)”, where it is not required, will be allowed to do so, under certain conditions. They will be provided the same initial medical evaluation as described above. The voluntary use of dust masks does not require the employee to undergo medical surveillance.
- Those employees whose medical evaluation (initial or otherwise) requires the use of a PAPR rather than allowing the use of a negative pressure air-purifying respirator shall be accommodated by the department (or via Central Distribution in some cases) who's job tasks require respiratory protection

3. *FIT TESTING AND FIT CHECKING*

- A. All individuals required to wear a tight-fitting respirator (other than an N-95 respirator for infectious disease control) must be qualitatively or quantitatively fit tested for that make, model, style, and size of mask by the safety and health department before use and annually thereafter (or when an employee has a radical facial structure change from weight loss or gain, dental changes, scarring, surgery, or other conditions, which interfere with the seal of the facepiece).
- B. Individuals wearing an N-95 respirator for infectious disease control shall be initially qualitatively fit tested for that make, model, style, and size of mask by university health. These persons are not required to be annually refitted unless infectious disease contact is expected (medium or high risk groups, based on hazard assessment).
- Annual refittings for users of N95 respirators used for infectious disease control (medium or high risk groups, based on hazard assessment) shall be conducted by Safety and Health.
 - If an individual has not received a respirator fit test in the last 12 months, and infectious disease contact is necessary, refitting shall be conducted on an emergency basis by the safety and health department or On-Call Nursing Administrator to ensure that the annual fit testing requirement has been met.
- C. All voluntary users of tight-fitting respirators will receive initial fit testing and training.
- D. The voluntary use of dust masks/filtering facepieces do not require fit testing.
- E. Additional fit testing will be conducted whenever the employee, supervisor, physician, or Safety and Health representative/Program Administrator makes visual observations of changes in the employee's physical condition that could affect the respirator fit. When an employee has successfully completed medical surveillance, that employee will be scheduled for training and fit testing by Safety and Health or University Health, as applicable. Safety and Health or University Health, as applicable, will review the physician's opinion before conducting the fit test and training.
- F. Every manufacturer designs facepieces to fit a broad section of the working population, but no single respirator will fit everyone. Safety and Health shall carry respirators from two manufacturers, so the probability of properly fitting most workers is increased.
- G. Sight-impaired users must be fitted with prescription glass inserts for use inside full-facepiece respirators. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program. (Please contact Safety and Health at ext. 5069 on the Health Science Campus or ext. 3600 for the

Main campus for prescription eyewear). In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, *except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline. Hard, nonpermeable lenses shall not be worn with full-facepiece respirators.*

- H. Individuals with facial hair that interferes with the face-to-facepiece seal of tight-fitting respirator facepieces will not be fit tested and these individuals shall not wear a respirator. Employees must be clean-shaven in order to receive a fit test. Employees with noticeable beard growth (more than 24-hours) will be asked to shave before receiving a fit test. Facial hair that does not interfere with the seal or the valve function of the respirator may be allowed.
- I. In order to assure a proper fit, two fit checks (employees will be instructed in how to conduct a fit check at the time of the fit test) and one qualitative or quantitative fit test will be conducted.
- J. Fit Checking
- Each time a respirator is donned, the user must perform positive and negative pressure fit checks. Respirator users will be properly trained in the performance of these checks and provided an understanding of their limitations.
 - Negative Pressure Check
 - Applicability – This test can only be carried out on facepieces of air-purifying respirators equipped with tight-fitting respirator inlet covers and on atmosphere-supplying respirators equipped with breathing tubes which can be squeezed or blocked at the inlet to prevent the passage of air.
 - Procedure – Close off the inlet opening of the respirator's canister(s), cartridge(s), or filter(s) with the palm of the hand, or squeeze the breathing air tube or block its inlet so that it will not allow the passage of air. Inhale gently and hold for at least 10-seconds. If the facepiece collapses slightly, and no inward leakage of air into the facepiece is detected, it can be reasonably assumed that the respirator has been properly positioned and the exhalation valve and facepiece are not leaking.
 - Positive Pressure Check
 - Applicability – This test can only be carried out on respirators equipped with exhalation valves.
 - Procedure – Close off the exhalation valve or the breathing tube with the palm of the hand. Exhale gently. If the respirator has been properly positioned, a slight positive pressure will build up inside the facepiece without detection of any outward air leak between the sealing surface of the facepiece and the face. It can be reasonably assumed that the respirator has been properly positioned and the inhalation valves are not leaking.
- K. Fit Testing
- Quantitative Fit Test: Safety and Health uses quantitative fit testing in lieu of qualitative fit tests when applicable.
 - Portacount Quantitative Test: This test is conducted by installing a probe within the respirator that allows the Portacount test unit to measure air particle concentrations inside and outside of the mask. The respirator wearer is instructed to perform various exercises during the testing period and an overall fit factor is calculated to determine if the respirator provides adequate protection if worn properly.
 - Qualitative Fit Test: University Health and Safety and Health qualitatively fit tests certain types of respirators. Refer to [Appendix C](#), "Qualitative Fit Testing Option Guidance," for guidance on acceptable qualitative fit testing circumstances. Below is a type of qualitative fit test protocol that may be used:
 - Bitrex™ (Denatonium Benzoate) / Saccharin Test: The employee is exposed to either Bitrex (creates an unmistakable bitter taste) or Saccharin (produces a sweet taste) while wearing a respirator equipped with particulate filters. If the wearer detects odor or taste, an adjustment to the respirator is necessary.
 - Respirator fit tests are documented and include the type of respirator, brand name and model, method of test, test date, and name of tester.

4. **MAINTENANCE, CARE, AND USE OF RESPIRATORY EQUIPMENT** – The employee and department are responsible for ensuring that respirators are properly used and cared for. This includes proper cleaning and disinfecting, storage, inspections, and proper cartridge/filter change-out and management.

A. Specific cleaning and disinfecting, storage, and inspection procedures can be found in the following training and respirator specific appendices:

- [Appendix D](#) – Information for Voluntary Users of Respirators
- [Appendix E](#) – Inspection Guidance for Air-Purifying Respirators (APRs)
- [Appendix F](#) – Respirator Training Information (For all Respirators except PAPRs, SARs, and SCBAs)
- [Appendix G](#) – Specific Procedures for the Use of Powered Air-Purifying Respirators (PAPRs)
- [Appendix H](#) – Specific Procedures for Use of Supplied-Air Respirators (SARs): *(Currently, there are no users of SAR units. Should the use of SARs be established in the future, this appendix must be used in conjunction with the SAR Manufacturer's operation manual.)*
- [Appendix I](#) – Specific Procedures for Use of Self-Contained Breathing Apparatus (SCBA)

B. Use of Respirators

- The employees and their department shall ensure that respirators are used as set forth in this guideline.
- Employees shall leave the respirator use area if they detect vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece.
- Cartridge Change Schedule
 - Respirator cartridges shall be changed before the end of their service life. For cartridges with an End-of-Service-Life Indicator (ESLI), e.g. mercury, replace the cartridges when indicated by color change. In the absence of an ESLI, Safety and Health generally recommends that gas/vapor cartridges be changed every six months, at a minimum. Cartridges designed for protection against particulates (e.g. HEPA filters) should be changed out once breathing resistance is noted, or every six months, whichever comes first. Safety and Health may recommend a more specific and/or frequent change-out schedule if necessary based on the following guidance:
 - Many variables exist that influence the service life of respirator cartridges. Some of these include characteristics and concentration of contaminant, amount and characteristics of filter media, breathing rate, temperature, and humidity.
 - Cartridge life expectancy for those chemicals and activities that have been identified as respirator required tasks should be estimated whenever possible using calculators provided by respirator manufacturers that have been made available through the manufacturer's website. The following manufacturers of respirators used at the University have made cartridge life expectancy calculators available at the following links:
 - a. 3M®: <http://csrv.3m.com/csrv/home.jsp>
 - b. Please refer to [Appendix J](#) for contaminant specific end-of-service-life information as well as an example printout from the SURVIVAIR® ESLI calculator using xylene.
- An alternate method to determine when a respirator cartridge must be changed is the "[Rule of Thumb](#)." The Rule of Thumb states that if the chemical's boiling point is greater than 70°C (158°F) and the concentration is less than 200 ppm and humidity is < 75%, you can expect a service life of 8-hours at a normal work rate. At less than 20 ppm, 40-hours can be expected. This Rule of Thumb applies only to chemical cartridges that have been approved for the particular contaminant.
- Respirator cartridge change-out schedules should be documented and kept on file in the applicable department or on the fit test record, if there is a deviation from the general 6 month change-out schedule. The change-out schedules should be communicated to the applicable respirator users during training with proof of that training filed in the employee's fit test/medical surveillance file.

