



UNIVERSITY
of HAWAII®
MĀNOA

RESPIRATORY PROTECTION PROGRAM

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RESPIRATORY PROTECTION PROGRAM

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1.0 Introduction

It is the policy of the University of Hawaii to provide its employees with a safe and healthful working environment. Occupational exposure to harmful airborne particulates and/or gases and vapors should be controlled whenever possible by engineering and administrative controls.

The purpose of this program is to ensure the protection of all employees from respiratory hazards through the proper use of respirators. Respirators are to be used only when engineering controls (e.g. enclosure or confinement of the operation, ventilation or substitution of less toxic materials) are not feasible, while engineering controls are being installed or repaired or in emergencies. When respirators are to be used, all requirements of this document shall be met.

This program does not apply to contractors as they are responsible for providing their own respirator protection program and respirator protection equipment.

2.0 Responsibilities

2.1 Environmental Health and Safety (EHSO)

The Environmental Health and Safety Office (EHSO) is responsible for establishing and maintaining a respiratory protection program consistent with the goal of protecting University personnel. EHSO will implement a Respiratory Protection Program which is designed and organized to ensure respirators are properly selected, used and maintained by University personnel, and meets the Hawaii Occupational Safety and Health (HIOSH) respiratory protection standard.

EHSO is also responsible for evaluating those tasks for which respiratory protection is thought to be necessary, determine the degree of hazard posed by the potential exposure, determine whether engineering or administrative controls are feasible, and will specify which respiratory protection device is to be used at each task. In addition, EHSO will train personnel in the selection and use of respiratory protection devices, conduct qualitative and quantitative fit testing, and issue necessary protective devices.

2.2 Departmental Units/Supervisors

Each department shall be responsible for implementing the provisions of this program. Supervisors will ensure each employee under his or her supervision using a respirator has received medical evaluation to wear a respirator and appropriate training in its use. Supervisors will ensure the availability of appropriate respirators and parts, provide adequate storage facilities and ensure proper respirator equipment maintenance. Supervisors must be aware of tasks

requiring the use of respiratory protection, and ensure all employees in such work use the appropriate respirators at all times.

2.3 Respirator Wearer

It is the responsibility of each respirator wearer to wear his/her respirator when and where required and in the manner in which he/she was trained. Respirator wearer must report any malfunctions of the respirator to his/her supervisor immediately. The respirator wearer must guard against damage to the respirator, clean/maintain the respirator as instructed, and store the respirator in a clean, sanitary location.

2.4 Others

Personnel, such as employees, inspectors, and visitors, who must enter an area where the use of respiratory protective equipment is required, shall be provided with and use appropriate equipment, including instructions regarding use and limitations. Personnel shall be fit tested and medically qualified to wear the respirator being issued prior to entry to the site.

Contractors are required to develop and implement a respirator protection program for their employees who must enter into or work in areas where exposure to hazardous materials cannot be controlled or avoided. This program must meet all elements of the HIOSH regulations.

3.0 Issue of Respirators

Respiratory protection devices are issued by the department head and designated respirator program coordinator for the department.

Respirators are issued only to those employees who have passed the respirator medical evaluation, have been fit tested, and received appropriate training in its use.

4.0 Medical Evaluation

A qualified physician or other licensed health care professional (PLHCP) shall evaluate the medical status of any employee required to wear a respirator in accordance with HIOSH respirator medical evaluation criteria. Job tasks requiring the use of a respirator shall not be assigned until the employee has been deemed physically able to wear a respirator without undue physical or psychological risk.

The University shall not allow any employee to wear a particular type of respirator if, in the opinion of PLHCP, the employee might suffer undue physical or psychological harm due to wearing the respirator.

A determination as to whether or not an employee can wear a respirator is made initially upon employment, and re-evaluation thereafter if:

- An employee reports medical signs and symptoms that are related to ability to use a respirator;
- The PLHCP, supervisor or EHSO program manager deems it necessary; or
- A change occurs in the workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Appendix A (Medical Questionnaire) may be obtained from the supervisor prior to conducting the medical evaluation.

Based on the overall health of the individual and special medical tests as appropriate, the examining PLHCP determines whether or not the individual will be restricted from wearing respiratory protective equipment. If a medical restriction is applied, the employee, his/her supervisor, and EHSO are formally notified of the restriction indicated on the Appendix B Medical Clearance Form.

Specific medical tests and procedures will be determined by a qualified PLHCP and will be in accordance with HIOSH medical surveillance requirements.

5.0 Selection and Use of Respiratory Protective Devices

5.1 Respirator Use

Respirator protection is authorized and issued for the following personnel:

- A. Workers in areas known to have contaminant levels requiring the use of respiratory protection or in which contaminant levels requiring the use of respiratory protection may be created without warning (e.g. emergency purposes such as hazardous materials spill responses).
- B. Workers performing operations documented to be a health hazard and those unavoidably required to be in the immediate vicinity where similar levels of contaminants are generated.

- C. Workers in suspect areas or performing operations suspected of being a health hazard but for which adequate sampling data has not been obtained.

5.2 Respirator Use for Biohazards

Respirators for use in areas where biohazards are used or stored must be selected based on the review of the laboratory procedures, protocols, biological agents proposed for use, etc. The Biosafety Program will conduct a risk assessment and determine the appropriate Biosafety Level rating for the laboratory and the corresponding level of personal protective equipment required.

If employees are required to wear respirators for protection against potentially infectious aerosols in their work environment, they must be placed in a respiratory protection program and comply with all applicable provisions of the program.

5.3 Voluntary Use of Respirators

When an employee chooses to use a dust mask for comfort, and not for protection against levels of contaminants that would require respiratory protection, the employee does not need training or fit testing, but must be informed of Appendix C. If an employee chooses to use a non-disposable, tight fitting facepiece (i.e. rubber half-face) for comfort, then the employee must be placed in the University's respiratory protection program.

The department/supervisor shall authorize voluntary use of respirators as requested by all other workers on a case-by-case basis, depending on specific workplace conditions and the results of exposure evaluations.

5.4 Hazard Evaluation

The selection of a proper respirator for any given situation requires consideration of the following factors:

- Nature of Hazard

The type of hazard, physical and chemical properties, health effect, airborne concentration, permissible exposure limit (PEL), immediately-dangerous-to-life-or-health (IDLH) concentrations and warning properties.

- Characteristics of Operation

Type of operation or process, work area layout, materials used or procedure and work activities.

□ Location of Hazardous Area

Distance of safe area and escape route.

□ Respirator Use Time Period (routine, non-routine, emergency, or rescue)

□ Respirator Wearer Activity

Continuous or intermittent during the work shift, light, medium, or heavy work rate.

□ Respirator Characteristics, Capabilities, and Limitations

Table 1 in Appendix D describes some of the characteristics, capabilities and limitations of various types of respirators

□ Respirator Protection Factor

Table 2 in Appendix D shows typical respirator protection factors for different types of respirators. A respirator protection factor is a measure of the degree of protection the respirator provides.

Appendix E (Respirator Protection Worksheet) is provided for the hazard evaluation and respiratory selection.

