

## C-11. RESPIRATORY PROTECTION PROGRAM

### I. SCOPE

The Respiratory Protection Program applies to all employees at NCI-Frederick required to utilize Respiratory Protective Equipment (RPE) under 29 CFR 1910.134. Employees voluntarily wearing respirators are only required to follow provisions listed under Voluntary Respirator Use.

### II. PURPOSE

- A. The objective of this program is to identify the requirements for the selection, use, training, care, and maintenance of respiratory protective equipment (RPE) used by the employees at the NCI-Frederick Cancer Research and Development Center (NCI-Frederick). The primary objective of this program is to assure that employees potentially exposed to harmful levels of air-borne contaminants are properly trained, fit tested, and medically able to wear respiratory protective devices.
- B. This program will assure compliance to OSHA regulation 29CFR1910.134 and consistency with the recommendations in ANSI standard Z88.2-1992.

### III. GENERAL

- A. In the control of those occupational diseases caused by particulates (dusts/mists/fumes) or gases/vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished, as far as possible, by accepted engineering controls, such as enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials. When effective engineering controls are not feasible, or while they are being instituted, appropriate approved respirators shall be worn.

### IV. DEFINITIONS

**FIT-TEST** – The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

**IMMEDIATELY DANGEROUS TO LIFE OR 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.

**PROGRAM ADMINISTRATOR** - The program administrator is the person who has the responsibility and authority for managing the respirator program. This person shall be designated by the managers of the Environment, Health and Safety Program (EHS). This person shall have knowledge of respiratory protection sufficient to supervise the respiratory protection program (RPP).

**RESPIRATORY PROTECTIVE DEVICES** - Respiratory protective devices are classified broadly according to the mode of operation. These classifications and their definitions are as follows:

1. **Air purifying respirators** - A respirator in which ambient air is passed through an air-purifying element that filters and removes the contaminant(s). Air is passed through the air purifying element by means of breathing or mechanically. Air-purifying respirators may be of either full face or half mask type. Examples of air-purifying respirators are as follows:
  - Particulate removing (dust/mist/fume)
  - Gas/vapor removing (chemical filter type)
  - Combination particulate removing and gas/vapor type
  
2. **Atmosphere-supplying respirator** - An atmosphere-supplying respirator is one in which the respirable air is supplied from an outside source of the work environment. Examples of atmosphere supplying respirators are as follows: Grade D air is used as the supply air in this situation.
  - a. Type A: hose/mask with a blower, maximum length of hose is 300 feet.  
  
Type B: hose/mask without a blower, maximum length of hose is 75 feet.  
  
Type C: Airline respirator, air is supplied from a compressor, maximum length of hose from the gauge is 300 feet.  
  
There are two categories:
    - a. Loose fitting (continuous flow hoods and helmets).
    - b. Tight fitting (demand and pressure demand respirators).

- b. **Self-Contained Breathing Apparatus (SCBA)** - An atmosphere-supplying respirator in which the respirable gas source is designed to be carried by the wearer. Examples of SCBA are as follows: Grade D air is used as the supply air in this situation.
  - Closed-circuit
  - Open circuit
    - a. Demand type
    - b. Pressure-demand type

## V. **RESPONSIBILITIES**

### A. Supervisor

1. Identifies each employee requiring RPE to the program administrator along with the type of RPE requested, frequency of use, other personal protective equipment required and a description of job activities.
2. Requests the assistance of EHS to perform worksite hazard assessments.
3. Ensures that no employee is assigned to tasks that require the use of RPE until the employee has been medically cleared by Occupational Health Services (OHS) and has received the initial and annual fit-testing and training required for RPE use.
4. Purchases the proper RPE in accordance with the program administrator's selection.
5. Monitors RPE usage in his/her area to ensure that the proper RPE is used correctly in the appropriate situations, and all RPE's are being properly stored, cleaned and maintained.
6. Reports any malfunctioning RPE to the program administrator.
7. Ensures that participant attends annual training, fit-test, and medical physical.

B. Employee

1. Uses the RPE provided by NCI-Frederick in accordance with training and instruction received at NCI-Frederick.
2. Complies with all requirements of the Respiratory Protection Program including annual fit testing and training, and annual medical evaluation.
3. Provides care, maintenance and inspection of the issued RPE in accordance with the instruction received at NCI-Frederick and the RPE manufacturer.
4. Immediately quits work and goes to an area of clean air in the event of RPE malfunction and immediately reports malfunction to the supervisor or program administrator.