- Replacement cartridges are available through the employee's applicable supervisor, or, in some cases, through the Safety and Health Department.
- C. *ASSURANCE OF APPROPRIATE AIR QUALITY FOR AIR SUPPLYING RESPIRATORS* – Breathing air must meet the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.
- These requirements include:
 - Oxygen content of 19.5 – 23.5%;
 - Hydrocarbon (condensed) content of 5 milligrams per cubic meter (mg/m³) of air or less;
 - Carbon monoxide (CO) content of 10 ppm or less;
 - Carbon dioxide (CO₂) content of 1,000 ppm or less; and
 - Lack of noticeable odor.
 - Breathing air from a cylinder must have moisture content in the cylinder that does not exceed a dew point of -50°F (-57°C) at one atmosphere pressure.
 - See the attachments entitled, "Specific Procedures for Use of Self-Contained Breathing Apparatus" ([Appendix I](#)) and "Specific Procedures for Use of Supplied-Air Respirators" ([Appendix H](#)) for air quality information specific to those protective devices.
5. *ANNUAL TRAINING ON RESPIRATOR USE* – For respirators other than PAPRs, SARs, and SCBAs, employees will be trained by Safety and Health or University Health staff on proper respirator usage at the time of fit testing. Voluntary users of respirators (including filtering facepieces) will be supplied, at a minimum, with OSHA "Information for Voluntary Users of respirators" information located in [Appendix D](#). It is suggested that supervisors of employees wearing respirators also receive training in order to aid in ensuring employees are using respirators properly.
- A. Training includes information on the following areas:
- Why respiratory protection is necessary and the consequences of misuse;
 - The limitations and capabilities of each respirator to be worn;
 - What to do in any emergency while wearing a respirator;
 - How to inspect, put on and remove, use, and check seals;
 - Steps of proper maintenance and storage of the respirator; and
 - Potential adverse medical effects of respiratory use.
 - See [Appendix F](#) for training information on respirators other than PAPRs, SARs, and SCBAs and a checklist used for training.
- B. Employees designated as authorized users of SCBA during emergencies must join the University of Toledo Emergency Response Team, attend all relevant trainings, and attend refresher training for SCBA usage at least semi-annually. This training will include practice putting on and removing the SCBA under the observation of the Safety and Health department.
6. *PROGRAM EVALUATION* – The Program Administrator will ensure that periodic evaluations of the respirator program are done to ensure that the provisions of the written respirator program are being effectively implemented. The Program Administrator will also ensure that periodic respirator user consultations are conducted to determine its effectiveness and to identify any problems
- A. A formal evaluation and program review shall be conducted at least annually and documented using a revision date.
7. *RECORDKEEPING*

A. Training

- The Safety and Health department will maintain training records via OHM and training test bank.

B. Medical Evaluations

- Confidential medical records, such as the Physicians written medical opinion, will be retained by the administering clinic for the duration of the employee's employment plus 30 years.

C. Fit Testing

- The Safety and Health department will retain a record of the fit test of each employee required to wear a respirator for the duration of the employee's employment plus 30 years via OHM. The record will contain:
 - The name and Social Security Number, if available, of the person tested;
 - The date of issue/test;
 - The type of respirator fit test used;
 - The specific make and model of the respirator issued;
 - The type and amount of cartridges and/or filters issued;
 - The success or failure of the person to obtain a satisfactory fit during the test;
 - The signature of Safety and Health representative administering the test; and
 - The signature of the tested individual indicating he/she was fit tested and trained on proper usage, cleaning, storage, and limitations of the respirator.

D. Inspection

- Emergency use respirators will be inspected monthly and the record kept for one year. These records will specify the inspection date, name of inspector, findings, remedial action, and a means to identify the respirator. Inspections will be kept in the area of respirator storage.

E. Program Evaluation

- The Safety and Health department will maintain the records related to the periodic evaluation of the program effectiveness and implementation for at least 2 years.

F. Air Quality

- SCBA bottles are filled with a minimum grade "D" breathing air from local fire departments or outside vendors.

TECHNICAL SUPPORT

All referenced guidelines, regulations, and other documents are available through Safety and Health (5069). Assistance in hazard evaluation, Medical Surveillance, and selection of respirators are also provided by Safety and Health.

Appendix A
 OSHA Respirator Assigned Protection Factors (*Non-escape Conditions*)

Employers must use the assigned protection factors listed in the Table below. Select a respirator that meets or exceeds the required level of employee protection.

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

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 1 are only effective when the employer implements a continuing, effective respirator program as required by 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.

Appendix B

Respirator Equipment Selection Guidance and the NIOSH Respirator Selection Logic Process

As stated in this guideline, the Safety and Health Representatives are encouraged to use the NIOSH Respirator Selection Logic Process to aid in the proper selection of respiratory protective devices.

Selection logic determinations should be communicated to those employees in the Respiratory Protection Program in the applicable area and made freely available to them for reference and training purposes.

The entire NIOSH Respirator Selection Logic guideline document is available online via the following link:
<http://www.cdc.gov/niosh/docs/2005-100/pdfs/05-100.pdf>.

In addition to the NIOSH Respirator Selection Logic and the information collected, the Safety and Health Representative will also use Table 1 below as a guide in selection when the following hazards exist:

Employee Group and Hazard Rating	RISK GROUPING and MINIMUM REQUIRED RESPIRATOR
Biological Particle Exposure Group	Medium Risk - Exposure to sources of infection somewhat likely.
Respiratory Care Operating Room Pathology Endoscopy Suite Pulmonologists Emergency Room Hospital Section 4C Hospital Section 4D Phlebotomy CT Scanner Lab-Autopsy Radiology – Nuclear Medicine Radiology – Diagnostic Radiology – Health Center Radiology – Mammography Radiology – Sonographic Imaging	N-95 Filtering Facepiece Or Powered Air Purifying Respirator
Biological Particle Exposure Group	Low Risk - Exposure to sources of infection unlikely.
3A Renal Intensive Care 3AB ICCU 3C Intermediate Cardiac Care Unit 3M Medical Intensive Care 4AB Med/Surgery GI 5AB Intermediate Care Area 5AB Med/Surgery 5CD Surgery-Neurosciences 6A Geri-Psych Acute Hemodialysis Acute Occupational Therapy Acute Physical Therapy Acute Speech Therapy	N-95 Filtering Facepiece Or Powered Air Purifying Respirator

Biological Particle Exposure Group	Low Risk - Exposure to sources of infection unlikely.
Admitting Anesthesiology Blood Bank Centralized Preregistration Clinical Dieticians Cytology Dentistry ED Registration Electron Microscopy Environmental Services Family Medicine Infection Control HVAC-Campus Env & Phy Plant Kobacker/IP Nursing Unit Lab – Central Office Lab – Chemical Metabolics Lab – Chemistry Lab – Coagulation Lab – Cytogenetics Lab – Flow Cytometry Lab – Hematology CLM/Micro Lab – Histology Lab- Microbiology Lab – Molecular Biology Lab – Serology/Immunology Lab- Toxicology Lab – Virology Maintenance – Campus Env & Phy Plant Medicine Neurodiagnostic Services Nursing Pool Obstetrics & Gynecology Occupational Ther: Univ Med Ctr OP – Clinic Dermatology OP – Clinic Genl Internal OP – Clinic – Admin OP – Clinic – Cardiology OP – Clinic – Dental OP – Clinic – ENT OP- Clinic – Gastroentero OP – Clinic – Glendale Medicine OP – Clinic - Kidney Transplant OP – Clinic – Medicine OP – Clinic – Neurosurgery	N-95 Filtering Facepiece Or Powered Air Purifying Respirator
Biological Particle Exposure Group	Low Risk - Exposure to sources of infection unlikely.