The hazard evaluation is performed by the EHSO's Workplace Safety/Industrial Hygiene section, prior to commencing any routine or non-routine tasks requiring respiratory protection. Each department may request assistance from EHSO to assess the hazard. Periodically thereafter, but not less than every 12 months, a review of the actual and/or potential exposure is made to determine if respiratory protection continues to be required, and if so, if the previously chosen respirator still provides adequate protection.

Records of all hazard evaluations are maintained by EHSO's Occupational Health & Safety section, with copies of the evaluation also maintained by each department.

5.5 Respirator Selection

Table 3 in Appendix D shall be used to select a respirator that is appropriate for the type of protection that is needed. Conditions of use covered by these guidelines include working in oxygen-deficient atmospheres, working where levels of contaminants exceed permissible exposure levels and working in environments immediately dangerous to life and health (IDLH).

Table 4 in Appendix D shall be used in selecting the appropriate respirator for protection against asbestos. NIOSH (National Institute of Occupational Safety and Health) Certified Equipment List, and/or NIOSH Respirator Selection Decision Logic may also be used as respirator selection guides.

5.6 Identification of Respirator Cartridges and Gas Mask Canisters

Respirator cartridges and canisters are designed to protect against individual or a combination of potentially hazardous atmospheric contaminants, and are specifically labeled and color coded to indicate the type and nature of protection they provide.

The NIOSH approval label on the respirator will also specify the maximum concentration of contaminant(s) for which the cartridge or canister is approved. For example, a label may read:

“DO NOT WEAR IN ATMOSPHERE IMMEDIATELY DANGEROUS TO LIFE. MUST BE USED IN AREAS CONTAINING AT LEAST TWENTY PERCENT OXYGEN. DO NOT WEAR IN ATMOSPHERES CONTAINING MORE THAN ONE-TENTH PERCENT ORGANIC VAPORS BY VOLUME. REFER TO COMPLETE LABEL ON RESPIRATOR OR CARTRIDGE CONTAINER FOR ASSEMBLY, MAINTENANCE, AND USE.”

5.7 Warning Signs

A. Particulate Air-Purifying

When breathing difficulty is encountered with a filter respirator (due to partial clogging with increased resistance), the filter(s) must be replaced. Disposable filter respirators must be discarded.

B. Gas or Vapor Air-Purifying

If, when using a gas or vapor respirator (chemical cartridge or canister), any of the warning properties (e.g., odor, taste, eye irritation or respiratory irritation) occur, promptly leave the area and check the following:

- Proper face seal
- Damaged or missing respirator parts
- Saturated or inappropriate cartridge or canister

If no discrepancies are observed, replace the cartridge or canister. If any of the warning properties appear again, the concentration of the contaminants may have exceeded the cartridge or canister design specification. When this occurs a respirator with a higher protection factor must be used, such as an airline respirator or self-contained breathing apparatus (SCBA).

C. Service Life of Air-Purifying Respirator Canisters and Cartridges

The canisters or cartridges of air-purifying respirators are intended to be used until filter resistance precludes further use, or the chemical sorbent is extended as signified by a specific warning property, e.g., odor, taste, etc. New canisters, cartridges or filters shall always be provided when a respirator is reissued. When in doubt about the previous use of the respirator, obtain a replacement canister or cartridge.

D. Supplied Air Respirator

When using an airline respirator, leave the area immediately when the compressor failure alarm is activated or if an air pressure is sensed.

6.0 Respirator Training

Respirator users and their supervisor will receive training on the elements of the University's Respiratory Protection Program and their responsibilities under it. They will be trained on the proper selection and use, as well as the limitations of the respirator. Training also covers how to ensure a proper fit before use and how to determine when a respirator is no longer providing the protection intended.

EHSO provides training to respirator wearers in the use, maintenance, capabilities, and limitations of respirators, initially upon assignment of personnel to tasks requiring the use of respirators. Retraining is given annually thereafter.

The training program will include the following:

1. Nature and degree of respiratory hazard.

2. Respirator selection, based in the hazard and respirator capabilities and limitations.
3. Donning procedures and fit tests.
4. Care of the respirator, e.g., need for cleaning, maintenance, storage, and/or replacement.
5. Use and limitations of respirator.

No employee is allowed to wear a respirator until he/she has been trained.

The respirator training record is provided in Appendix F.

7.0 Respirator Fit Testing

Each person required to wear a negative pressure air purifying respirator shall undergo qualitative fit testing. A proper face to facepiece seal shall be obtained prior to respirator assignment and use. Air purifying respirators shall be worn when conditions prevent a good face seal; these conditions are discussed in Section 7.1.

The face to facepiece fit (positive and negative pressure tests) shall be checked by the wearer each time the respirator is donned. Detailed procedures on fit testing of air purifying respirators are contained in Appendix G.

Respirator fitting is done initially upon employment of new employees whose work requires the use of respirators or when an employee changes a job classification which requires respirator protection. Refitting is required annually and if a different model, brand, or size of respirator is worn.

Individual fit testing records are kept on each individual by each department, with records provided to EHSO Occupational Safety and Health Section. Records of respirator fit test (Appendix H) shall be kept for at least the duration of employment.

7.1 Respirator Sealing Problems

7.1.1 Facial Hair

No employee is allowed to wear a respirator, in the workplace for either routine or non-routine task if he has facial hair which comes between the sealing periphery of the facepiece and the face, or if facial hair interferes with normal functioning of the exhalation valve of the facepiece.

7.1.2 Glasses and Eye/Face Protection Devices

Proper fitting of a respirator protection device facepiece for an individual wearing correct eyeglasses or goggles, may not be established if temple bars and straps extend through the sealing edge of the facepiece. If eyeglasses, goggles, face shields or welding helmets must be worn with a respirator, they must be worn so as not to adversely affect the seal of the facepiece. If a full-facepiece is used, special prescription glasses inserts are available if needed.

7.13 Miscellaneous Sealing Problems

Scars, hollow, temples, very prominent cheekbones, deep skin creases, and lack of teeth or dentures may cause facepiece sealing problems.

8.0 Respirator Maintenance and Cleaning

8.1 Maintenance

The maintenance of respirators involves a thorough visual inspection for cleanliness and defects (i.e., cracking rubber, deterioration of straps, defective exhalation and inhalation valves, broken or cracked lenses, etc.). Worn or deteriorated parts will be replaced prior to reissue. No respirator with a known defect shall be reissued for use. No attempt shall be made to replace components, make adjustments or make repairs on any respirator beyond those recommended by the manufacturer. Under no circumstances will parts be substituted as such substitution will invalidate the approval of the respirator.

8.2 Cleaning of Respirators

All respirators in routine use shall be cleaned and sanitized on a periodic basis. Respirators used non-routinely shall be cleaned and sanitized after each use and filters and cartridges replaced. Routinely used respirators are maintained individually by the respirator wearer. Replacement cartridges and filters are obtained from the individual departments.