C. Program Administrator

1. Specifies appropriate RPE based upon review of the hazard assessment.
2. Ensures the maintenance of records for the program. Included in these records are medical clearance documentation, fit testing results, training records, worksite hazard assessments and exposure monitoring, type of RPE issued as well as contaminants RPE is approved for.
3. Conducts and documents annual program review.
4. Investigates all reports of RPE malfunction to determine cause and corrective action to be taken.
5. Communicates with supervisor providing documentation regarding employee's receiving medical clearance, fit testing and training for utilizing RPE.
6. Designates properly trained personnel to provide employee fit testing and training regarding RPE's.

D. Occupational Health Services (OHS)

1. Performs medical evaluation of all employees required to utilize

RPE initially and annually.

2. Provides a written statement regarding the determination of the employee's medical and psychological ability to wear RPE.
3. Maintains medical surveillance and fit test records with the employees' medical chart.
4. Assists with fit testing and training if needed.

E. Environment, Health and Safety Program (EHS)

1. Performs appropriate hazard assessments of work sites requiring RPE.
2. Provides the program administrator and OHS with the results of any hazard assessments performed.
3. Conducts fit-testing and training as designated by the program administrator.
4. Participates in investigation of RPE malfunctioning as needed.

**VI. SELECTION OF RESPIRATORY PROTECTIVE DEVICES**

Proper selection of respirators shall be made according to the American National Standards Institute (ANSI) publication "Practices for Respiratory Protection" ANSI Z88.2-1992, and OSHA's substance specific respiratory requirements.

- A. The program administrator shall select RPE based on the specific hazards as identified by worksite hazard assessments.
- B. Only NIOSH-certified respirators shall be selected and used at the NCI-Frederick.
- C. When selecting respirators, the program administrator shall consider the following factors:
  1. Identification of the contaminants that are hazardous and may become air-borne.
  2. Measured or estimated concentration of the contaminant(s) in the employee's breathing zone.

3. The chemical, physical, biological, and toxicological properties of the contaminant.
4. The conditions under which the contaminant is produced (e.g., work process, heat, equipment etc.).
5. Whether the concentration of the contaminant is immediately dangerous to life or health (IDLH) or whether injurious effects would be produced only after prolonged exposure to the contaminant.
6. The nature of the duties to be performed by the employee, along with any other personal protective equipment and other equipment that will be utilized while working with the contaminant.
7. Warning properties of the contaminant (e.g., odor, irritation, etc.).
8. An estimation of the total amount of working time the respirator is to be worn daily or weekly.
9. The understanding of the principles, design, scope of use, limitation, advantages and disadvantages of the type of RPE to be utilized.
10. OSHA permissible exposure limits (PEL), ACGIH threshold limit values (TLVs), NIOSH exposure limits and IDLH atmospheres.
11. Eye or respiratory irritation potential.
12. Skin absorption potential of the contaminant (SKIN notation).
13. Oxygen concentration in the atmosphere or the potential for an oxygen-deficient (<19.5%) or oxygen-rich (>23%) atmosphere.
14. Minimum protection factor required, unless OSHA requires specific RPE.
15. Feasibility of engineering controls for reducing the employee's exposure.
16. Availability of a NIOSH/MSHA approved cartridge for each task and the protection factor provided by the respirator.

17. Emergency escape provisions.

See Appendix C-11-D for additional respirator and cartridge selection information. (Attached at the end of this report).

**VII. RESPIRATOR ISSUANCE**

- A. Employees required to use a respirator will be referred to the program administrator by their supervisor by utilizing the Respiratory Surveillance Program Eligibility Form (Appendix C-11-A).
- B. The correct type of respirator and appropriate cartridge, canister and/or filters to be used during the work procedure shall be specified by the program administrator. RPE selected will be based on NIOSH decision logic for contaminants specified by the supervisor.
- C. The employee will make an appointment with OHS for complete medical evaluation to assure that the employee is medically able to utilize the RPE specified.
- D. After being medically cleared for RPE usage, the employee will receive training regarding the proper usage of the RPE. Fit-testing shall be done as recommended in ANSI standard Z88.2-1992.
- E. At the time of issue, each RPE assigned to an individual shall be durably marked with that individual's name. Employees are responsible for marking cartridges and canisters with the date placed in use.

See Appendix C-11-E for complete respirator issuance procedures. (Attached at the end of this report).