OP – Clinic – OB/GYN OP – Clinic – Ophthalmology OP – Clinic – Orthopedics OP – Clinic – Pediatrics OP – Clinic – Psychiatry OP – Clinic – Rehab Med OP – Clinic – Renal OP – Clinic – Surgery OP – Clinic – Urology OPS – PACU Orthopedic Surgery Orthopedics Outcome Management Painters – Campus Environment & Physical Plant Pastoral Care Perfusion Plumbers Pulmonary Function Radiation Therapy – Univ Med Ctr Radiology Radiology – MRI Rehab Physical Therapy Rehabilitative Care Unit All Residents Surgery Surgical Intensive Care Tissue Typing Trauma Program University Health Services Urology	N-95 Filtering Facepiece Or Powered Air Purifying Respirator
Biosafety Level 3 Employees	High Risk – Exposure to sources of infection likely
Any person entering or who may likely enter into Biosafety level 3 laboratory	N95 Filtering Facepiece
DLAM Animal Care Workers	Medium Risk – Exposure dependent on protocol used
Various Animal Protocols (see individual protocol)	N95 Filtering Facepiece Or Air-purifying half-mask respirator Or Full-facepiece air purifying respirator Or Powered air purifying respirator
UT Health Science Campus Emergency Response Team	High Risk – Exposure dependent on emergency
Response to various emergencies	Full-facepiece air purifying respirator Or Powered air purifying respirator
UT Main Campus Emergency Response Team	High Risk – Exposure dependent on emergency
Response to gas leak at McMaster Hall	Self-Contained Breathing Apparatus (SCBA)
Grounds	Medium Risk – Exposure dependent on work performed
Application of various pesticides	Air-purifying half-mask respirator

Voluntary use during dusty conditions	N95 Filtering facepiece
Research Animal Users	Medium Risk – Exposure dependent on protocol used
Various animal protocols	N95 Filtering Facepiece Or Air-purifying half-mask respirator Or Full-facepiece air purifying respirator Or Powered air purifying respirator
Researchers	Medium Risk – Exposure dependent on protocol used
Various research protocols	N95 Filtering Facepiece Or Air-purifying half-mask respirator Or Full-facepiece air purifying respirator Or Powered air purifying respirator
Powerhouse Employees	Medium Risk – Exposure dependent on work performed
Voluntary use for coal dust	N95 Filtering face piece
Emergency Asbestos Repair	Powered air purifying respirator
Boiler Oversmoke	Escape Self-Contained Breathing Apparatus (ESCBA)
Safety and Health Staff	High Risk – Exposure dependent on work performed/ emergency
Response to a reported leak or gas release at McMaster Hall	Self-Contained Breathing Apparatus (SCBA)
Response to a reported leak or spill of known origin and/or concentration	Air purifying full-facepiece respirator
Occasional sampling of asbestos-containing materials	Air purifying full-facepiece respirator
Entering TB Negative Pressure Isolation Rooms	N95 Filtering face piece
Maintenance of HEPA Filtration Systems	N95 Filtering face piece
Entering Biosafety Level 3 Laboratory	N95 Filtering face piece
Various	Escape Self-Contained Breathing Apparatus (ESCBA)
MRI Staff	Medium Risk – Exposure dependent on emergency
MRI Escape Use	Escape Self-Contained Breathing Apparatus (ESCBA)

If applicable, any operating procedures developed within an operating department shall clearly identify hazards that require or potentially require respiratory protection. The procedure shall state the minimum type of respiratory protection required for protection from the hazard. These procedures shall provide instructions on when and where protective equipment must be used and what type of equipment to use in situations that may arise.

Appendix C

Qualitative Fit Testing Option Guidance

The decision to perform a qualitative fit test (QLFT) may be based on the Acceptable Fit-Testing Methods table of this appendix below. This table was taken from the [OSHA Directive Number CPL-2-0.120](#), "Inspection Procedures for the Respiratory Protection Standard" and modified to reflect those respirators used at the University of Toledo.

Acceptable Fit-Testing Methods

Respirator Type	QLFT	QNFT
Half-Face, Negative Pressure, APR (<100 fit factor)	Yes	Yes
Full-Face, Negative Pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full-Face, Negative Pressure, APR (>100 fit factor)	No	Yes
Positive Air-Purifying Respirator (PAPR)	Yes	Yes
Supplied-Air Respirators (SAR), or SCBA used in Positive Pressure (Pressure Demand Mode)	Yes	Yes
Loose-fitting Respirators (e.g., hoods, helmets)	Fit-testing NOT required	

Appendix D

Information for Voluntary Users of Respirators

This appendix is provided for those individuals who are wearing respiratory protection, but are not required to do so under the OSHA standards. Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirators can be used, even when exposures are below exposure limits, to provide an additional level of comfort and protection to workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker.

The following precautions need to be taken to be sure that the respirator itself does not present a hazard:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning, and care, and warnings regarding the respirators limitations;
2. Make sure that the respirator in use is adequately protecting against the contaminant of concern. All respirators and cartridges/filters issued through Safety and Health are certified by NIOSH and are designed to protect against specific contaminants. Obtain all respiratory protection through Safety and Health to ensure that the proper equipment is used;
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 against gases, vapors, or very small solid particles of fumes or smoke. If the contaminant of concern differs from that which you were originally evaluated for, call Safety and Health to re-evaluate your protection; and
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

Appendix E

Inspection Guidance for Air-Purifying Respirators (APRs)

Respirator inspections shall occur before each use and during cleaning. During the inspection of APRs, the following guidance is to be followed:

Examine the facepiece for:

- Excessive dirt, cracks, tears, holes, or distortion;
- Inflexibility (stretch and massage to restore flexibility);
- Cracks or badly scratched lenses in full facepieces; and
- Incorrectly mounted full-facepiece lens or broken or missing mounting clips.

Examine the head straps or head harness for:

- Breaks;
- Loss of elasticity;
- Broken or malfunctioning buckles and attachments (full facepieces only); and
- Excessively worn serrations on the head harness that might permit slippage.

Examine the exhalation valve for the following:

- Foreign material, such as detergent, particles, or human hair under the valve seat;
- Cracks, tears, or distortion in the valve material;
- Improper insertion of the valve body in the facepiece;
- Cracks, breaks, or chips in the valve body, particularly in the sealing surface; and
- Missing or defective valve cover, improper installation of the valve body.

Examine the inhalation valve for the following:

- Foreign material, such as detergent, particles, or human hair under the valve seat;
- Cracks, tears, or distortion in the valve material;
- Improper insertion of the valve body in the facepiece;
- Cracks, breaks, or chips in the valve body, particularly in the sealing surface; and
- Missing or defective valve cover, improper installation of the valve body.

Examine the filter(s) for:

- Loading of filter(s) or replacement date on filter.

Examine cartridge(s) for:

- Worn threads;
- Cracks in housing; and
- Worn or missing cartridge gasket.

Appendix F

Respirator Training Information (For all Respirators *except* PAPRs, SARs, and SCBAs)

Hazard Communication

Discuss with the employee the general health hazards associated with the contaminants for which they are requesting respiratory protection. Refer to [Table 1](#) of this appendix for hazard communication guidance. Discuss items such as potential for skin absorption and other items related to safety and health. Also refer to the [Respirator Training Information Checklist](#) for additional training information.

Proper Respirators for Specific Tasks

Discuss with the employee the specific use of respirator and cartridges for the work to be performed.

Chemical cartridges and filters do not have the same capabilities. For example, gas and vapor air-purifying respirators provide no protection against particulate contaminants unless specified on the canister or chemical cartridge label. Likewise, particulate removing respirators protect against non-volatile particles and do not provide protection against gases and vapors. Neither of these types that are classified as air-purifying respirators will provide protection where there is an insufficient oxygen level. A self-contained breathing apparatus (SCBA) is the appropriate respirator for emergencies in atmospheres containing less than 19.5% oxygen.

Assignment

Each respirator shall be permanently assigned to an individual. Other employees shall not use a respirator assigned to one employee. Other employees wishing to use respiratory protection must obtain their own respirator. Respiratory equipment shared by employees shall be properly cleaned after each use.