Cleaning and disinfection of respirators must be conducted frequently to ensure that skin-penetrating and dermatitis-causing contaminants are removed from the respirator surface. Respirators maintained for emergency use or those used by more than one person must be cleaned after each use by the user.

The following procedure is recommended for cleaning and disinfecting respirators:

- Remove and discard all used filters, cartridges or canisters.
- Remove respirator elements and valve flaps.

- Wash facepiece in warm water, about 140 degrees fahrenheit or as directed by the manufacturer. Detergents containing a bactericide are preferred. The bactericide is generally a quaternary ammonia compound. The facepiece and parts should be scrubbed with a soft brush to ensure that all foreign matter is removed from the surface contacting the wearer's face.
- If the detergent used in washing does not contain a bactericide, a disinfectant rinse must follow. Reliable disinfectants may be from some simple household solutions. Two tablespoons of chlorine bleach added to a gallon of water will produce a hypochlorite solution that disinfects respirators effectively with a simple immersion. A aqueous solution of iodine made by adding one teaspoon of tincture of iodine per gallon of water will serve as an adequate disinfectant and will not damage rubber or plastic respirator facepieces. Immersing the unit is sufficient.
- Other surfaces of the respirator facepiece covered with accumulations of paint, enamel, or lacquer may be wiped with cloth that has been soaked with an appropriate cleaning agent. If found effective, mineral spirits, turpentine or naphtha may be used; these solvents, however, will degrade the facepiece in time. After cleaning, the agent is wiped from the facepiece and then washed thoroughly. Soap and warm water is the best cleaning solution.
- An organic solvent or stripping agent should never be used for soaking respirator parts. Plastic or rubber components can be adversely affected by solvents.
- Water-based paints or enamels can be removed from the respirator parts with cloth soaked in a soap and water solution.

8.3 Replacement Parts/Filters

- Consult the manufacturer or distributor for replacement parts and filters. Manufacturers may assign their filters/cartridges specific end-of-service-life or change schedule.
- Do not attempt to remove paint, varnish, or lacquer from cartridges or filters. When these air-purifying elements contain accumulation of paint, enamel, or lacquer, they must be discarded.
- When air-purifying respirators are used for protection against gases and vapor, cartridges must be changed when the wearer has worn the cartridges for a total of eight (8) hours, whenever an increase in breathing

resistance is detected or whenever the filter has reached the manufacturer's end-of-service-life.

- Filter elements (cartridges to protect against particulates) must be changed when the wearer has worn the cartridges for a total of eight (8) hours, whenever an increase in breathing resistance is detected or whenever the filter has reached the manufacturer's end-of-service-life.

8.4 Storage

After inspection, cleaning, and any necessary minor repairs, store respirators to protect against sunlight, heat, extreme cold, excessive moisture, damaging chemicals or other contaminants. Respirators placed at stations and work areas for emergency use shall be stored in compartments built for that purpose, shall be quickly accessible at all times and will be clearly marked. Routinely used respirators, such as half-mask or full-face air-purifying respirators, shall be placed in sealable plastic bags. Respirators may be stored in such places as lockers and tool boxes only if they are first placed in carrying cases or cartons. Respirators shall be packed or stored so that the facepiece and exhalation valves will rest in a normal position and not be crushed. Emergency use respirators shall be stored in a sturdy compartment that is quickly accessible and clearly marked.

8.5 Inspection

Respirators shall be inspected as follows:

- All respirators used in routine situations shall be inspected before each use and during cleaning.
- All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use.
- Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

Respirator inspections include the following:

- A check of respirator function, tightness of connections, and the condition of various parts including, but not limited to , the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters

- Check elastomeric parts for pliability and signs of deterioration.
- Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls 90% of the manufacturer's recommended pressure level.

For Emergency Use Respirators the Additional Requirements Apply:

- Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.
- Provide this information in 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 stores as paper or electronic files. This information shall be maintained until replaced following subsequent certification.

8.6 Repair of Respirators

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

- Repairs or adjustments to respirators to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator.
- Repairs shall be made according to the manufacturer's recommendation and specifications for the type and extent of repairs to be performed.

9.0 Recordkeeping

In order to maintain surveillance on and control of the program, four sets of records are recommended:

- Hazard assessment (industrial hygiene monitoring data)
- Medical assessment and surveillance
- Training
- Respirator Care and maintenance

Copies of these records are retained by the respective departments.

10.0 Surveillance of Respirator Use

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

The respirator wearer shall leave the respirator use area when the following conditions are met or needed:

- To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use.
- If vapor or gas breakthrough is detected, if there is a change in breathing resistance, or leakage of the facepiece.
- To replace the respirator's filter, cartridge or canister.

If the employee detects vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece, the employer must replace or repair the respirator before allowing the employee to return to the work area.

11.0 Program Evaluation

Evaluations shall be conducted as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

The department will conduct an annual review and evaluation of the program. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- Appropriate respirator selection for the hazards to which the employee is exposed;
- Proper respirator use under the workplace conditions the employee encounters; and
- Proper respirator maintenance



APPENDIX A

OSHA RESPIRATOR MEDICAL EVALUATION 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:

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 & 2. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

Please complete the form, and sign and date it. When completing this form as part of a physical exam you should give the completed form to a physician or other licensed health care professional (PLHCP) performing the exam. The provider will determine if you are physically able to wear a respirator and should complete the Appendix B Medical Clearance for Respirator Use.

Part A. Section 1. Employee Information	Today's Date:
Last Name, First Name, Middle Initial:	
Job Title:	
Age: Male <input type="checkbox"/> Female <input type="checkbox"/>	Height: (ft) (in) Weight: (lbs)
Phone numbers where you can be reached by the health care professional who reviews this questionnaire. <u>Home:</u> <u>Work:</u>	
The best time to phone you at this number:	
Has your employer told you how to contact the health care professional who will review this questionnaire? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Check the type of respirator you will use (you can check more than one category): <input type="checkbox"/> N, R, or P disposal respirator (filter-mask (e.g. N95), non-cartridge type only). <input type="checkbox"/> Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).	