**VIII. USE OF RESPIRATORS**

- A. All users of tight-fitting facepieces shall perform a user seal check each time they put on a respirator. A positive pressure check and a negative pressure check are necessary to ensure that an adequate seal is achieved each and every time the respirator is used.

1. Positive Pressure Check

Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the employee first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

## 2. Negative Pressure Check

Close off the inlet opening of the canister of cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

- a. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. Covering the inlet opening of the cartridge with a thin latex or nitrile glove can perform the test.
- B. When there is a change in the work area conditions, the level of exposure, or the degree of physical burden, the effectiveness of the selected respirator must be reevaluated by EHS.
- C. Employees shall be required to leave the respirator use area in the following situations:
1. If the employee detects vapor or gas breakthrough, changes in breathing resistance, or experiences facepiece leakage.
  2. When replacing the respirator or filter, cartridge, or canister.
  3. Upon malfunction of the respirator.
  4. If severe discomfort or illness results from wearing the respirator.
  5. To wash face and facepiece as necessary to prevent skin or eye irritation.
- D. IDLH Atmospheres



IDLH atmospheres do not normally exist at NCI-Frederick, but in rare instances such as confined space entry, the following policies apply:

1. Self-Contained Breathing Apparatus (SCBAs) provided for emergency situations only shall be located in areas designated by EHS.
2. Only EHS employees and other trained authorized personnel shall enter potential IDLH atmospheres for pre-entry monitoring.
3. Only the United States Army Garrison Fire and Emergency Services (USAG-FES) shall provide emergency rescue and enter known IDLH atmospheres.
4. At least one other employee must be located outside of the IDLH atmosphere.
5. Visual, voice, or signal line communication must be maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.
6. The employee(s) located outside the IDLH atmosphere must have been trained and equipped to provide effective emergency nonentry rescue.
7. The employee(s) outside the IDLH atmosphere must have the capability to summon rescue personnel in the event of an emergency.

E. Voluntary Respirator Use

1. Air-Purifying Respirators
  - a. Employees using respirators at NCI-Frederick where respirators are not required by OSHA or their supervisor, (except voluntary users of filtering facepieces (see section E.2 below), must be medically cleared, fit-tested, trained, and follow respirator maintenance requirements.
  - b. Voluntary users must read the Voluntary User Information (Appendix C-11-B) and sign at the bottom of the page, indicating an understanding of the information.

2. Filtering Facepieces (dust masks)
  - a. Employees whose only use of respirators involves the voluntary use of filtering facepieces do not need to be medically evaluated. EHS shall be contacted for information on obtaining appropriate filtering facepieces.
  - b. Voluntary users must read the Voluntary User Information (Appendix C-11-B) and sign at the bottom of the page, indicating an understanding of the information.

F. Cartridge Change Out Schedules

1. OSHA has substance-specific standards for acrylonitrile, benzene, butadiene, formaldehyde, vinyl chloride and methylene chloride that include mandatory change out schedules. (Refer to Appendix C-11-G for specific requirements.) Employees using respirators for any of these specific contaminants shall change cartridges/canisters according to OSHA's requirements.
2. All other employees shall change cartridges/canisters based on recommendations provided by the Program Administrator for their department/area. See Appendix C-11-G for additional information. (Attached at the end of this report).

IX. **RESPIRATOR TRAINING AND FIT-TESTING**

A. Training

1. Initial training shall be given to employees prior to wearing a respirator and fit-testing .
2. Annual training and education is mandatory for **ALL** employees assigned RPE, and their supervisors.
3. Designated personnel having advanced training in RPE will perform annual training.
4. Training provided will include but is not limited to:

- a. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
  - b. What the limitations and capabilities of the respirator are.
  - c. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
  - d. How to inspect, don and remove, use, and check the seals of the respirator.
  - e. What the procedures are for maintenance and storage of the respirator.
  - f. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
  - g. The general requirements of 29 CFR 1910.134.
5. Refresher training is provided annually or when one of the following situations occurs:
- a. Changes in the workplace or the type of respirator may render previous training obsolete.
  - b. Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the level of understanding or skill required.
  - c. Any other situation arises in which retraining appears necessary to ensure safe respirator use is maintained.