Employees with facial hair that comes between the sealing surface of the facepiece and the face, or that interferes with the valve function are not permitted to wear tight-fitting respirators. Facial hair that does not interfere with the seal or the valve function of the respirator may be allowed.

Respirator Inspection

Prior to each usage, the employee should inspect the following:

1. Tightness of connections;
2. Condition of facepiece, straps, cartridges, and/or filters;
3. Condition of exhalation and inhalation valves. If the sides of the exhalation valve gap even slightly, a new valve shall be furnished;
4. Pliability and flexibility of rubber parts. Deteriorated respirators shall be replaced; and
5. Condition of lenses of full-face respirators. Damaged lenses shall be replaced or the respirator must be returned by Safety and Health to the manufacturer.
6. Safety and Health shall be the contact point for issue, repair, and return of all respirators.

Donning the Respirator and Checking its Fit and Operation

Instruct the employee on how to properly don and doff the respirator. This includes facepiece to face seal using the negative and positive pressure tests. Conditions that may possibly prevent a satisfactory seal include long side burns, a beard and/or mustache, temples on eyeglasses, absence of dentures, heavy make-up or an unusual face structure. If the conditions cannot be corrected or eliminated, the worker shall not be assigned to any area requiring routine or emergency use of respiratory protection.

Cleaning the Respirator

It is the responsibility of the respirator wearer and his/her using department to ensure that all respiratory protective equipment is cleaned and sanitized. Cleaning and disinfecting shall occur according to the manufacturer's instruction at the following intervals:

1. Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition;
2. Respirators issued to more than one employee shall be cleaned and disinfected after each individual's use;
3. Respirators maintained for emergency use shall be cleaned and disinfected after each use; and

4. Respirators used in fit testing and training shall be cleaned and disinfected after each use.

In order to properly clean respiratory equipment, 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. Further guidance is as follows:

1. Wash components in warm (49°C [120°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.
2. Rinse components thoroughly in clean, warm (49°C [120°F] maximum), preferably running water. Drain.
3. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
 - a. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 49°C (120°F); or,
 - b. 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 49°C (120°F); or
 - c. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
4. Rinse components thoroughly in clean, warm 49°C (120°F), 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.
5. Components should be hand-dried with a clean lint-free cloth or air-dried.
6. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
7. Test the respirator to ensure that all components work properly
 - a. Safety and Health recommends the use of respirator refresher pads to disinfect the respirator.

Storage of Respirators

When not in use, the respirator and cartridges should be kept in a sealed plastic bag and stored in a clean, dry, moderate temperature, non-contaminated environment. It is especially important to keep gas and vapor cartridges in a sealed container so they do not absorb gases and vapors from the storage environment. Particulate filters should also be protected from dust and dirt to enhance their service life. Care should be taken to prevent deformation of the respirator during storage. When respirators are taken into the workplace for use throughout the day, respirators must be stored inside a plastic bag in a manner that will prevent deformation of the facepiece and exhalation valve and in accordance with the manufacturer's instructions when not in use.

Respirators placed at work stations and work areas for emergency use shall be stored in compartments built for this purpose and must be quickly accessible at all times and clearly marked. Manufacturer's instructions shall be closely followed for proper storage of masks.

Respirator Limitations and Change-Out Schedules

A respirator and cartridges are selected for specific contaminants based on the tasks performed by the employee. A cartridge that filters one substance may not necessarily be used for another. Any new exposures need to be re-evaluated to ensure that the proper respirator protection is provided.

The service time of any cartridge or filter will depend on how often the respirator is worn and the levels of contamination in which it is used. Gas and vapor cartridges need to be changed at a minimum of every six months or per the cartridge change-out schedule determined by the area specific Safety and Health representative through the use of manufacturer cartridge life expectancy calculators or other means of life expectancy calculations. Particulate filters may also be changed out every six months or used until breathing resistance increases to an uncomfortable level. For cartridges with an End-of-Service-Life Indicator (ESLI), e.g. mercury, replace the cartridges when indicated by color change.

NOTE: Please refer to [Appendix J](#) for contaminant specific end-of-service-life information as well as an example printout from the SURVIVAIR® ESLI calculator using xylene.

General Limitations

As stated in the section on donning the respirator, beards, facial hair, mustaches, heavy make-up, dentures, and glasses can interfere with a face seal. Tight-fitting respirators will not be issued to employees with facial hair that interferes with the seal or valve function. These employees shall not be assigned to any area requiring routine or emergency use of tight-fitting respirators.

If the wearer of a respirator has a significant weight change (10 pounds or more), the employee shall be fit tested again.

In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, *except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline.* Hard, nonpermeable lenses shall not be worn with full-facepiece respirators.

Safety and Health recommends frequent breaks if a respirator is to be worn for any length of time.

Hazard Communication Information

Respiratory Hazard	Examples	Health Effects
Oxygen (O₂) Deficiency Less than 19.5% oxygen (by volume) in respirable air	May exist in confined spaces such as tanks, wells and pits.	Effects range from slightly impaired coordination and breathing effects to nausea, vomiting, & unconsciousness, to death within minutes depending on percentage of O ₂ in the air.
Asphyxiates <u>Simple</u> – Materials that displace O ₂ in the air to create an O ₂ deficiency. <u>Chemical</u> – Materials that act to render the body unable to utilize O ₂	<u>Simple</u> – nitrogen (N ₂), hydrogen (H ₂), methane (CH ₄), helium (He), neon (Ne), argon (Ar) <u>Chemical</u> – carbon monoxide (CO), hydrogen (H ₂), hydrogen sulfide (H ₂ S), nitriles	See O ₂ Deficiency (above)
Carcinogens	<u>Gas/Vapor</u> – benzene, carbon tetrachloride, vinyl chloride <u>Particulate</u> – radioactive particulate, asbestos, chromates	Development of cancer(s) after a period of time.
Irritants	<u>Gas/Vapor</u> – ammonia (NH ₃), hydrogen chloride (HCl), sulfur dioxide (SO ₂), hydrogen sulfide (H ₂ S), chlorine (Cl ₂), ozone (O ₃) <u>Particulate</u> – fiberglass, acidic mists, alkali mists	May cause irritation and inflammation to various parts of the respiratory system. Pulmonary edema may also result. Chronic bronchitis may be seen with long term exposure. Eye and skin irritation may also be a concern.
Systemic Poisons	<u>Gas/Vapor</u> – mercury (Hg), lead (Pb), hydrogen sulfide (H ₂ S), organic solvents, pesticides, ethylene oxide, ether, carbon tetrachloride, chloroform, benzene, carbon disulfide <u>Particulate</u> – lead (Pb), cadmium (Cd), pesticides	Acute effects may include irritation to eyes, nose, and throat, headache, nausea, vomiting, dizziness, drowsiness, incoordination, and unconsciousness. Long term exposure may involve damage to organs and systems such as nervous system, kidneys, liver, blood, bone or respiratory system. May also have reproductive effects. Skin absorption may also be an important route of exposure.
Allergy-producing	Animal furs, pollens, molds, formaldehyde, pesticides, ethylenediamine	Reactions may include itching, sneezing, and asthma. Other hypersensitive reactions may also occur. Skin contact may also be a concern.
Pulmonary fibrosis-producing	Silica, asbestos	Fibrotic disease in lungs
Febrile-producing	Fumes of zinc (Zn), iron (Fe), and copper (Cu) (usually associated with welding)	Flu-like disorder with fever and chills that typically last 24 to 48 hours.
Nuisance particulate	Construction dust, plaster dust, ceramics, sawdust	May cause discomfort and irritation but usually not associated with causing any adverse health problems.
Infectious Agents (pathogenic microorganisms that are transmitted through air and can cause disease in humans)	Tuberculosis (TB), pigeon excrement	May cause infection and disease specific to the pathogen.