Have you worn a respirator? Yes <input type="checkbox"/> No <input type="checkbox"/>		
If yes, what type(s):		
Part A. Section 2. Relevant Medical History		
1. Do you <i>currently</i> smoke tobacco, or have you smoked tobacco in the last month?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2. Have you <i>ever had</i> any of the following conditions?		
a. Seizures (fits)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Diabetes (sugar disease)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Allergic reactions that interfere with your breathing	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Claustrophobia (fear of closed-in places)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Trouble smelling odors	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3. Have you <i>ever had</i> any of the following pulmonary or lung problems?		
a. Asbestosis	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Asthma	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Chronic bronchitis	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Emphysema	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Pneumonia	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f. Tuberculosis	Yes <input type="checkbox"/>	No <input type="checkbox"/>
g. Silicosis	Yes <input type="checkbox"/>	No <input type="checkbox"/>
h. Pneumothorax (collapsed lung)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
i. Lung cancer	Yes <input type="checkbox"/>	No <input type="checkbox"/>
j. Broken ribs	Yes <input type="checkbox"/>	No <input type="checkbox"/>
k. Any chest injuries or surgeries	Yes <input type="checkbox"/>	No <input type="checkbox"/>
l. Any other lung problems that you've been told about	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4. Do you <i>currently</i> have any of the following symptoms of pulmonary or lung illness?		
a. Shortness of breath	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Shortness of breath when walking fast on level ground or walking up a slight hill/incline	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Shortness of breath when walking with other people at an ordinary pace on level ground	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Have to stop for breath when walking at your own pace on level ground	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Shortness of breath when washing or dressing yourself	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f. Shortness of breath that interferes with your job	Yes <input type="checkbox"/>	No <input type="checkbox"/>
g. Coughing that produces phlegm (thick sputum)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
h. Coughing that wakes you early in the morning	Yes <input type="checkbox"/>	No <input type="checkbox"/>
i. Coughing that occurs mostly when you are lying down	Yes <input type="checkbox"/>	No <input type="checkbox"/>
j. Coughing up blood in the last month	Yes <input type="checkbox"/>	No <input type="checkbox"/>
k. Wheezing	Yes <input type="checkbox"/>	No <input type="checkbox"/>
l. Wheezing that interferes with your job	Yes <input type="checkbox"/>	No <input type="checkbox"/>
m. Chest pain when you breathe deeply	Yes <input type="checkbox"/>	No <input type="checkbox"/>
n. Any other symptoms that you think may be related to lung problems?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5. Have you <i>ever had</i> any of the following cardiovascular or heart problems?		

a. Heart attack	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Stroke	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Angina	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Heart Failure	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Swelling in your legs or feet (not caused by walking)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f. Heart arrhythmia (heart beating irregularly)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
g. High blood pressure	Yes <input type="checkbox"/>	No <input type="checkbox"/>
h. Any other heart problem that you've been told about	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6. Have you <i>ever had</i> any of the following cardiovascular or heart symptoms?		
a. Frequent pain or tightness in your chest	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Pain or tightness in your chest during physical activity	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Pain or tightness in your chest that interferes with your job	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. In the past two years, have you noticed your heart skipping or missing a beat	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Heartburn or indigestion that is not related to eating	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f. Any other symptoms that you think may be related to heart or circulation problems	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7. Do you <i>currently</i> take medication for any of the following problems?		
a. Breathing or lung problems	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Heart trouble	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Blood pressure	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Seizures (fits)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8. If you've used a respirator, have you <i>ever had</i> any of the following problems? (If you have never used a respirator, skip and go to question 9)		
a. Eye irritation	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Skin allergies or rashes	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Anxiety	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. General weakness or fatigue	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Any other problem that interferes with your use of a respirator	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9. Would you like to talk to the health care professional who will review your responses to this questionnaire?		
Yes <input type="checkbox"/> No <input type="checkbox"/>		
<i>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.</i>		
10. Have you <i>ever lost</i> vision in either eye (temporarily or permanently)?		
Yes <input type="checkbox"/> No <input type="checkbox"/>		
11. Do you <i>currently</i> have any of the following vision problems?		
a. Wear glasses	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Wear contact lenses	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Color blind	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Any other eye or vision problem	Yes <input type="checkbox"/>	No <input type="checkbox"/>
12. Have you <i>ever had</i> an injury to your ears, including a broken ear drum?		
Yes <input type="checkbox"/> No <input type="checkbox"/>		
13. Do you <i>currently</i> have any of the following hearing problems?		
a. Difficulty hearing	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Wearing a hearing aid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Any other hearing or ear problem	Yes <input type="checkbox"/>	No <input type="checkbox"/>

14. Have you ever had a back injury?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
15. Do you currently have any of the following musculoskeletal problems?		
a. Weakness in any of your arms, hands, legs, or feet	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. Back pain	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Difficulty fully moving your arms and legs	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d. Pain or stiffness when you lean forward or backward at the waist	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e. Difficulty fully moving your head up or down	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f. Difficulty fully moving your head side or side	Yes <input type="checkbox"/>	No <input type="checkbox"/>
g. Difficulty bending at your knees	Yes <input type="checkbox"/>	No <input type="checkbox"/>
h. Difficulty squatting to the ground	Yes <input type="checkbox"/>	No <input type="checkbox"/>
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
j. Any other muscle or skeletal problem that interferes with using a respirator	Yes <input type="checkbox"/>	No <input type="checkbox"/>

To the best of my knowledge, the information I have provided is true and accurate.

Employee Signature: _____ **Date:** _____

APPENDIX B



MEDICAL CLEARANCE FOR RESPIRATOR USE

Part I:

EMPLOYER:

Employee Name:

Job Title:

Date of Birth:

Supervisor's Name:

Department:

Check Type of Respirator(s) to be used:

- Air-purifying respirator (non-powered)
- Air-purifying (powered, PAPRs)
- Particulate-filtering facepiece (N95, P100)
- Atmosphere-supplying respirator (SAR, SCBA)

Level of Work Effort (check one):

- Light
- Moderate
- Heavy
- Strenuous

Extent of Usage:

- On a daily basis
- Occasionally - but more than once a week
- Rarely or for emergency situations only

Length of Time of Anticipated Effort in Hours:

Special work considerations (i.e. high places, temperature, hazardous material, protective clothing, etc., if none, state none)

Date:

Supervisor's Signature:

Part II: To be completed by the Employee

EMPLOYEE NAME:

Have you worn a respirator?

Yes No

If yes, describe any difficulties noted with respirator usage:

Date:

Employee's signature

Part III: To be completed by a Physician or licensed health care professional (PLHCP)

Class (Check one):

- No restriction on respirator use (medically cleared to use a respirator)
- Some specific use restrictions (explain below)
- No respirator use permitted (explain below)

Restrictions:

Need for a follow-up examination?

No *

Yes; state reason and date of return: _____

Date:

Examining PLHCP Signature:

*You must be reevaluated when:

1. You report medical signs or symptoms that are related to your ability to use a respirator, such as a heart condition, lung disease, or claustrophobia;
2. A physician or licensed health care professional, your supervisor, or the respirator program administrator informs your employer that you need to be reevaluated;
3. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for you to be reevaluated; or
4. A change occurs in workplace conditions that increases the burden on you while using the respirator; for example your job becomes more physically demanding, or you must wear additional protective clothing, or you must work in extreme temperatures.

APPENDIX C

VOLUNTARY USE OF RESPIRATORS

Information For Employees Using Respirators When Not Required Under the Standard

Respirators are 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, even if the amount of hazardous substances does not exceed the limits set by HIOSH standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

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

Appendix D

TABLE 1: CAPABILITIES AND LIMITATIONS OF RESPIRATORS

ATMOSPHERE-SUPPLIED RESPIRATORS

Atmosphere-supplying respirators provide protection against oxygen deficiency and toxic atmospheres. The breathing is independent of ambient atmospheric conditions.

General Limitations: Except for some air-line suits, no protection is provided against skin irritation by materials such as ammonia and hydrogen chloride, or against sorption of materials such as hydrogen cyanide, tritium, or organic phosphate pesticides through skin. Facepieces present special problems in individuals required to wear prescription lenses. Use of atmosphere-supplying respirators in atmosphere immediately dangerous to life or health is limited to specific devices under specified conditions (see Table 2).