B. Fit-Testing

1. Before an employee is required to use any respirator with a negative or positive pressure tight-fitting facepiece, he or she shall be fit tested by EHS with the same make, model, style, and size of respirator that will be used. In addition to the initial fit testing, employees must be refitted:
  - a. Annually

- b. Whenever a different respirator facepiece (size, style, model, or make) is used
  - c. Whenever the employee reports, (or OHS, the employee's supervisor, or EHS makes visual observations) of changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, significant dental changes, cosmetic surgery, or an obvious change in body weight.
  - d. If after passing a fit-test, the employee subsequently notifies EHS, OHS, or his or her supervisor that the fit of the respirator is unacceptable, EHS will assist employees in selecting a properly fitted facepiece as determined by quantitative fit testing.
2. Quantitative fit testing (QNFT) shall be conducted using the Dynatech 3000, according to 29 CFR 1910.134, Appendix A.
- 1) If the fit factor is equal to or greater than 100 for tight-fitting half facepieces, the QNFT has been passed with that respirator.
  - 2) If the fit factor is equal to or greater than 500 for tight-fitting full facepieces, the QNFT has been passed with that respirator.
  - 3) Any modifications to the respirator facepiece for fit-testing shall be completely removed, and the facepiece restored to NIOSH-approved configuration before the facepiece can be used in the workplace.
3. Qualitative fit-tests (QLFT) will only be performed under special circumstances, as determined by the program administrator. QLFTs shall never be performed when a protective factor greater than 10, or a fit factor greater than 100, must be achieved.

## **X. RESPIRATOR MAINTENANCE**

A. Inspection

1. Employees shall inspect their RPE before and after each use and during cleaning. Guidance for inspection procedures is included in Appendix C-11-F and should be performed in accordance with the manufacturers' instructions.
2. Supervisors shall periodically spot check respirators for fit, usage and condition.
3. Any RPE that is not routinely used, but is kept ready for emergency use, shall be inspected after each use and at least monthly to assure that it is in satisfactory working condition by personnel specified by the program administrator. Designated personnel shall keep inspection records on location.
4. Respirators not passing inspection should be immediately taken out of service and sent to the program administrator for possible repair. Use of defective RPE shall not be permitted.

B. Cleaning

1. Respirator users shall clean and disinfect their respirator in accordance with 29 CFR 1910.134, Appendix B-2 as often as necessary to be maintained in a sanitary condition.
2. Employees shall be instructed during annual training on how to clean and disinfect their RPE. Cleaning recommendations are provided in Appendix C-11-F.
3. If RPE is being used by more than one employee, it shall be cleaned and disinfected after each use.
4. Respirators maintained for emergency use and fit-testing shall be cleaned and disinfected after each use.
5. Where exposure to dusts and biological contamination is known, a daily wipe of the interior and exterior respiratory inlet covering with a disinfectant is recommended. Cleaner-sanitizers are available from manufacturers and may be preferred.
7. When goggles are worn together with the RPE, similar cleaning procedures for the goggles should be carried out.

C. Storage

1. Employees are responsible for proper storage of the respirator that has been issued to them according to the manner specified during the training sessions and methods that may be recommended by the manufacturer. RPE's shall not be stored in such places as lockers or tool boxes unless they are in plastic bags or cartons.
2. The employee is responsible for protecting their RPE against dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals. RPE's in regular or daily use should be placed in a designated dust proof and dry cabinet for individual storage.
3. Plastic bags that can be sealed, plastic containers or cans with tight-fitting lids are measures that can be used to protect the RPE from damage during storage.

XI. **MEDICAL SURVEILLANCE OF THE RESPIRATOR USER**

A. Before an employee is fit-tested or required to wear a respirator in the work setting, he/she shall be cleared by an Occupational Health Services (OHS) Nurse Practitioner. The purpose of the medical evaluation is to assure that the employee is both medically and psychologically capable of utilizing a respirator while performing essential job functions. The following factors may be pertinent for this examination:

- Respiratory diseases that affect pulmonary function
- Cardiovascular diseases
- Neurovascular diseases
- Neurological disorders
- Endocrinal disorders
- Psychological disorders
- Facial deformities or facial hair that would prevent a proper facial seal
- Use of prescription eyeglasses or contact lenses
- Medications
- Past problems associated with respiratory use
- Hearing ability
- Any miscellaneous conditions that would be specific to the working environment

B. In the event that an employee is referred to an outside pulmonary

medicine specialist, the pulmonary medicine specialist shall be provided with a copy of this procedure, ANSI Z88.6 - 1984 and types of respirators used, typical work activities, environmental conditions, frequency and duration of use, and hazards and contaminants for which respirators will be worn.