Respirator Training Information Checklist

USE	Why the respirator is necessary; Include general information on hazards of substance.	<input type="checkbox"/>
	For initial fit testing, the user should be given opportunity to select the respirator and size that is most comfortable. Respirator should be worn at least five minutes to assess comfort.	<input type="checkbox"/>
	Inspection: Should be performed before each use- Check valves, headstraps, facepiece, etc. for any defects. All problems must be rectified before use, Call Safety and Health for parts.	<input type="checkbox"/>
	Instruct user how to don, doff, and use respirator. Demonstrate donning, positioning on the face, setting strap tension, and doffing. Strap tension must be readjusted with each use.	<input type="checkbox"/>
	Fit should be assessed by using the following criteria: placement of the chin; adequate strap tension (not overly tightened); fit across nose bridge; proper size to span from nose to chin; tendency to slip.	<input type="checkbox"/>
	Seal check: Positive and negative pressure checks must be done each time the respirator is used.	<input type="checkbox"/>
	Conditions that may prevent a satisfactory seal include long sideburns, a beard (more than 24 hours growth), and/or mustache, temples on eyeglasses, absence of dentures, heavy makeup, or unusual face structure. Fit Test will not be conducted if wearer has any facial hair that interferes with the sealing areas of the respirator.	<input type="checkbox"/>
	How improper fit, usage, or maintenance can compromise the protection provided by the respirator.	<input type="checkbox"/>
	Limitations and capabilities of respirator – only will protect for contaminant indicated in use, i.e., Organic vapor cartridge on a ½ face will not protect against oxygen deficient atmosphere.	<input type="checkbox"/>
	Medical signs and symptoms: Respirator use may cause increased physiological stress on the heart and lungs. This is why all respirator users receive a medical exam prior to receiving a respirator. If you experience symptoms such as dizziness, difficulty breathing or irritation, leave the area immediately, remove respirator, and inform your supervisor/Safety and Health. In addition, you may need an additional medical examination if your personal health status has changed in any way that may affect your respirator use.	<input type="checkbox"/>
CARTRIDGES	Cartridges are designed for specific contaminants. The cartridges issued are selected according to the particular substance that will be used. Consult Safety and Health if substance used changes to ensure that the proper cartridge is used.	<input type="checkbox"/>
	Gas/Vapor cartridges should be changed out every 6 months (<i>at a minimum</i>), or anytime odor has been detected. Alternatively, change out at the following frequency as determined by a Safety and Health Representative for your exposure situation: _____. For cartridges with an End-of-Service-Life Indicator (ESLI), e.g. mercury, replace the cartridges when indicated by the color change. HEPA filters should be changed out once breathing resistance increases or if the filters become wet.	<input type="checkbox"/>
CLEANING	Respirators should be washed regularly with warm soapy water. Remove cartridges prior to washing. In between washings, the respirator may be wiped with respirator wipe pads after each use.	<input type="checkbox"/>
STORAGE	Keep respirator and cartridges in a clean, dry plastic bag when not in use.	<input type="checkbox"/>
	Ensure that the respirator is dry before storing. Respirators should be air-dried rather than mechanically dried after washing.	<input type="checkbox"/>
	Do not store respirator in a contaminated area.	<input type="checkbox"/>
	Do not store respirator where it can be crushed.	<input type="checkbox"/>
	Do not expose the respirator to temperature extremes.	<input type="checkbox"/>
INFORMATION	If "Required" user, inform that they will need to have annual fit tests and training.	<input type="checkbox"/>
	If "Voluntary" user, supply with <u>Appendix D</u> .	<input type="checkbox"/>

Appendix G

Specific Procedures for the Use of Powered Air-Purifying Respirators (PAPRs)

This attachment is meant to supplement the Respiratory Protection Program and is specific to the use of powered air-purifying respirators (PAPRs). This appendix should be used in conjunction with the PAPR manufacturer's operation manual.

Selection and Use

PAPRs will be used in situations where adequate protection with an air-purifying respirator is appropriate. Units will be equipped with either a tight-fitting full facepiece or a loose-fitting hood or helmet. The loose-fitting headgear may be worn in areas where individuals are not required to shave, but have a need for respiratory protection given that this is an appropriate level of protection as determined by Safety and Health.

PAPRs will not be utilized for situations where the hazardous substance lacks adequate warning properties (odor or taste), or the air concentration exceeds that which could adequately be protected from the use of a negative pressure air-purifying respirator. It will also not be used for emergency response situations in which an oxygen deficiency or IDLH atmosphere may be encountered.

All PAPR units must be NIOSH approved.

Authorized Users of PAPRs

All potential users of PAPRs must contact Safety and Health at x5089 and comply with all provisions of the Respiratory Protection Program and this attachment. Authorized users must meet the following specific criteria in addition to the criteria set forth in the Respiratory Protection Program:

1. The PLHCP must determine that the user is physically able to wear a PAPR and perform work;
2. The individual must be fit tested by Safety and Health with a facepiece of the same make, model, and size as the PAPR unit that will be assigned to the user. A fit test may be conducted annually if the usage is determined to be mandatory. Fit testing will not be required if a loose-fitting facepiece is used;
3. The user must attend Safety and Health training at the time of fit testing and will receive refresher training from Safety and Health annually. For those wearing loose-fitting systems that do not receive annual fit testing, Safety and Health will conduct separate training on an annual basis; and
4. Sight-impaired users must be fitted with prescription glass inserts for use inside full-facepiece respirators. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program. (Please contact Safety and Health at ext. 5069 on the Health Science Campus or ext. 3600 for the Main campus for prescription eyewear). In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, *except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline.* Hard, nonpermeable lenses shall not be worn with full-facepiece respirators.

Location and Storage

Respirators should be stored to protect them from weathering, contamination, and deterioration. The respirator should be located so that unauthorized users cannot "borrow" to enter the area.

Batteries should be charged in a location that is maintained at room temperature. Temperature extremes may shorten the capacity of the battery unit. Batteries should not be recharged in an enclosed area that lacks ventilation and charging units should not be stored on top of each other.

Standard Operating Procedures

Before entering an area where PAPRs are used, the following procedures must be followed:

1. Conduct an inspection of the facepiece unit to assure proper working order of all components. Check the lens for scratches, nicks, and gouges. Check the skirt, head strap, and buckles for any signs of damage or wear. Hoods or head covers should be checked for any holes/tears in the material;
2. Appropriate cartridges should be attached to the unit. Refer to the Respiratory Protection Program for information pertaining to cartridge selection and change-out schedules;
3. Batteries should be checked to ensure that they are fully charged;
4. A flow check should be conducted according to the manufacturer's guidelines. Acceptable airflow is four cubic feet per minute (cfm) for tight-fitting facepieces and six cfm for loose-fitting facepieces; and

5. When all of the above provisions are in place, the authorized employees may don the PAPRs in accordance with the manufacturer's specifications and enter the work area. It is recommended to wear the facepiece under any protective outerwear that covers the head.

Cleaning

Individually assigned respirators should be cleaned and maintained by the user as needed. Shared PAPRs shall be cleaned and disinfected after each use in accordance with the manufacturer's operation manual. PAPR components (motor/blower, battery, breathing tube) and hoods should not be immersed in liquids and instead should be wiped down with a damp towel or sponge.

Battery Maintenance

There are two options for battery pack maintenance:

1. Assigning each user a battery pack and charger to individually maintain a charged battery; or
2. Establishing a central battery management system where an individual will be responsible for charging and distributing the batteries to the users.
 - a. The central management system is usually effective in situations with large numbers of users.

When maintaining batteries, only use the charger supplied with the battery pack. The user should connect the battery to a charger at the end of each work shift and disconnect it at the beginning of the next shift. If a central charging area is used, the batteries should be clearly marked to avoid accidental usage of uncharged batteries. Reserve batteries should be available.

An expected run-time test should be conducted to determine the number of hours the battery will be able to power the respirator at the acceptable airflow rate. The battery should be fully charged prior to start of the test and the PAPR must be equipped with all cartridges, breathing tube, and head piece. The PAPR should maintain the required airflow for eight hours or the unit needs troubleshooting or repair. Follow manufacturer's instruction for conducting this test and for troubleshooting.

Batteries should be recharged when the recharge indicator light is on (if equipped) or when reduced airflow is detected. Note that an overloaded filter may also cause reduced airflow. Batteries should not be charged continuously for more than one week. This will cause deterioration of the battery pack due to heat generation. A typical service life for a nickel-cadmium ("NiCad") battery pack is 500 charge/discharge cycles.

For infrequent PAPR usage, it is recommended that battery packs be initially charged fully, and then follow the manufacturers suggested schedule for maintenance of a full charge. This will prevent storage losses that may occur if periodic charging does not take place. Batteries subjected to long periods of storage (longer than 1-year) may lose their capacity to hold a full charge. Executing several charge and discharge cycles may restore Battery capacity.