Self-Contained Breathing Apparatus (SCBA)

The wearer carries his/her own breathing atmosphere.

Limitations: The period over which the device will provide protection is limited by the amount of air or oxygen in the apparatus, the ambient atmosphere pressure (service life or open-circuit devices are cut in half by a doubling of the atmospheric (pressure), and type of work being performed. Some SCBA devices have a short service life (less than 15 minutes) and are suitable only for escape (self-rescue) from a respirable atmosphere.

Chief limitations of SCBA devices are their weight or bulk, both limited service life, and the training required for maintenance and safe use.

Closed-Circuit SCBA:

The closed circuit operation conserves oxygen and permits longer service life at reduced weight. The negative-pressure type produces a negative pressure in the respirator inlet covering during inhalation, and this may permit inward leakage of

contaminants, whereas the positive-pressure type always maintains a positive pressure in the respiratory inlet covering and is less apt to permit inward leakage of contaminants.

Open-Circuit SCBA:

The demand type produces a negative pressure in the respiratory inlet covering during inhalation, whereas the pressure-demand type maintains a positive pressure in the respiratory inlet covering during inhalation and is less apt to permit inward leakage of contaminants.

Open-Circuit SCBA:

The demand type produces a negative pressure in the respiratory inlet covering during inhalation, whereas the pressure-demand type maintains a positive pressure in the respiratory inlet covering during inhalation and is less apt to permit inward leakage of contaminants.

Supplied-Air Respirators

The respirable air supply is not limited to the quantity the individual can carry, and the devices are lightweight and simple.

Limitations: Limited to use in atmosphere from which the wearer can escape unharmed without the aid of the respirator, except when equipped with an auxiliary self-contained air supply.

The wearer is restricted to movement by the hose and must return to a respirable atmosphere by retracting his route of entry. The hose is subject to being severed or pinched off.

Hose Mask

The inlet blower must be located and secured in a respirable atmosphere.

(a) Hose mask with blower

If the blower fails, the unit still provides protection although a negative pressure exit in the facepiece during inhalation.

(b) Hose mask without blower

Maximum hose length may restrict application of device.

Air-line Respirator (Continuous flow, Demand, and Pressure-Demand Types):

The demand type produces a negative pressure in the facepiece on inhalation, whereas continuous-flow and pressure-demand types maintain a positive pressure in the respiratory inlet covering and are less apt to permit inward leakage of contaminants.

Air-line suits may protect against atmospheres that irritate skin or that may be absorbed through the unbroken skin.

Limitation: Air-line respirators provide no protection if the air supply fails. Some contaminants such as tritium may penetrate the material of an air-line suit and limit its effectiveness.

Other contaminants such as fluorine may react chemically with the material of an air-line suit and damage it.

Combination Air-line Respirators with Auxiliary SC Air Supply

The auxiliary self-contained air supply on this type of device allows the wearer to escape from a dangerous atmosphere. This device with the auxiliary self-contained (SC) air supply is approved for escape and may be used for entry when it contains at least 15-minute auxiliary SC air supply (See Table 2).

Air-Purifying Respirators

General Limitations: Air-purifying do not protect against oxygen-deficient atmosphere nor against skin irritation by sorption through the skin of airborne contaminants.

The maximum contaminant concentration against which an air-purifying respirator will protect is determined by the design efficiency; capacity of the cartridge, canister, or filter, and the facepiece-to-face seal on the user. For gases and vapors, the maximum concentration for which the air-purifying element is designed is specified by the manufacturer or is listed on the labels of cartridges and canisters.

Non-powered air-purifying respirators will not provide the maximum design protection specified unless the facepiece or mouthpiece/nose clamp is carefully fitted to the wearer's face to prevent inward leakage. The time period over which protection is provided is dependent on the canister, cartridge, or filter type; concentration of contaminant; humidity levels in the ambient atmosphere; and the wearer's respiratory rate.

The proper type of canister cartridge, or filter must be selected for the particular atmosphere conditions. Non-powered air-purifying respirators may cause discomfort due to a noticeable resistance to inhalation. This problem is minimized in powered respirators. Respirator facepieces present special problems to individuals required to wear prescription lenses. These devices do not have advantage of being small, light and simple in operation.

Use of air-purifying respirators in atmospheres immediately dangerous to life or health is limited to specific devices under specified conditions (See Table 2).

Vapor-and-Gas Removing Respirators

Limitations: No protection is provided against particulate contaminants. A rise in canister or cartridge temperature indicates that a gas or vapor is being removed from the inspired air.

An uncomfortable high temperature indicates a high concentration of gas or vapor and requires an immediate return of fresh air.

Use should be avoided in atmosphere where the contaminant(s) lack sufficient warning properties (i.e. odor, Vapor-and-gas removing respirators are not approved for contaminants that lack adequate warning properties.

Not for use in atmospheres immediately dangerous to life or health unless the device is a powered-type respirator with escape provisions (see Table 2).

Full Facepiece Respirator:

Provides protection against eye irritation in addition to respiratory protection.

Quarter-Mask and Half-Mask facepiece Respirators:

A fabric covering (facelet) available from some manufacturer shall not be used unless approved for use with respirator.

Mouthpiece Respirator:

Shall be used only for escape applications. Mouth breathing prevents detection of contaminant by odor. Nose clamp must be securely in place to prevent nasal breathing.

A small lightweight device that can be donned quickly.

Particulate-Removing Respirators

Limitations: Protection against non-volatile particles only. No protection against gases and vapors.

Not for use in atmospheres immediately dangerous to life or health unless the device is a powered-type respirator with escape provisions (See Table 2).

Full Facepiece Respirator:

Provides protection against eye irritation in addition to respiratory protection.

Quarter-Mask and Half-Mask Facepiece:

A fabric covering (facelet) available from some manufacturers shall not be used unless approved for use with respirator.

Mouthpiece Respirator:

Shall be used only for escape applications. Mouth breathing prevents detection of contaminant by odor. Nose clamp must be securely in place to prevent nasal breathing.

A small, lightweight device that can be donned quickly.

Combination Particulate-and-Vapor-and Gas –Removing Respirators

The advantages and disadvantages expressed above of the mode of operation being used will govern. The mode with the greater limitations (air-purifying mode) will mainly determine the overall capabilities and limitations of the respirator since the wearer may for some reason fail to change the mode of operation even though conditions would require such a change.

Note: Table 1 was reproduced from ANSI Z88.2-1980 (American National Standard Practices for Respiratory Protection).

