UNIVERSITY OF TOLEDO

SUBJECT: RESPIRATORY PROTECTION PROGRAM Procedure No: S-08-034

PROCEDURE STATEMENT

Safe procedures, as defined by this plan, 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 (29 CFR 1910.134) and Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas (10 CFR 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 Environmental Health and Radiation Safety 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 (ESCBA)* – 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 Environmental Health and Radiation Safety 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 Environmental Health and Radiation Safety and Occupational 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 with 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

Environmental Health and Radiation Safety

- 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, including the assurance that the necessary program evaluations are performed as necessary.
- Identify a Program Administrator.

Occupational Health

- Coordinate medical clearance, initial respirator fit testing and training for N-95 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 Andrew Shupp, Sr. Safety and Health Specialist, Environmental Health and Radiation Safety Department (419-383-3768 or Andrew.shupp@utoledo.edu).

Supervisors

- Identify jobs requiring respiratory protection and inform their employees of these requirements;
- Assure that employees are issued respiratory protection through the procedures outlined in this program 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 Environmental Health and Radiation Safety 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

- Environmental Health and Radiation Safety 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 Environmental Health and Radiation Safety 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 an Environmental Health and Radiation Safety 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 Environmental Health and Radiation Safety 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/Fit Testing 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 and Research Assistants; and
- Students.

B. If individuals wish to use respirators, but are not involved in University business, Environmental Health and Radiation Safety 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 UT Health PLHCP prior to initial fit testing. The evaluation can be accomplished by use of a medical questionnaire, by examination or a combination of both. Environmental Health and Radiation Safety 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 Occupational Health on the Health Science Campus and complete a respirator

clearance form during normal working hours. Environmental Health and Radiation Safety 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 contact Environmental Health and Radiation Safety to obtain and complete a respirator clearance form during normal working hours. The completed respirator clearance form will be sent from Environmental Health and Radiation Safety to Occupational Health for review. Environmental Health and Radiation Safety 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.
- Approval, non-approval, and any medical restrictions for an employee regarding respirator use will be communicated to the Environmental Health and Radiation Safety 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 (OHM) Program.

F. Additional Medical Evaluations
- At the time of the physical, the physician will determine the frequency of any re-evaluations. Occupational Health will contact users for any additional medical re-evaluations.
- 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 responses to annual fit testing questionnaire and/or 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 N-95 shall be accommodated by the department (or via Central Distribution in the case of infectious disease control) whose job tasks require respiratory protection

3. *FIT TESTING AND FIT CHECKING*

A. All individuals required to wear a tight-fitting respirator, such as a half-mask respirator, (other than an N-95/PAPR respirator for infectious disease control) must be qualitatively or quantitatively fit tested for that make, model, style, and size of mask by the Environmental Health and Radiation Safety 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 face piece).
- Individuals in high risk groups wearing an N-95 respirator shall be initially qualitatively fit tested and trained for that make, model, style, and size of mask by Occupational Health. Annual refitting when necessary, (refer to Appendix B) for users of N95 respirators shall be conducted by Environmental Health and Radiation Safety or EHRS representatives who are trained to conduct respirator fit testing.

- If an individual has not received a respirator fit test in the last 12 months, and infectious disease contact is necessary, refitting can be conducted on an emergency basis by the Environmental Health and Radiation Safety Department or On-Call Nursing Administrator to ensure that the annual fit testing requirement has been met, or the employee can wear a PAPR.

B. 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 Environmental Health and Radiation Safety 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 Environmental Health and Radiation Safety or Occupational Health, as applicable. Environmental Health and Radiation Safety or Occupational Health, as applicable, will review the physician's opinion before conducting the fit test and training.

F. Every manufacturer designs face pieces to fit a broad section of the working population, but no single respirator will fit everyone. Environmental Health and Radiation Safety shall carry respirators in at least two different models, 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-face piece respirators. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program. (Please contact Environmental Health and Radiation Safety at 419-383-4521 on the Health Science Campus or 419-530-3600 for the Main Campus for prescription eyewear.) In lieu of glass inserts, contact lenses may be worn with full-face piece 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-face piece 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 will be instructed to wear a PAPR instead when appropriate. 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 seal check at the time of the fit test) and one qualitative or quantitative fit test will be conducted.

J. Seal Checking

- Every time a respirator is donned, the user must perform positive and negative pressure seal 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 face pieces 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 – Cover the inlet opening of the respirator's canister(s), cartridge(s), or filter(s) with 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 face piece collapses slightly, and no inward leakage of air into the face piece is detected, it can be reasonably assumed that the respirator has been properly positioned and the exhalation valve and face piece are not leaking.
- Positive Pressure Check
  - Procedure – Cover as much of the face piece with the hands. Exhale gently. If the respirator has been properly positioned, a slight positive pressure will build up inside the face piece without detection of any outward air leak between the sealing surface of the face piece and the face. It can be reasonably assumed that the respirator has been properly positioned and the inhalation valves are not leaking.