Maintenance

When any aspect of the PAPR system fails to work properly, the system must be immediately red tagged. An authorized service facility with factory-trained technicians should be contacted for repair. Contact your vendor or Safety and Health for contact information.

Battery Repair and Disposal

Some batteries can be repaired if problems arise. Consult the manufacturer or Safety and Health for more information. Battery packs that have reached the end of their service life due to damage or age should be placed in a campus battery recycling collection box.

New Equipment Purchase

The Safety and Health Department should authorize purchases of PAPR systems.

Appendix H

Specific Procedures for Use of Supplied-Air Respirators (SARs)

This attachment is meant to supplement the Respiratory Protection Program and is specific to the use of Supplied-Air Respirators (SARs).

Currently, there are no users of SAR units at the University of Toledo. Should the use of SARs be established in the future, this appendix must be used in conjunction with the SAR Manufacturer's operation manual.

Selection and Use

SARs will be used during maintenance activities where the hazardous substance, in certain atmospheres, lacks an adequate warning property (odor or taste), or air concentrations may exceed that which could be adequately protected from use of negative pressure air-purifying respirators.

SAR units will not be utilized for emergency response situations where oxygen deficiency or IDLH atmospheres may be encountered.

All SAR units must be NIOSH approved, positive pressure, continuous flow, and have a full facepiece.

Authorized Users of SARs

All potential users of SARs must register with Safety and Health by calling 5089 and complying with all provisions of the Respiratory Protection Program and this attachment. Authorized users must meet the following specific criteria in addition to the criteria set forth in the Respiratory Protection Program:

1. A PLHCP must determine that the user is physically able to wear an SAR and perform work;
2. The individual must be fit tested by Safety and Health with a full facepiece of the same make, model, and size as the SAR unit that will be assigned to the user. A fit test must be conducted annually. Fit tests will not be required if a loose-fitting facepiece is used;
3. The user must attend Safety and Health training at the time of fit testing and will receive refresher training from Safety and Health annually. The user should also receive training from the manufacturer/supplier or the department in the use and wearing of SARs; and
4. Sight-impaired users must be fitted with prescription glass inserts for use inside full-facepiece respirators. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program. (Please contact Safety and Health at ext. 5069 on the Health Science Campus or ext. 3600 for the Main campus for prescription eyewear). In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, *except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline. Hard, nonpermeable lenses shall not be worn with full-facepiece respirators*

Location and Storage

Respirator facepieces must be stored outside of the work area where they will be worn. Respirators should be stored to protect them from weathering, contamination, and deterioration. Each individual should be assigned their own facepiece and it should be located so that unauthorized users cannot "borrow" to enter the area.

Standard Operating Procedures

Before entering an area where SARs are used, the following procedures must be followed:

1. Conduct an inspection of the facepiece unit to assure proper working order of all components. Check the lens for scratches, nicks, and gouges. Check the skirt, head strap, and buckles for any signs of damage or wear;
2. Check the service life of the cylinder and estimate the amount of time needed to complete tasks. If necessary, have additional cylinders on hand so as to facilitate change-out of cylinders to complete tasks. For compressors, check the pressure gauge to make sure that it is at an acceptable pressure for use;
3. Individuals entering the area and donning SARs should make notification to others outside of the work area before entry. The backup personnel that is notified is responsible for ensuring that the employees are working safely inside the work area and should be present until they exit the work area. The backup individual should notify Campus Police at x77 or x2600 in the event of an emergency and should never attempt to enter the work area themselves;

- a. Assure there is a means for continuous communication between both authorized employees who will be entering the work area and the outside personnel. Communication can be accomplished by radio, visual signals, a signal line, etc.; and;
4. When all of the above provisions are in place, the authorized employees may don the SARs in accordance with the manufacturer's specifications and enter the work area.

Cleaning

SARs shall be cleaned and disinfected after each use in accordance with the manufacturer's operation manual.

Inspection

All SAR systems should be inspected at least monthly and checked for proper function before and after each use. The inspection should be documented and maintained to serve as a written certification of the monthly inspection. Facepieces should be inspected by the user prior to use and is not necessary to be documented.

1. The following inspection guidance can be referenced during inspection of SAR units:
 - a. Examine the facepiece for:
 - Excessive dirt, cracks, tears, holes, or distortion;
 - Inflexibility (stretch and massage to restore flexibility);
 - Cracks or badly scratched lenses in full facepieces; and
 - Incorrectly mounted full facepiece lens or broken or missing mounting clips
 - b. Examine the head straps or head harness for:
 - Breaks; Loss of elasticity;
 - Broken or malfunctioning buckles and attachments (full facepieces only); and
 - Excessively worn serrations on the head harness that might permit slippage.
 - c. After removing its cover, examine the exhalation valve for the following:
 - Foreign material, such as detergent, particles, or human hair under the valve seat;
 - Cracks, tears, or distortion in the valve material;
 - Improper insertion of the valve body in the facepiece;
 - Cracks, breaks, or chips in the valve body, particularly in the sealing surface; and
 - Missing or defective valve cover, improper installation of the valve body.
 - d. If the device has a corrugated breathing tube, examine it for:
 - Broken or missing end connectors;
 - Missing or loose hose clamps; and
 - Deterioration (determined by stretching the tube and looking for cracks).
 - e. When the device is a hood, helmet, blouse, or full suit, the following should be done:
 - Examine for rips, tears, seam integrity, and general condition of inlet air and out air connections;
 - Examine protective headgear for general conditions with emphasis on the suspension inside the headgear;
 - Examine the protective face shield for cracks, breaks, impaired vision due to rebounding abrasive particles, or chemical action on the lenses; and
 - Make sure that the protective screen is intact and secured correctly over the facepiece of abrasive blasting hoods and blouses.
 - f. Examine all atmosphere-supplied respirators for:
 - Integrity of air supply hoses and lines;
 - Adequate and correct fittings for hose and lines;
 - Correct operation and condition of all regulator valves on air supply systems, belt-mounted regulator valves, exhalation valves of discharge air openings, or other air-flow regulators; and
 - Correct particulate filters or organic vapor filter in the air supply system.

Maintenance

When any aspect of the SAR system fails to work properly, the system must be immediately red tagged. An authorized service facility with factory-trained technicians should be contacted for repair.

All air cylinders used must supply at a minimum Grade D breathing air.

Breathing air compressor units should supply Grade D breathing air at a minimum. The units should be constructed to prevent entry of contaminated air into the air supply system as well as be equipped with in-line air-purifying sorbent beds and filters to further ensure breathing are quality. Sorbent beads and filters should be maintained and replaced periodically per the

manufacturer's instructions. A tag should be maintained at the compressor that details the change date and signature of authorized person.

If compressors are not oil-lubricated, carbon monoxide (CO) levels must not exceed 10 ppm in breathing air. If compressors are oil-lubricated, they must have a high-temperature alarm or CO alarm, or both. If the unit is only equipped with a high-temperature alarm, CO needs to be periodically monitored to ensure that levels do not exceed 100 ppm in breathable air.

New Equipment Purchases

The Safety and Health Department should authorize purchase and installation of new SAR systems. All breathing air couplings must be incompatible with outlets for non-respirable worksite air or other gas systems.

Appendix I

Specific Procedures for Use of Self-Contained Breathing Apparatus (SCBA) or Escape Self-Contained Breathing Apparatus (ESCBA)

This appendix is meant to supplement the Respiratory Protection Program and is specific to the use of Self-Contained Breathing apparatus (SCBA) or Escape Self-Contained Breathing Apparatus (ESCBA) for emergency response or emergency evacuation, emergency equipment shutdown, or emergency patient evacuation/extrication, respectively. This appendix should be used in conjunction with the SCBA or ESCBA manufacturer's operation manual.

It should be noted that SCBAs will provide the highest level of respiratory protection and it is important to use the appropriate protective clothing to complete the ensemble. In particular, full body protection is needed in emergency situations where gas or vapor is present that can be absorbed through the skin or cause deterioration of the SCBA components.