Table 2: Respirator Protection Factors

Respirator Type	Permitted for Use in Oxygen Deficient Atmosphere	Permitted for Use in Immediately Dangerous to Life or Health Atmosphere	Respirator Protection Factor – Qualitative Test	Respirator Protection Factor-Quantitative Test
Particulate filter, quarter mask or half-mask facepiece (b,c)	No	No	10	As measured in each person with a max. of 100
Vapor-or-gas-removing quarter mask or half-mask facepiece (c)	No	No	10 or max use limit of cartridge or canister, whichever is less	Same as above or max. use cartridge or canister, whichever is less (g,h)
Combination particulate filter and vapor-or-gas-	No	No	10 or max. use limit of cartridge or	Same as previous respirator (g,h)

removing, quarter-mask or half-mask facepiece (b,c)			canister, whichever is less	
Particulate-filter, full facepiece (b)	No	No	100	As measured on each person with max. of 100 if dust, fume, or mist filter is used, or maximum of 1000 if high-efficiency filter is used.
Vapor-or-gas-removing full facepiece	No	No	100 or max use limit of cartridge or canister for vapor or gas, whichever is less	As measured on each person with max. of 1000 or max. use limit of cartridge or canister for vapor or gas, whichever is less (g,h)
Combination particulate filter and vapor-or-gas removing, full facepiece (b)	No	No	100 or max use limit of cartridge for vapor or gas whichever is less	As measured on each person with max. of 1000 if dust, fume or mist filter is used and max. of 1000 if high efficiency filter is used or max. use limit of cartridge or canister for vapor or gas whichever is less (g,h)
Powered particulate filter, any respiratory inlet covering (,c,d)	No	No (yes, if escape provisions are provided)	N/A; no test are required to positive operation of respirator. The max. protection factor is 100 if dust, fume or mist filter is used and 1000 if high efficiency filter is used.	N/A; no test are required to positive operation of respirator. The max. protection factor is 100 if dust, fume or mist filter is used and 1000 if high efficiency filter is used.

Powered vapor-or-gas removing, any respirator inlet covering (c,d)	No	No (yes, if escape provisions are provided)	N/A; no tests are required due to positive pressure operation of respirator. The maximum protection factor is 3000, or max. use limit of cartridge or canister for vapor or gas, whichever is less (g,h)	N/A; no tests are required due to positive pressure operation of respirator. The maximum protection factor is 3000, or max. use limit of cartridge or canister for vapor or gas, whichever is less (g,h)
Powered combination particulate-filter and vapor-or-gas-removing, any respirator inlet covering (b,c,d)	No	No (yes, if escape provisions are provided)	N/A; no tests are required due to positive pressure operation of respirator. The maximum protection factor is 100 if dust, fume, or mist filter is used and 3000 if high-efficiency filter is used, or maximum use limit of cartridge or canister for vapor or gas, whichever is less (g,h)	N/A; no tests are required due to positive pressure operation of respirator. The maximum protection factor is 100 if dust, fume, or mist filter is used and 3000 if high-efficiency filter is used, or maximum use limit of cartridge or canister for vapor or gas, whichever is less (g,h)
Airline, demand, quarter mask or half-mask (facepiece, with or without escape provisions). (c,e)	Yes	No	10	As measured on each person, but limited to the use of respirator in concentrations of contaminants below the immediately-dangerous to life-or-health (IDLH) values
Airline demand, full facepiece with or without escape provisions	Yes	No	100	(same as respirator type)
Airline, continuous flow or pressure	Yes	No	N/A; no tests are required due to	N/A; no tests are required due to

demand type, any facepiece without escape provisions (e)			positive-pressure operation of respirator. The protection factor provided by the respirator is limited to use of respirator in concentration of contamination below (IDLH) values	positive-pressure operation of respirator. The protection factor provided by the respirator is limited to use of respirator in concentration of contamination below (IDLH) values
Airline, continuous flow or pressure-demand type, any facepiece, with escape provisions (c,e)	Yes	Yes	N/A; no tests are required due to positive-pressure operation of respirator. The maximum protection is 10,000 plus (f)	N/A; no tests are required due to positive-pressure operation of respirator. The maximum protection is 10,000 plus (f)
Airline, continuous flow helmet, hood or suit without escape (e) provisions	Yes	No	N/A; no tests are required due to positive-pressure operation of respirator. The protection factor provided by the respirator is limited to the use of the respirator in concentrations of contaminants below the immediately-dangerous –to-life-or-health (IDLH) values.	N/A; no tests are required due to positive-pressure operation of respirator. The protection factor provided by the respirator is limited to the use of the respirator in concentrations of contaminants below the immediately dangerous-to-life-or health (IDLH) values.
Airline, continuous flow helmet, hood or suit with escape provisions (e)	Yes	Yes	N/A; no tests are required due to positive-pressure operation of respirator. The maximum protection factor is 10000 plus (f)	N/A; no tests are required due to positive-pressure operation of respirator. The maximum protection factor is 10000 plus (f)

Hose mask, with or without blower, full facepiece	Yes	No	10	As measured on each person, but limited to the use of the respirator in concentrations of contaminants below IDLH values.
Self-contained breathing apparatus, demand-type-open circuit or negative-pressure type closed-circuit quarter mask or half-mask facepiece (e)	Yes	No	10	As measured on each person, but limited to the use of the respirator in concentrations of contaminants below the IDLH values
Self-contained breathing apparatus, demand type open circuit or negative pressure type closed-circuit, full facepiece or mouthpiece/nose clamp (e)	Yes, if respirator used for mine rescue and mine recovery operation	No (yes, if respirator is used for mine rescue and mine recovery operations)	100	As measured on each person but limited to the use of the respirator in concentrations of contaminants below the IDLH values, except when the respirator is used for mine rescue and mine recovery operations
Self-contained breathing apparatus, pressure-demand type open circuit or positive pressure-type closed circuit, quarter mask or half-mask facepiece, full-facepiece, or mouthpiece/nose clamp (e)	Yes	Yes	N/A; no tests are required due to positive-pressure operation of respirator. The maximum protection factor is 10,000 plus (f)	N/A; no tests are required due to positive-pressure operation of respirator. The maximum protection factor is 10,000 plus (f)
Combination Respirator not listed		The type and mode of operation having the lowest respirator protection factor shall be applied to the combination respirator.		

N/A means not applicable since a respirator-fitting test is not carried out.

a) A respirator protection factor is a measure of the degree of protection provided by the respirator wearer. Multiplying the permissible time-weighted average concentration or the permissible ceiling concentration, whichever is applicable, for toxic substance, or the maximum permissible airborne concentration for a radionuclide, by a protection factor assigned to a respirator gives the maximum concentration of the hazardous substances for which the respirator can be used. Limitations of filters, cartridges and canisters used in air-purifying respirator shall be considered in determining protection factors.

b) When a respirator is used for protection against airborne particulate matter having a permissible time-weighted average concentration less than 0.05 milligram particulate matter per cubic meter of air or less than 2 million particles per cubic foot of air, or for protection against airborne radionuclide particulate matter, the respirator shall be equipped with high-efficiency filter(s).

c) If the air contaminant causes eye irritation, the wearer of a respirator equipped with a quarter mask or half-mask facepiece or mouthpiece and nose clamp shall be permitted to use a protective goggles or use a respirator equipped with a full facepiece.

d) If the powered air-purifying respirator is equipped with a facepiece, the escape provision means that the wearer is able to breathe through the filter, cartridge or canister and through the pump. If the powered air-purifying respirator is equipped with a helmet, hood or suit, the escape provision shall be an auxiliary self-contained supply of respirable air.

e) The escape provision shall be an auxiliary self-contained supply of respirable air.

f) The protection factor measurement exceeds the limit of sensitivity of the test apparatus. Therefore, the respirator has been classified for use in atmospheres having unknown concentration of contaminants.

g) The service life of a vapor-or-gas-removing cartridge or canister depends on the specific vapor or gas, the concentration of the vapor or gas in air, the temperature and humidity of the air, the type and quantity of the sorbent in the cartridges or canister, and the activity of the respirator wearer. Cartridges and canister may provide only very short service lives for certain vapors and gases. Vapor/gas service life testing is recommended to ensure that cartridges and canisters provide adequate service lives. Reference should be made to published reports which gave vapor/gas life data for cartridge and canisters.

h) Vapor and gas removing respirators are not approved for contaminants that lack adequate warning properties of odor, irritation, or taste at concentrations in air or above the permissible exposure limits.