G. Fit Testing

- Quantitative Fit Test: Environmental Health and Radiation Safety 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: Occupational Health and Environmental Health and Radiation Safety 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)
   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 face piece.
      - 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, Environmental Health and Radiation Safety generally recommends that gas/vapor cartridges be changed every six months or at the manufacturer's recommendation, or when breathing resistance is noted. Environmental Health and Radiation Safety may recommend a more specific and/or frequent change-out schedule if necessary based on the following guidance:
          1. 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.
          2. 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 link http://extra8.3m.com/SLSWeb/home.html.
      - Replacement cartridges are available through the employee's applicable supervisor, or, in some cases, through the Environmental Health and Radiation Safety 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/m^3) of air or less;
        - Carbon monoxide (CO) content of 10 ppm or less;
        - Carbon dioxide (CO_2) 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* –Employees will be trained by Environmental Health and Radiation Safety or Occupational Health staff on proper respirator usage at the time of fit testing. Voluntary users of respirators (including filtering face pieces) 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.

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.

7. *RECORDKEEPING*

A. Training

- The Environmental Health and Radiation Safety Department will maintain training records in the training test bank.

B. Medical Evaluations

- Confidential medical records, such as the Physicians written medical opinion, will be retained at a centralized records retention location for the duration of the employee's employment plus 30 years.

B. Fit Testing

- The Environmental Health and Radiation Safety Department and Occupational Health 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 University-issued Identification Number (Rocket ID) 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 success or failure of the person to obtain a satisfactory fit during the test; and
  -- The signature of Environmental Health and Radiation Safety representative administering the test;

D. Inspection

- Emergency use respirators will be inspected monthly by the equipment owner and the record kept for one year. Inspection documentation will include the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files.

E. Program Evaluation

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

Technical Support

All referenced guidelines, regulations, and other documents are available through Environmental Health and Radiation Safety at 419-383-3768. Assistance in hazard evaluation, Medical Surveillance, and selection of respirators are also provided by Environmental Health and Radiation Safety.

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 Face piece	Full Face piece	Helmet	Loose-Fitting Face piece
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 • Demand mode • Continuous flow mode • Pressure-demand or other positive-pressure mode	10 50 50	50 1,000 1,000	– 25 –	– 25 –
4. Self-Contained Breathing Apparatus (SCBA) • Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	10 –	50 10,000	50 10,000	– –

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/Fit Testing Guidance and the NIOSH Respirator Selection Logic Process

As stated in this guideline, the Environmental Health and Radiation Safety 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: https://www.cdc.gov/niosh/docs/2005-100/pdfs/2005-100.pdf.

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

Employee Group and Hazard Rating	REQUIRED RESPIRATOR and FIT TESTING FREQUENCY/INFORMATION
High Risk Exposure Group	
3D Medical Intensive Care (Nurses) 4AB GU/Nephrology/Med-Surg (Nurses) 4CD Oncology/Hemoc/Med-Surg (Nurses) 5AB Med/Surgery (Nurses) 5CD Surgery-Neurosciences (Nurses) 6AB Surgery-Orthopedics (Nurses) Acute Hemodialysis Anesthesiology (Providers) CT Scanner (Nurses/Providers) Vascular Lab Emergency Department Endoscopy Suite Infectious Disease (Providers) Nursing Pool OPS – PACU (Nurses) Painters – Campus Environment & Physical Plant Radiology (Nurses/Providers) Respiratory Care Surgical Intensive Care (Nurses) Pulmonary Medicine (Providers) Operating Room	• Requires Medical Clearance to wear a respirator and Initial Fit Test by Occupational Health on N-95 • Requires Annual Fit Testing on N-95 • If unable to be fit tested, requires Initial Training by Occupational Health on the PAPR
Low to Medium Risk Exposure Group	
Employees working in Patient Care Areas or entering Patient Care Areas to include such groups as: Outpatient Clinics Environmental Services HVAC-Campus Env & Phy Plant Infection Control Maintenance – Campus Env & Phy Plant Medical Students Nursing Assistants Pastoral Care Pathology and Lab Services Plumbers Residents Students in Clinical Settings	• Requires Medical Clearance to wear a respirator by Occupational Health • Requires Initial Training by Occupational Health on the PAPR • Requires Annual Training by Safety Test Bank on PAPR