Selection and Use

SCBAs will be used during certain maintenance activities or operations where other respirator protection is not adequate based on the toxicity and warning properties of the hazardous materials (such as Isocyanates), or when responding to emergencies where:

- The atmosphere presents an oxygen deficiency (less than 19.5% oxygen);
- There is a concentration of a hazardous chemical that is immediately dangerous to life or health (IDLH);
- Where the hazardous substance, in certain atmospheres, lacks an adequate warning property (odor or taste), or the identity or quantity of the substance is unknown and in the professional judgment of the emergency responder, air concentrations may exceed that which could be adequately protected from use of negative pressure respirators; and
- It is deemed necessary by the emergency response personnel.

Normally the determination to use SCBA in an emergency shall be made by Safety and Health Staff.

ESCBA's will be used only for emergency evacuation, emergency equipment shutdown, or emergency patient evacuation/extrication.

When such an emergency arises, authorized University personnel to affect rescue or mitigate the release of a hazardous material will wear SCBA's or ESCBA's. All SCBA or ESCBA units used for emergency purposes will be NIOSH approved, open circuit/pressure demand, with a full-facepiece, or will use a constant flow hood assembly, respectively.

Authorized Users of SCBA

All potential users of SCBA must register with Safety and Health by calling 419-383-5089 and complying with all provisions of the Respiratory Protection Program and this attachment. Authorized users must meet the following specific criteria in addition to the criteria set forth in the Respiratory Protection Program:

1. Medical Surveillance

- Medical surveillance must determine that the user is physically able to wear an SCBA or ESCBA and perform the work;
- The individual must be fit tested by Safety and Health with a full-facepiece of the same make, model, and size as the SCBA unit which may potentially be used;
- ESCBA's do not require fit testing.
- The user must have attended appropriate initial trainings and receive semi-annual refresher training from Safety and Health or the manufacturer/supplier in the use and wearing of SCBA or ESCBA; and
- Sight-impaired users must be fitted with prescription glass inserts for use inside full-facepiece respirators. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program. (Please contact Safety and Health at ext. 5069 on the Health Science Campus or ext. 3600 for the Main campus for prescription eyewear). In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, *except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline.* Hard, nonpermeable lenses shall not be worn with full-facepiece respirators

Current authorized users of SCBA's include:

1. Select Safety and Health staff, select McMaster Hall research and support staff, and Select Main Campus Police Officers.
 - SCBA's for emergency use are located at the Main Campus Police office and room 32 in the Ritter Observatory.

Current authorized users of ESCBAs include:

1. MRI Staff, Select Safety and Health Staff, Powerhouse employees.
 - ESCBAs used for emergency evacuation, emergency equipment shutdown, or emergency patient evacuation/extrication are located in the hospital 3T MRI storage room, Room 070 Block Health Science, and in the Powerhouse.

Location and Storage

The location and storage of SCBA units must be thought out carefully in order to afford adequate protection of staff and emergency responders and at the same time provide effective and timely response to the emergency at hand. Each university building that has a potential for using SCBAs during an emergency need not be equipped with SCBAs. Instead, SCBA units may be placed in a strategic location, so that responders can access them quickly and safely and respond to emergencies in several different buildings in the area. Under no circumstances will SCBAs be placed in or just outside of the area where an oxygen deficient or IDLH atmosphere is possible. The area where responders pick up and/or don this equipment must be free from potential hazards. Safety and Health can assist departments in determining a suitable storage location.

When a suitable location has been determined, SCBAs should be stored in a compartment built for this purpose. The compartment must be secured or locked to prevent unauthorized use of SCBAs. Planning must be such that all authorized users have the ability to access the units quickly, 24-hours a day. They should also be stored in a manner to protect them from weathering, contamination, and deterioration. The storage area should be clearly marked as containing emergency respirators.

Standard Operating Procedures

Safety and Health will assess the emergency. If key facility staff determines that SCBAs are needed due to the potential presence of an atmosphere that is IDLH, the following procedures will be followed:

1. Contact Campus Police at ext. 2600 on the Main Campus (*with a campus phone*) and inform them of the exact nature of the emergency and need for SCBA use. Also, report the number of SCBA units, breathing air cylinders on hand, and the number of authorized users on hand;
2. Campus Police will contact Safety and Health to respond to the emergency and provide technical assistance. The procedures described below will be followed by University departments in using SCBAs during emergencies:
 - Conduct an inspection of the SCBA units to assure proper working order of all components. Check the service life of the cylinder and estimate the amount of time needed to complete the emergency tasks. If necessary, have additional cylinders on hand so as to facilitate change-out of cylinders to complete the emergency tasks. Consider the time to and from the emergency work area and decontamination (if necessary) when estimating the time to complete the task;
 - No attempt will be made to don a SCBA and respond to the emergency until there are four SCBA units and four authorized users present. A buddy system will be used, whereby two authorized employees don SCBA and enter the emergency work area. As a backup, the other two authorized employees will stay in a safe area with SCBA donned (except for mask and use of breathing air) ready to enter the emergency work area if necessary. There must be two backup authorized employees with SCBA at all times, therefore, two additional authorized employees and SCBAs must be on the scene before backup personnel take any action to enter the emergency work area. Safety and Health staff members will provide backup in emergency situations if possible;
 - Assure there is a means for continuous communication between both authorized employees who will be entering the emergency work area and the backup personnel. Communications can be accomplished by radio, visual signs, a signal line, etc.;
 - When appropriate, authorized employees entering the hazardous area with SCBA should be equipped with retrieval equipment or lifeline to aid in rescue, should it become necessary. If this is not feasible, there must be some equivalent provisions for rescue; and
 - When all of the above provisions are in place, the authorized employees (including the backup personnel) may don the SCBAs in accordance with the manufacturer's specifications and enter the emergency work area.
 - NOTE: There may be some situations where responders decide to use SCBAs when there is not an IDLH atmosphere present. In these cases, a SCBA may be used in the same manner as a negative pressure respirator, without outside assistance or a buddy system.

Cleaning

SCBAs shall be cleaned and disinfected after each use in accordance with the manufacturer's operation manual.

Inspections

All SCBAs shall be inspected at least monthly and checked for proper function before and after each use using the inspection sheet and inspection table developed by Safety and Health (see attached table, below). The inspection sheet will serve as a written certification of the monthly inspection and shall be maintained for each SCBA.

The inspection sheet must be kept in an area where it is available for inspection by authorized users, emergency responders, and state/federal inspectors. It is recommended that the sheet be kept in a three-ring binder located in an area near the SCBAs. A tagging system should be used for the SCBA itself to indicate the units have been inspected and passed. Inspection tags should indicate the SCBA number, inspection date, and inspector's initials. Tags are available from Safety and Health at 419-383-5089.

The following is general guidance that can be referenced during the inspection of SCBAs using the SCBA Inspection Table ([Table 1](#)) and the [SCBA Logs](#) attached:

1. Visually inspect the complete respirator for worn or aging rubber parts, worn or frayed harness webbing or damaged components;
2. Check the latest cylinder hydrostatic test date to ensure it is current. All cylinders must be visually inspected monthly and hydrostatically tested by a licensed cylinder retester in accordance with the appropriate US Department of Transportation (USDOT) specification or the applicable DOT exemption;
 - a. University cylinders are made of steel construction and must be hydrostatically tested every five years. If during the inspection it is noted that hydrostatic testing is necessary again, note it on the inspection sheet and report it to Safety and Health.
3. Visually inspect cylinder and valve assembly for physical damage such as dents or gouges in metal. Cylinders that show physical damage or exposure to high heat or flame, such as paint turned brown or black, decals charred or missing, pressure gauge lens melted or elastomeric bumper distorted, and cylinders that show evidence of exposure to chemicals such as discoloration, cracks in the cylinder, or bulging of the cylinder wall shall be removed from service and emptied of compressed air;
4. Check cylinder pressure gauge for "FULL" indication. If cylinder pressure is less than "FULL," replace with a fully charged cylinder;
5. Check to ensure reducer hose coupling is hand tightened to the cylinder valve outlet;
6. Check that the breathing regulator purge valve is closed;
7. Don the facepiece or hold the facepiece to the face to affect a good seal. Inhale sharply to automatically start the flow of air. Breathe normally from the facepiece to ensure proper operation;
8. Clean and sanitize mask when done; and
9. File the inspection form in a binder with the SCBAs and retain them for one year after inspection, then destroy.