- C. Medical evaluation is required of all respirator users (except dust mask users) regardless of the frequency of respirator utilization.
- D. Clearance is issued following the review of information contained in the OSHA Medical Questionnaire (Appendix C-11-C), a physical assessment, or both. The OHS Nurse Practitioner determines the level of evaluation and may include diagnostic testing to measure lung volumes, assess lung functions, or obtain other applicable information.

## **XII. RESPIRATORY PROGRAM EVALUATION**

- A. The program administrator will annually review, and revise if necessary, the respiratory protection program. Results of this review will be provided to OHS and EHS managers and other officials as necessary.
- B. The evaluation will include results of random worksite visits, any changes to the program, results of hazard assessments and industrial hygiene surveys if available, inspection records, a listing of all employees utilizing respirators, any problems identified with the program and any recommendations to reduce the need for respirators at NCI-Frederick.
- C. Furthermore, the program evaluation will specifically address those items listed in 29 CFR 1910.134(l) as necessary.

## **XIII. REFERENCES**

- A. American National Standards Institute, New York. Standards:
  - Practices for Respiratory Protection, Z88.2-1992, 1992
  - Physical Qualifications for Personnel, Z88.6-1984, 1984
- B. Occupational Safety and Health Administration. Washington D.C.: U.S. Government Printing Office.
  - 29 CFR 1910.134, Respiratory Protection
  - 29 CFR 1910.1025, Medical Surveillance Guidelines
  - Instruction CPL 2-2.54, Respiratory Protection Program Manual





**APPENDIX C-11-B**  
**Voluntary Respirator User Information**

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

You should do the following:

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
- Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
- Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
- Keep track of your respirator so that you do not mistakenly use someone else's respirator.

I have received respiratory equipment training and have read and understand the conditions under which it is to be used as described above and as presented during training.

\_\_\_\_\_  
Employee Name (PRINT)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Employee Signature

\_\_\_\_\_  
Employee #

### APPENDIX C-11-C Medical Questionnaire

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

To the employee:

Can you read (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

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

1. Today's date: \_\_\_\_\_
2. Your name: \_\_\_\_\_
3. Your age (to nearest year): \_\_\_\_\_
4. Sex (circle one):            Male    Female
5. Your height: \_\_\_\_\_ ft. \_\_\_\_\_ in.
6. Your weight: \_\_\_\_\_ lbs.
7. Your job title: \_\_\_\_\_
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): \_\_\_\_\_
9. The best time to phone you at this number: \_\_\_\_\_
10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No
11. Check the type of respirator you will use (you can check more than one category):
  - a. \_\_\_\_\_ N, R, or P disposable respirator (filter-mask, non- cartridge type only).
  - b. \_\_\_\_\_ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).
12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s): \_\_\_\_\_  
\_\_\_\_\_

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

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month: Yes/No
2. Have you *ever had* any of the following conditions?
  - a. Seizures (fits): Yes/No
  - b. Diabetes (sugar disease): Yes/No
  - c. Allergic reactions that interfere with your breathing: Yes/No
  - d. Claustrophobia (fear of closed-in places): Yes/No
  - e. Trouble smelling odors: Yes/No
3. Have you *ever had* any of the following pulmonary or lung problems?
  - a. Asbestosis: Yes/No
  - b. Asthma: Yes/No
  - c. Chronic bronchitis: Yes/No
  - d. Emphysema: Yes/No
  - e. Pneumonia: Yes/No
  - f. Tuberculosis: Yes/No
  - g. Silicosis: Yes/No
  - h. Pneumothorax (collapsed lung): Yes/No
  - i. Lung cancer: Yes/No
  - j. Broken ribs: Yes/No
  - k. Any chest injuries or surgeries: Yes/No
  - l. Any other lung problem that you've been told about: Yes/No
4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?
  - a. Shortness of breath: Yes/No
  - b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
  - c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
  - d. Have to stop for breath when walking at your own pace on level ground: Yes/No
  - e. Shortness of breath when washing or dressing yourself: Yes/No
  - f. Shortness of breath that interferes with your job: Yes/No
  - g. Coughing that produces phlegm (thick sputum): Yes/No
  - h. Coughing that wakes you early in the morning: Yes/No
  - i. Coughing that occurs mostly when you are lying down: Yes/No
  - j. Coughing up blood in the last month: Yes/No
  - k. Wheezing: Yes/No
  - l. Wheezing that interferes with your job: Yes/No
  - m. Chest pain when you breathe deeply: Yes/No
  - n. Any other symptoms that you think may be related to lung problems: Yes/No
5. Have you *ever had* any of the following cardiovascular or heart problems?
  - a. Heart attack: Yes/No
  - b. Stroke: Yes/No
  - c. Angina: Yes/No
  - d. Heart failure: Yes/No
  - e. Swelling in your legs or feet (not caused by walking): Yes/No
  - f. Heart arrhythmia (heart beating irregularly): Yes/No
  - g. High blood pressure: Yes/No
  - h. Any other heart problem that you've been told about: Yes/No
6. Have you *ever had* any of the following cardiovascular or heart symptoms?
  - a. Frequent pain or tightness in your chest: Yes/No
  - b. Pain or tightness in your chest during physical activity: Yes/No
  - c. Pain or tightness in your chest that interferes with your job: Yes/No
  - d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No