Note: Respirator protection factor for an air-purifying respirator equipped with a mouthpiece/nose clamp form of respiratory-inlet covering are not given, since such respirators are approved only for escape purposes.

TABLE 3: SELECTION OF RESPIRATORS

I. These respirators are permitted for use in an oxygen-deficient atmosphere where the level of contaminants exceed the PEL.

<p>Not Immediately dangerous to life or health (Oxygen concentration above 16.0% but below 19.5%)</p>	<ol style="list-style-type: none"> 1. Air-line, demand, quarter or half-mask facepiece, with or without escape provisions. 2. Air-line, demand, full facepiece, with or without escape provisions. 3. Air-line, continuous-flow or pressure-demand type, and facepiece without escape provisions. 4. Air-line, continuous-flow, helmet hood, or suit, without escape provisions. 5. Hose mask, with or without blower, full-facepiece. 6. Self-contained breathing apparatus, demand-type open circuit or negative pressure-type closed circuit, quarter or half-mask facepiece (a). 7. Self-contained breathing apparatus, demand-type open circuit or negative pressure type closed circuit, full facepiece or mouthpiece/nose clamp (a). 8. Air-purifying, half-mask, or full facepiece respirator with chemical canister and/or appropriate filter.
<p>Immediately dangerous to life or health (Oxygen Concentration below 16%)</p>	<ol style="list-style-type: none"> 1. Air-line, continuous-flow or pressure demand type, and facepiece with escape provisions. 2. Air-line, continuous flow, helmet, hood or suit, with escape provisions. 3. Self-contained breathing apparatus, pressure demand type open-circuit or positive pressure type closed-circuit, quarter or half-mask, full facepiece, or mouthpiece/nose clamp.

II. These respirators are permitted for use when the levels of contaminants (gas,vapor, or particulates) exceed the PEL and IDLH conditions exist.

1. Air-line, continuous-flow or pressure-demand type, any facepiece, with escape provisions (a).
2. Air-line, continuous-flow, helmet, hood or suit, with escape provisions (a).
3. Self-contained breathing apparatus, pressure-demand type open-circuit or positive pressure-type closed circuit, quarter or hlf-mask, full facepiece, or mouthpiece/nose clamps.
4. Powered particulate-filter, any respiratory-inlet covering (bed).l
5. Powered vapor-or-gas-removing, any respiratory-inlet covering.
6. Powered combination particulate-filter and vapor-or-gas-removing, any respiratory-inlet covering (bed).

Notes on Table 3

- (i) For the purpose of this part, “immediately dangerous to life or health” (IDLH) is defined a condition that either poses an immediate threat to life and health or an immediate threat of severe exposure to contaminants, such as radioactive materials which are likely to have adverse delayed effects on health.
- (ii) The escape provision shall be an auxiliary self-contained supply of respirable air of sufficient capacity.
- (iii) Small letter (a) means if the air contaminant causes eye irritation, the wearer of a respirator equipped with a quarter or half-mask or mouthpiece/nose clamp shall be permitted to use either a protective goggle or a respirator equipped with a full facepiece;
- (iv) Small letter (b) means when the respirator is used for protection against airborne particulate matter having a permissible time-weighted average concentration less than 0.05 milligram particulate matter per cubic meter of air or less than 2 million particulate per cubic foot of air, or for protection against radionuclide particulate matter, the respirator shall be equipped with a high-efficiency filter(s);
- (v) Small letter (c) means the respirator is permitted only if escape provisions are provided; and

- (vi) Small letter (d) means if the powered air-purifying respirator is equipped with a facepiece, the escape provisions means the wearer is able to breathe through the filter, cartridge, or canister and through the pump. If the powered air-purifying respirator is equipped with a helmet, hood, or suit, the escape provisions shall be an auxiliary self-contained supply of respirable air.

**TABLE 4: RESPIRATORY PROTECTION GUIDE
FOR ASBESTOS CONCENTRATION**

The following guide has been developed from current HIOSH regulations to assist in determining the type of respiratory protection needed to various levels of asbestos exposure.

Airborne Asbestos Concentration	Required Respiratory Protection
Not in excess of 2 fibers/cc	Half-mask respirator with HEPA filter
Not in excess of 10 fibers/cc	Full facepiece respirator with HEPA filter
Not in excess of 20 fibers/cc	Powered air-purifying respirator with HEPA filters. Supplied-air respirator with continuous flow
Not in excess of 200 fibers/cc	Full facepiece supplied-air pressure demand respirator
Greater than 200 fiber/cc or unknown concentration	Full facepiece supplied –air pressure demand respirator with auxiliary escape device

APPENDIX E

RESPIRATOR SELECTION WORKSHEET

1. Material
 - A. Chemical Name _____
 - B. Trade Name _____
 - C. Formula _____
 - D. Allowable Concentration Limits, TLV or PEL:
 - (1) HIOSH 12-202-4 _____
 - (2) Current ACGIH _____
 - (3) Short-term Exposure Limit (STEL) _____
 - (4) Other limits _____
2. Form in which it will be used
 - A. ___ liquid B. ___ solid C. ___ gaseous
 - D. If gaseous, is it an ___ organic vapor, ___ acid gas or ___ other
3. Maximum expected concentration
 - A. ___ parts per million (ppm) B. ___ milligram per cubic meter (mg/cm³)
 - C. Duration of exposure to maximum expected concentration _____
4. Will material be heated
 - A. ___ Yes B. ___ No C. If so, to what temperature _____
5. What is the odor threshold of the material? _____
6. At what concentration is the material considered to be immediately dangerous to life or health? _____

APPENDIX E Continued

7. Can the substance be absorbed through the skin? _____
8. Is the substance an irritant to the eyes? ___Yes ___No
Is the substance an irritant to the respiratory tract? ___Yes ___No
Is the substance an irritant to the skin? ___Yes ___No
9. At what concentration is the substance an irritant? _____
10. If the substance is known to be flammable, which are the lower and upper flammable limits in percent by volume? _____
11. What is the vapor pressure of the material? _____
12. Will the material be mixed with other chemicals? ___Yes ___No
If so, give details _____
13. Is there any possibility of oxygen deficiency? ___Yes ___No
14. Can good ventilation in the area be maintained? ___Yes ___No
15. Will the exposure be continuous? ___Yes ___No
16. Will the respiratory device be used for routine exposure? ___Yes ___No
Will the respiratory device be used as an escape device? ___Yes ___No
Will the respiratory device be used as an emergency
re-entry device? ___Yes ___No
17. Provide as much further detail as possible concerning exposure conditions.