Table 1

COMPONENT	LOOK FOR:
FACEPIECE LENS	<ol style="list-style-type: none"> 1. Nicks, scratches, or abrasions that could impair vision; 2. Deep gouges or cracks that could reduce impact resistance; and 3. Anti-fog coating in need of replacement.
FACEPIECE RIMS	<ol style="list-style-type: none"> 1. Deformed, cracked or broken rims; and 2. Loose rim screws (do not over tighten).
FACEPIECE SKIRT	<ol style="list-style-type: none"> 1. Cuts, gouges, or punctures; 2. Tears or nicks in the sealing area; and 3. Deterioration from age, heat or contamination.
FACEPIECE HEAD STRAP	<ol style="list-style-type: none"> 1. Abrasions or nicks; and 2. Deterioration from age, heat or contamination.
FACEPIECE BUCKLES	<ol style="list-style-type: none"> 1. Crushed, bent, or corroded; and 2. Damaged or loose rivets.
FACEPIECE INLET NOZZLE	<ol style="list-style-type: none"> 1. Loose nozzle cover screws; 2. Heat damage to the nozzle body and cover; 3. AIR KLIK not seated and locking pawl not engaged; 4. Dirt and debris in the exhalation module; 5. Sticking exhalation valve; and 6. Damaged exhalation valve set.
SECOND STAGE REGULATOR & HOSE	<ol style="list-style-type: none"> 1. Cracks or heat damage to housing or cover; 2. Faulty operation of bypass valve, first breath-on, AIR KLIK or override buttons; 3. Dirt and debris in the outlet port; screen and grill cracked; 4. Hose or fittings corroded, cracked or leaking; and 5. Sticking release and shutoff buttons.
GAUGE/ALARM ASSEMBLY	<ol style="list-style-type: none"> 1. Gauge lens scratched; pointer deformed or stuck; 2. Hose or fittings corroded, cracked or leaking; 3. Debris in whistle outlet; and 4. Loose back plate screws.
FIRST STAGE REGULATOR & HOSE	<ol style="list-style-type: none"> 1. Hose and fittings corroded, cracked or leaking; 2. Loose retaining rings on hose connectors. Loose inlet nipple; 3. Abrasion of hose; 4. Damaged female threads on C.G.A. hand wheel; 5. Damaged O-ring or groove on C.G.A. nipple; 6. Loose inlet nipple; 7. Missing O-ring; 8. Dents or heat damage to housing; and 9. Loose pressure port screws.
HARNESS FRAME	<ol style="list-style-type: none"> 1. Cylinder band and latch not working properly; 2. Cylinder not secured in frame and band; 3. Bent or broken frame; 4. Webbing color change; excessive wear or fraying; cuts, nicks, nicks or broken stitching; 5. Buckles damaged or corroded; and 6. Loose Hardware.
AIR CYLINDER & VALVE	<ol style="list-style-type: none"> 1. Dents, gouges, blisters, or cuts; 2. External damage to cylinder valve; 3. Smooth operation of valve hand wheel and ratchet collar; 4. Loose screws securing rubber guard on cylinder valve; 5. Condition of threads on valve outlet; 6. Cylinder pressure gauge lens scratched; pointer deformed or stuck; 7. Gauge reading incorrectly; and 8. Hydrostatic test date within 5 years.

Maintenance and Repair

For SCBA units that fail inspection, the unit must be immediately taken out of service and red tagged. The deficiency must be noted in the inspection log and an authorized service facility with factory-trained technicians should be contacted for repair.

Refilling Air Cylinders

Refilling of high-pressure cylinders is arranged through Safety and Health (419-383-5089). Safety and Health will arrange for Grade D or Higher quality cylinder refilling through local fire agencies or outside vendors.

New Equipment Purchases

The purchase of new SCBA units should be consistent with the equipment used by Safety and Health and the Toledo Lucas County Fire Department. By utilizing identical equipment, Safety and Health and the Fire Department can more effectively assist departments in refilling cylinders, having backup cylinders available, repair work, and training. Identical equipment also provides authorized users with the ability to use buddy system breathing, should the need arise.

SCBA Equipment Specifications

Four (4) Drager Safety PA-80 SCBA

Three (3) North Model 850 10-Minute ESCBA

SCBA TANK INSPECTION LOG

Year: _____ SCBA #: _____ Serial #: _____ Mask #: _____

COMPONENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	COMMENTS
Air Cylinder No. & Hydrostatic Date													
Facepiece Lens & Rims													
Facepiece Head Straps													
Facepiece Skirt													
Facepiece Buckles													
Facepiece Inlet Nozzle													
Gauge / Alarm													
1 st Stage Reg. & Hose													
2 nd Stage Reg. & Hose													
Harness/Frame													
Date													
Initials													

Note: A check mark indicates that each component was inspected as per guidelines and that the component passed inspection. An "X" indicates the component failed inspection.

SCBA FACEPIECE MONTHLY INSPECTION LOG

Year: _____ SCBA #: _____ Serial #: _____ Mask #: _____

COMPONENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	COMMENTS
Facepiece Lens & Rims													
Facepiece Head Straps													
Facepiece Skirt													
Facepiece Buckles													
Facepiece Inlet Nozzle													
Date													
Initials													

Note: A check mark indicates that each component was inspected as per guidelines and that the component passed inspection. An "X" indicates the component failed inspection.

SCBA AIR CYLINDER TANK INSPECTION LOG

Year: _____ Tank #: _____ Hydrostatic Test Date: _____

COMPONENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	COMMENTS
Air Cylinder & Valve													
Date													
Initials													

COMPONENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	COMMENTS
Hydrostatic Test History													

Repair History Tanks must be hydrostatically tested every three (3) years.
 Tanks must be replaced after 15 years of service.

Appendix J

Calculated Cartridge Life Expectancies

Cartridge life expectancy for those chemicals and activities that have been identified as respirator required tasks should be estimated whenever possible using calculators provided by respirator manufacturers that have been made available through the manufacturer's website. The following manufacturers of respirators used at the University have made life expectancy calculators available at the following links:

3M®:

<http://csrv.3m.com/csrv/home.jsp>

Formaldehyde

The Occupational Safety and Health Administration's (OSHA) General Industry Health Standard for Formaldehyde (OSHA 29CFR 1910.1048) has specific cartridge change-out requirements located specifically at 1910.1048(g)(2)(ii) "Respirator Program". Therefore, a cartridge change-out calculation is not calculated and the requirements of the standard are followed when cartridge respirators are used. Engineering measures such as closed processes, local exhaust ventilation, or chemical substitution will be used as the primary means of controlling air contaminants. The requirements of this program will be followed when engineering controls are not adequate, or during implementation of engineering controls.

Formaldehyde cartridge change-outs will be done after 3-hours of use or at the end of the work shift, whichever occurs first, unless the cartridge contains a NIOSH approved end-of-service-life indicator (ESLI) to show when break through occurs.

See following page for an [example xylene SURVIVAIR® End-of-Service-Life Calculator print-out.](#)

Example SURVIVAIR® Cartridge End-of-Service-Life Calculator Report – Xylene

Survivair Respirator Cartridge Service Life Estimate

Employee Information

Employee Name: John Doe
Date: 2/6/2004
Employee Number: NA
Job Title/Job Description: Operations
Employer: University of Toledo
Employer Location/Address: Toledo
Comments: This is an example Cartridge Service Life Estimate
Calculation for display purposes only

Estimated Cartridge Service Life

Survivair Cartridge Model: 1051
Estimated Service Life: 9.17 Hours
550.41 Minutes

Contaminant Information

Contaminant Name: m-Xylene
Contaminant CAS Number: 108-38-3
Permissible Exposure Limits: Exposure Limit (PEL, TLV, WEEL): 100.0000 ppm
STEL (OSHA, TLV): 150.0000 ppm
Ceiling (OSHA, TLV): ppm
IDLH: 900.0000 ppm

Work Site Parameters

Contaminant Concentration: 250.0000 ppm
Temperature: 26.7 °C
Relative Humidity: 66% to 80%
Work Rate: Moderate - continuous movement (50 lpm)
Safety Factor: None

Effective Date: 12/3/07

Review/Revision Date: 12/19/07