- e. Heartburn or indigestion that is not related to eating: Yes/ No
- f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No

7. Do you *currently* take medication for any of the following problems?

- a. Breathing or lung problems: Yes/No
- b. Heart trouble: Yes/No
- c. Blood pressure: Yes/No
- d. Seizures (fits): Yes/No

8. If you've used a respirator, have you *ever had* any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)

- a. Eye irritation: Yes/No
- b. Skin allergies or rashes: Yes/No
- c. Anxiety: Yes/No
- d. General weakness or fatigue: Yes/No
- e. Any other problem that interferes with your use of a respirator: Yes/No

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

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

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

11. Do you *currently* have any of the following vision problems?

- a. Wear contact lenses: Yes/No
- b. Wear glasses: Yes/No
- c. Color blind: Yes/No
- d. Any other eye or vision problem: Yes/No

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

13. Do you *currently* have any of the following hearing problems?

- a. Difficulty hearing: Yes/No
- b. Wear a hearing aid: Yes/No
- c. Any other hearing or ear problem: Yes/No

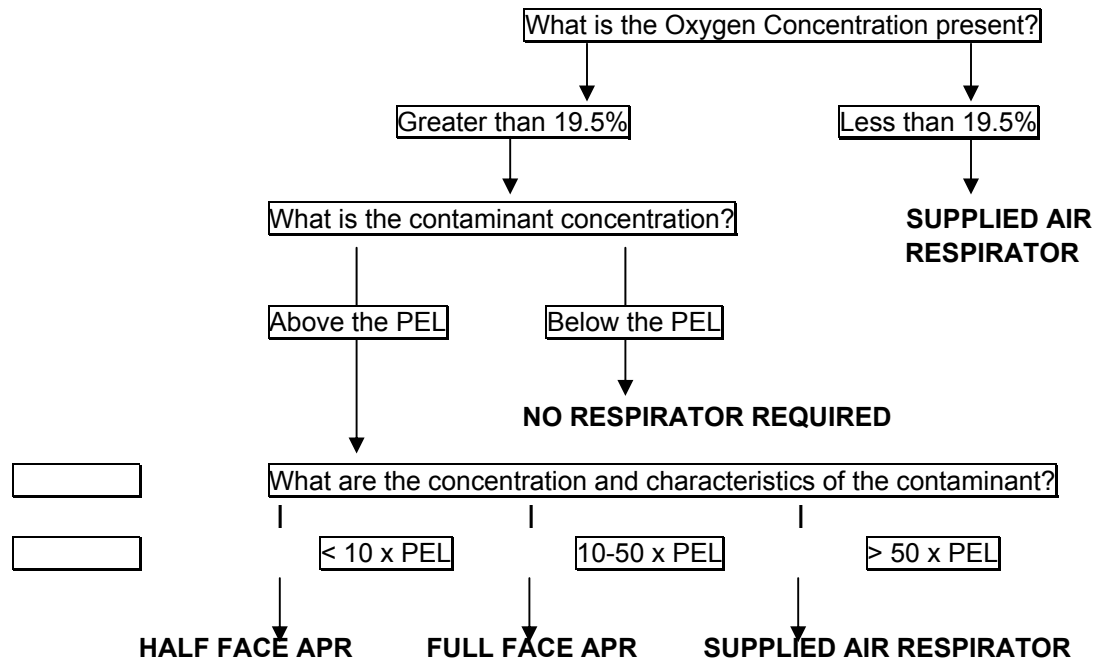
14. Have you *ever had* a back injury: Yes/No