Biosafety Level 3 Employees	
Any person entering or who may likely enter into Biosafety level 3 laboratory	• Requires Medical Clearance to wear a PAPR by Occupational Health • Requires Initial Training by Environmental Health and Radiation Safety on PAPR • Requires Annual Training by Safety Test Bank on PAPR
DLAR Animal Care Workers/Researchers	
Various Protocols (see individual protocol)	• Requires Medical Clearance to wear a respirator by Occupational Health • Requires Initial Fit Test by Occupational Health on N95. Requires Initial Fit Test by Environmental Health and Radiation Safety on APR, if needed. • Requires Annual Fit Test by Environmental Health and Radiation Safety on type of Respiratory Protection Equipment Required
Campus Wide Emergency Response/Decon Team	
Response to various emergencies	• Requires Medical Clearance to wear a PAPR by Occupational Health • Requires Initial Training by Environmental Health and Radiation Safety on PAPR • Requires Annual Training by Safety Test Bank on PAPR
Grounds	
Application of various pesticides	• Requires Medical Clearance to wear a respirator by Occupational Health • Requires Initial Fit Test By Environmental Health and Radiation Safety on Half-Mask. • Requires Annual Fit Test by Environmental Health and Radiation Safety on Half-Mask.
Environmental Health and Radiation Safety Staff	
Emergency response to Disasters Occasional sampling of asbestos-containing materials Maintenance of HEPA Filtration Systems Various	• Requires Medical Clearance to wear a respirator by Occupational Health • Requires Initial Fit Test by Environmental Health and Radiation Safety on type of Respiratory Protection Equipment Required • Requires Annual Fit Test by Environmental Health and Radiation Safety on type of Respiratory Protection Equipment Required

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, 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 Environmental Health and Radiation Safety are certified by NIOSH and are designed to protect against specific contaminants. Obtain all respiratory protection through Environmental Health and Radiation Safety 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 Environmental Health and Radiation Safety 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 face piece for:

- Excessive dirt, cracks, tears, holes, or distortion;
- Inflexibility (stretch and massage to restore flexibility);
- Cracks or badly scratched lenses in full face pieces; and
- Incorrectly mounted full-face piece 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; 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 face piece;
- 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 face piece;
- 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 APRs and N95s *excludes* 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 Environmental Health and Radiation Safety. Also refer to the Respirator Training Information Checklist for additional training information (found at the end of this appendix).

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.

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. Employees with facial hair that comes between the sealing surface of the face piece 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

Refer to Appendix E.

Donning the Respirator and Checking Its Fit and Operation

Instruct the employee on how to properly don and doff the respirator. This includes face piece 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 maintained for emergency use shall be cleaned and disinfected after each use; and
3. 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 face pieces 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 (49ºC [120ºF] 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 (49ºC [120ºF] 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 49ºC (120ºF); 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 49ºC (120ºF); 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 49ºC (120ºF), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces 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 face piece, replacing filters, cartridges, and canisters where necessary.

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

Environmental Health and Radiation Safety 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 face piece 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 Environmental Health and Radiation Safety 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.

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-face piece 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-face piece respirators.
Environmental Health and Radiation Safety recommends frequent breaks if a respirator is to be worn for any length of time.

Table 1 – Hazard Communication Information

Respiratory Hazard	Examples	Health Effects
Oxygen (O_2) 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 Simple – Materials that displace O_2 in the air to create an O_2 deficiency. Chemical – Materials that act to render the body unable to utilize O_2	Simple – nitrogen (N_2), hydrogen (H_2), methane (CH_4), helium (He), neon (Ne), argon (Ar) Chemical – carbon monoxide (CO), hydrogen (H_2), hydrogen sulfide (H_2S), nitriles	See O_2 Deficiency (above)
Carcinogens	Gas/Vapor – benzene, carbon tetrachloride, vinyl chloride Particulate – radioactive particulate, asbestos, chromates	Development of cancer(s) after a period of time.
Irritants	Gas/Vapor – ammonia (NH_3), hydrogen chloride (HCl), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), chlorine (Cl_2), ozone (O_3) Particulate – 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	Gas/Vapor – mercury (Hg), lead (Pb), hydrogen sulfide (H_2S), organic solvents, pesticides, ethylene oxide, ether, carbon tetrachloride, chloroform, benzene, carbon disulfide Particulate – 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.	☐
	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.	☐
	Inspection: Should be performed before each use- Check valves, headstraps, facepiece, etc. for any defects. All problems must be rectified before use, Call Environmental Health and Radiation Safety for parts.	☐
	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.	☐
	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.	☐
	Seal check: Positive and negative pressure checks must be done each time the respirator is used.	☐
	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.	☐
	How improper fit, usage, or maintenance can compromise the protection provided by the respirator.	☐
	Limitations and capabilities of respirator – only will protect for contaminant indicated in use, i.e., Organic vapor cartridge on a half-face will not protect against oxygen deficient atmosphere.	☐
	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/Environmental Health and Radiation Safety. 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.	☐
CARTRIDGES	Cartridges are designed for specific contaminants. The cartridges issued are selected according to the particular substance that will be used. Consult Environmental Health and Radiation Safety if substance used changes to ensure that the proper cartridge is used.	☐
	Gas/Vapor cartridges should be changed out every 6 months (*at a minimum*), or anytime odor has been detected. Alternatively, change out at the following frequency as determined by a Environmental Health and Radiation Safety 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.	☐
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.	☐
STORAGE	Keep respirator and cartridges in a clean, dry plastic bag when not in use.	☐
	Ensure that the respirator is dry before storing. Respirators should be air-dried rather than mechanically dried after washing.	☐
	Do not store respirator in a contaminated area.	☐
	Do not store respirator where it can be crushed.	☐
	Do not expose the respirator to temperature extremes.	☐
INFORMATION	If “Required” user, inform that they will need to have annual fit tests and training.	☐
	If “Voluntary” user, supply with Appendix D.	☐