*Note: This worksheet is a modification of Mine Safety Appliances Bulletin 1000- 16, and acknowledgement is hereby given to MSA for the original idea.

APPENDIX F

RESPIRATOR PROTECTION TRAINING RECORD

This is to certify that the following individuals were trained at a minimum on the following elements of the respirator protection program.

- University of Hawaii Policy
- Respirator Protection Regulations
- Proper Respirator Protection
- Limitations of Respirators
- Proper Use and Fitting
- Proper Maintenance

Date: _____

Department: _____

Name (Please Print)	Signature
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
INSTRUCTOR'S SIGNATURE:	

APPENDIX G

QUALITATIVE FIT TEST PROCEDURE

The following is the negative pressure, positive pressure, and qualitative fit test protocol:

A. Respiratory Selection

1. The test subject shall be allowed to pick the most comfortable respirators, including respirators of various sizes from different manufacturers. The selection shall include various sizes of elastomeric half facepieces , from at least two manufacturers. Each respirator shall be equipped with a combination of high-efficiency particulate air (HEPA) and acid-gas cartridges.
2. The selection process shall be conducted in a room separate from the fit-test room to prevent odor fatigue. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine a “comfortable” respirator. This instruction may not constitute the subject’s formal training on respirator use , as it is only a review.
3. The more comfortable facepiece are noted; the most comfortable mask is donned and worn at least five minutes to assess comfort. All donning and adjustments of the facepiece shall be performed by the test subject without the assistance from the test conductor or other person.
4. Assessment of the comfort shall include reviewing the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
 - Positioning of mask on nose
 - Room for eye protection

5. The following criteria shall be used to help determine the adequacy of the respirator fit:
 - Chin properly placed
 - Strap tension
 - Fit across nose bridge
 - Distance from nose to chin
 - Tendency to slip
 - Self-observation in mirror
6. The test subject shall conduct the conventional negative-and – positive fit checks (Section B and C) before the irritant smoke test is conducted. The subject shall be told to “seat” the mask by rapidly moving the head from side-to-side and up and down, while taking a few deep breaths.

B. Negative Pressure Tests

For this test, the user closes off the inlet of the cartridges or filters by covering the palms or squeezing the breathing tube so it does not allow air to pass; inhales gently so that the facepiece collapses slightly; and holds his/her breath for about 10 seconds.

If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator probably fits tightly enough. This test, of course, can only be used on respirators with tight fitting pressure modifying the facepiece seal and causing false results.

- C. This test is very similar in principle to the negative pressure test. It is conducted by closing off/covering the exhalation valve and exhaling gently into the facepiece. The respirator fit is considered acceptable if slight positive pressure can be built up inside the facepiece without the evidence of outward leakage around the facepiece. For some respirators, test

required that the wearer remove the exhalation valve cover. This removal often disturbs the respirator fit if not done before the respirator is put on. This test is easy for respirators whose valve cover has a single small port that can be closed by the palm or finger.

D. Fit Test

1. The test subject shall be allowed to smell a weak concentration of the irritant smoke to familiarize the subject with the characteristic odor.
2. The test subject shall properly don the respirator selected as above, and wear it for at least 10 minutes before starting the test.
3. The test conductor shall review this protocol with the test subject before testing.
4. The test subject shall perform the conventional positive-pressure and negative-pressure fit tests (see HIOSH 64.1 Fit check appendix). Failure of either check shall be cause to select an alternate respirator.
5. Break both ends of a stannic chloride smoke tube. Attach a short length of tubing to an end of the smoke tube. Attach the other end of the smoke tube to a low pressure air pump set to deliver 200 milliliters per minute or to an aspirator squeeze bulb.
6. Advise the test subject that the smoke can be irritating and to keep the eyes closed while the test is performed.
7. The test conductor shall direct the stream of irritant smoke from the tube towards the face seal area of the test subject. The person conducting the test shall begin with the tube at least 12 inches from the facepiece and gradually move to within one inch, moving around the whole perimeter of the mask.

8. The test subject shall be instructed to do the following exercises while the respirator is being challenged by the smoke. Each exercise shall be performed for one minute.
- a. Breathe normally.
 - b. Breathe deeply. Be certain breaths are deep and regular.
 - c. Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against shoulder.
 - d. Nod head up and down. Be certain motions are complete and made every second. Inhale when head is in the full-up position (looking towards the ceiling). Do not bump the respirator against the chest.
 - e. Talk aloud and slowly for several minutes. The following paragraph is called the "Rainbow Passage". Reading it will result in a wide range of facial movement and thus, be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.

RAINBOW PASSAGE

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch, with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for a pot of gold at the end of the rainbow.

- f. Jog in place.

g. Breathe normally

9. The test subject shall indicate to the test conductor if the irritant smoke is detected, the test conductor shall stop the test. In this case, the tested respirator is rejected and another respirator shall be selected.
10. Each test subject passing the smoke test (i.e., without detecting smoke) shall be given a sensitivity check of smoke from the same tube to determine if the test subject reacts to the smoke. Failure to evoke a response shall void the fit test.
11. Steps 4,9 and 10 of this fit test protocol shall be performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the test agents.
12. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.
13. If hair growth or apparel interferes with a satisfactory fit, they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as a powered air-purifying respirator, supplied air respirator or self-contained breathing apparatus.
14. If a test subject exhibits difficulty in breathing during the tests, he or she shall be referred to a physician trained in respirator disease or pulmonary medicine to determine whether the test subject can wear a respirator while performing his or her duties.
15. Qualitative fit testing shall be repeated at least once a year or more often if required under another standard.

16. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has:
 - (a) A weight change of 20 pounds or more
 - (b) Significant facial scarring in the area of the facepiece seal
 - (c) Significant dental changes (i.e., multiple extractions without prosthesis or acquiring dentures)
 - (d) Reconstructive or cosmetic surgery
 - (e) Any other condition that may interfere with facepiece sealing

APPENDIX H
RESPIRATOR FIT TEST RECORD

Employee Name: _____ Date: _____

Respirator Brand/Model # _____

Respirator Type: _____

Respirator Size: _____

Fit test results: Irritant smoke No fit Fit
 Bitrex Solution
 Sweet Solution

Comments:

Signature of Respirator Fit Tester

Date

*Fit testing shall be done prior to initial use of the respirator, whenever a different respirator facepiece (style, size, model or make) is used, any changes in physical condition that could affect respirator fit, (including, but not limited to, facial scarring, dental changes, cosmetic surgery, or obvious change in body weight) and at least annually thereafter.