15. Do you *currently* have any of the following musculoskeletal problems?

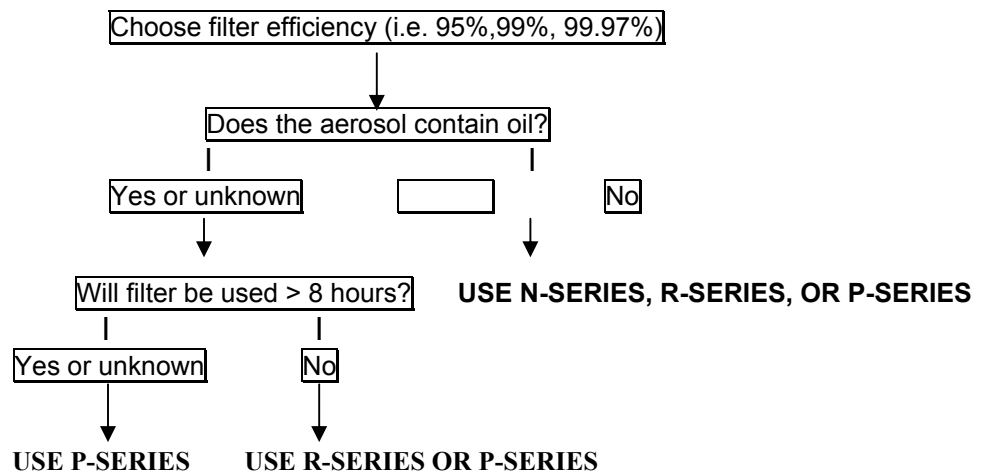
- a. Weakness in any of your arms, hands, legs, or feet: Yes/No
- b. Back pain: Yes/No
- c. Difficulty fully moving your arms and legs: Yes/No
- d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
- e. Difficulty fully moving your head up or down: Yes/No
- f. Difficulty fully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

## APPENDIX C-11-D Respirator and Particulate Filter Selection

### RESPIRATOR DECISION LOGIC



### PARTICULATE RESPIRATOR DECISION LOGIC



**APPENDIX C-11-E**  
**Procedures for Respirator Issuance**

1. Contact EHS at ext. 1451 or ext. 1832 for a hazard assessment to determine if respiratory hazards are present, or are likely to be present, at a concentration which necessitates the use of respiratory protection.
2. If EHS determines that respiratory protection is **required** for the given job, contact Occupational Health Services (OHS) to schedule a medical evaluation. Prior to the appointment in OHS, the employee shall complete the Medical Questionnaire for Respiratory Protection. A nurse practitioner in OHS will review the questionnaire with the employee during the appointment and answer any questions he or she may have. If respiratory protection is **not required** by EHS or the supervisor but is being worn solely as a voluntary preference of the employee, follow the procedures listed in the "Voluntary Respirator Use" section of NCI-Frederick's written Respiratory Protection Program.
3. After obtaining medical clearance to use a respirator, the employee will be scheduled for training and a fit-test. Training is required prior to being issued a respirator.
4. At the fit-test appointment, the employee will be fit-tested with the same make, model, size, and style of respirator to be used in his or her workplace. After the employee has passed a fit-test, the program will send the employee and his/her supervisor a memo with the ordering information for the appropriate respirator. The supervisor is responsible for ordering the respirator and should have it sent to EHS (the appropriate address is given in the memo).
5. When EHS receives an employee's respirator, they will examine the respirator and cartridges to ensure the appropriate respirator and cartridges were ordered. After it has been determined the correct respirator was received, EHS will notify the employee and the employee will be asked to pick up the respirator.
6. After picking up a respirator, the employee shall durably mark the respirator with his or her name. Cartridges shall also be marked with the date placed in use. After labeling their respirator, an employee should begin using it as appropriate in their workplace.

NOTE: Respirators will not be issued until all of the steps listed above have been completed. Respirators must be ordered on an individual basis and EHS does not keep a stock of them for employee use. Please allow adequate time for ordering a respirator and completing the issuance procedure prior to the time the

respirator must be worn.