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 for use of PAPR units at the University of Toledo.

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 Environmental Health and Radiation Safety.

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 Environmental Health and Radiation Safety at 419-383-4521 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. Fit testing will not be required if a loose-fitting facepiece is used;
3. For those wearing loose-fitting systems that do not receive annual fit testing, Environmental Health and Radiation Safety will conduct separate (online) training on an annual basis.

Location and Storage

Respirators should be stored to protect them from weathering, contamination, and deterioration. 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 for PAPR's used for Infectious Disease Control (Hospital)

Before entering a patient's room/area where PAPRs are used, the following procedures must be followed:

1. Request a "PAPR Cart" from Central Distribution. Cart will be delivered to unit/room with 5 PAPR blowers, hoods, belts, a multi-unit charger, and cleaning wipes;
2. Hoods or head covers should be checked for any holes/tears in the material. Clean hood using provided wipes as necessary;
3. A flow check should be conducted according to the manufacturer's guidelines. Acceptable airflow is six cfm for loose-fitting facepieces (flow that moves "bullet" float past second line); and
4. 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.

When work requiring PAPRs is completed in the patient's room, the following procedures must be followed:

1. Doff the PAPR unit. PAPR assemblies are not disposable – Do Not Throw Any Part of Them Away.
2. Thoroughly wipe clean (using the provided wipes) the PAPR hood, breathing tube and PAPR blower;
3. Place all PAPR unit pieces back on the PAPR Cart and plug the PAPR blower into the charger; and
4. When work is completed in the unit (patient is discharged or airborne status is lifted) PAPR Cart shall be returned to Central Decontamination for processing and return to service.

Cleaning

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

1. Clean the outer surfaces of the Motor Blower Unit with a soft cloth dampened in a solution of water and mild pH-neutral detergent. Do not immerse the motor blower unit or the battery pack in water. Do not use solvents or abrasive cleaners.
    a. You should not use solvents to clean the motor blower unit, battery case or battery charging system as they may chemically weaken the plastics.
    b. Do not use detergents that contain lanolin or other oils, or abrasive cleaning agents.

   c. Do not soak the materials or immerse the motor blower unit.
2. Clean the hood with the water and detergent solution. The inside of the hood must be completely dried prior to use or storage. Air drying is recommended. The hood is not disposable and will be replaced as needed by a designated official.
3. Clean the connection sites on the breathing tube with the water and detergent solution. The breathing tube can be immersed in water for cleaning. The inside of the tube must be completely dried prior to use or storage. Air drying is recommended.
4. Clean the belt by machine washing in cold water with mild detergent. Air dry prior to use or storage.
5. Do NOT attempt to clean the filters. Leave the filter in the motor blower unit undisturbed. Never attempt to clean filters by knocking or blowing out accumulated material. This may result in damage to the filter membrane allowing hazardous particles to enter the breathing zone, resulting in sickness or death. If you feel that a filter needs to be replaced, contact Safety and Health at x4521 for disposal, and contact Central Distribution at x3884 for a replacement.

Battery Maintenance

PAPR Batteries are replaced every three years, but annually inspected by BioMed. Batteries should be recharged 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 manufacturer's 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 Environmental Health and Radiation Safety for contact information.

Battery Repair and Disposal

Some batteries can be repaired if problems arise. Consult the manufacturer or Environmental Health and Radiation Safety 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 Environmental Health and Radiation Safety Department should authorize purchases of PAPR systems.

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