## **APPENDIX C-11-F Respirator Maintenance**

### RESPIRATOR INSPECTION CHECKLIST

Inspection items for disposable respirators

- Holes in filter material
- Elasticity of straps
- Deterioration of straps and metal nose clip

Inspection items for air-purifying respirators

Facepiece:

- Excessive dirt
- Cracks, tears, holes, or distortion from improper storage
- Inflexibility (stretch and massage to restore flexibility)
- Cracked or badly scratched lenses in full face pieces
- Incorrectly mounted full-face piece lens or broken or missing mounting clips
- Cracked or broken air-purifying element or holder(s), badly worn threads, or missing gasket(s) (if required)

Head straps of the head harness:

- Breaks or tears
- Loss of elasticity
- Broken or malfunctioning buckles and attachments
- Excessively worn serrations on the head harness which may permit slippage

Inhalation and exhalation valves:

- Foreign material, such as detergent residue, dust particles, or human hair on valve or 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 the sealing surface

- Missing or defective valve cover
- Improper installation of the valve in the valve body

Filter elements:

- Incorrect cartridge or filter for the hazard
- Incorrect installation, loose connections, missing or worn gaskets, or cross threading in the holder
- Expired shelf-life date on cartridge
- Cracks or dents in outside case of filter or cartridge
- Evidence of prior use of sorbent cartridge, indicated by absence of sealing material over inlet

Breathing tube:

- Broken or missing end connectors
- Missing or loose hose clamps
- Deterioration, determined by stretching the tube and looking for cracks

Inspection items for atmosphere-supplying respirators

Hood, helmet, blouse, or full suit:

- Ripped or torn seams
- Headgear suspension
- Cracks or breaks in face shield
- Protective screens that are intact and fit correctly over face shields, hoods, or blouses

Air supply systems for:

- Breathing air quality
- Breaks or kinks in air supply hoses and fittings
- Tightness of connections
- Settings of regulators and valves
- Correct operations of air-purifying elements and alarm for carbon monoxide or high temperatures



## RECOMMENDED CLEANING PROCEDURES

1. 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.
2. Wash components in warm (43° C [110° 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.
3. Rinse components thoroughly in clean, warm (43° C [110° F] maximum), preferably running water. Drain.
4. Disinfect components. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
  - Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43° C (110° F); or,
  - Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43° C (110° F); or,
  - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
5. Rinse components thoroughly in clean, warm (43° C [110° F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. Dry components. Components should be hand-dried with a clean lint-free cloth or air-dried.
7. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
8. Test the respirator to ensure that all components work properly.

**APPENDIX C-11-G**  
**Filter and Cartridge Change Information**

**A. FILTER CHANGE OUT SCHEDULES**

The service life of all filters is limited by considerations of hygiene, damage, and breathing resistance. All filters should be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance.

<b>Filter Series</b>	<b>Recommended Change Schedule</b>
N	When breathing becomes difficult, or when breakthrough odor or taste is detected
R	After each 8-hour shift or 8 hours of use
P	Follow manufacturer's time-use recommendation

**B. CARTRIDGE CHANGE SCHEDULES**

OSHA has substance-specific standards that provide mandatory change out schedules. Employees exposed to any of the following contaminants at or above the OSHA Permissible Exposure Limit (PEL) shall change cartridges/canisters according to their requirements:

<b>Contaminant</b>	<b>OSHA Mandatory Cartridge Change Rules</b>
Acrylonitrile	End of service life or end of shift
Benzene	End of service life or beginning of shift
Butadiene	Every 1,2 or 4 hours based on concentration and at beginning of each shift
Formaldehyde	Cartridges every 3 hours or end of shift; canisters every 2 or 4 hours, according to (g)(2)(ii) of Formaldehyde Standard 1910.1048
Vinyl Chloride	End of service life or end of shift in which they are first used
Methylene Chloride	Canisters for emergency escape only, replace after use

Employees NOT included under OSHA's substance specific requirements shall change their cartridges/canisters according to the Program Administrator's recommendations for their department/area. **For conservative purposes, employees should change their cartridges every 8 hours of work or at the end of the shift.**

Since hazards and their concentrations continuously vary at NCI-Frederick as with other research facilities, the development of change schedules will rely on good judgement and available data. There is no OSHA-accepted method for determining a cartridge's service life when exposed to mixtures; therefore, OSHA's recognized rules of thumb and factors affecting cartridge service life are taken into consideration:

#### OSHA's Rules of Thumb

- If the chemical's boiling point is  $>70^{\circ}\text{C}$  ( $158^{\circ}\text{F}$ ) and the concentration is less than 200 ppm you can expect a service life of 8 hours at a normal work rate.
- Service life is inversely proportional to work rate.
- Reducing concentration by a factor of 10 will increase the service life by a factor of 5.
- Humidity above 85% will reduce service life by 50%.

#### Factors that Reduce Cartridge Service Life

- Exertion level (work rate)
- Cartridge variability (charcoal content, characteristics)
- Temperature
- Humidity
- Multiple Contaminants