Environmental Health and Safety Department

RESPIRATORY PROTECTION PROGRAM

December 2012
President's Environmental Health and Safety Statement of Commitment

The University of Texas at Austin is committed to protecting the health and welfare of students, faculty, staff and visitors, as well as the environment. Together we must maintain a healthy and safe campus and foster a culture of safety throughout the university.

Environmental health and safety (EHS) is a shared responsibility. All members of the university should recognize and work to reduce injuries and minimize adverse environmental impacts. It is essential that deans, directors, department heads, and faculty and staff supervisors lead this effort. Employees are to take an active part in their own safety and the safety of those around them. This includes understanding and complying with EHS requirements, reporting all incidents and accidents, completing all required training, and taking personal responsibility for a safe and healthy campus.

With this Statement, I hereby reaffirm my support for the following EHS principles:

- prevent or mitigate human or economic losses arising from accidents, adverse occupational exposures and environmental events;
- build EHS considerations into all phases of operations including facility design and construction, research and teaching;
- achieve and maintain compliance with EHS laws and regulations; and
- continually improve our EHS performance by adopting best practices.

This commitment also recognizes and promises to respond to legitimate community concerns about EHS and to provide appropriate and timely information in response to questions about EHS issues.

The EHS office has been charged with developing innovative and responsible programs and procedures to support this commitment including periodic assessments to review performance and track corrective actions. For questions or assistance, contact the EHS office.

William Powers, Jr.
President

9/26/11

Date
1.0 Purpose and Applicability

The purpose of this Program Overview is to ensure that University employees who are required to wear respiratory protection due to the nature of their work are provided with appropriate equipment and training and participate in a formal protection program.

2.0 Definitions

2.1 "Personal Protective Equipment (PPE)" is defined as respiratory protective equipment that is worn by the user to mitigate or preclude exposure to harmful contaminants through inhalation including:

- Filtering Facepiece Respirator, e.g. dust masks, disposable N95 or N99 respirators;
- Air Purifying Respirator (APR), e.g. dual or single cartridge half-mask and full-face APRs, gas masks, powered air purifying respirators (PAPR);
- Air Supplying Respirator (ASR), e.g., supplied air respirators and self-contained breathing apparatus (SCBA).

2.2 "TWA", time weighted average, is defined as the amount of contaminant that an employee can be exposed to for eight hours a day, forty hours work week.

2.3 "PEL", permissible exposure limit, is defined as the level of air contaminants that represents an acceptable exposure level generally expressed as 8-hour time-weighted average concentrations.

2.4 "Airborne contaminants" are defined as any chemical or substance that has the ability to pose adverse health effects on otherwise healthy individuals. For more information see the University Respiratory Protection Plan.

2.5 "Employee" is defined as any University faculty, staff, as well as a visiting scholar or researcher.

3.0 Roles and Responsibilities

3.1 Environmental Health & Safety (EHS), along with department Safety Coordinators, has overall responsibility for the program administration including the selection of proper respiratory protection for each employee. EHS will also conduct periodic evaluations of the workplace necessary to ensure that this program is being effectively implemented.
3.2 **HealthPoint Occupational Health Program (OHP)**, or their designee, is responsible for implementing and overseeing the medical clearance requirements and all respirator fit tests necessary to protect employee health.

3.3 Each department and contractor is responsible for purchasing and maintaining their own respiratory PPE, as recommended by EHS or their department Safety Coordinator. The department will be responsible for notifying OHP of its employees that may be required to participate in the respiratory protection program. Each supervisor is responsible for evaluating the respiratory hazard in their work area. Supervisors can request assistance from EHS to assess potential air contaminants or inhalation hazards. Supervisors are responsible for ensuring that their employees have completed all necessary medical evaluations, fit testing, and training requirements.

3.4 Employees are responsible for complying with all appropriate guidance as to when to wear respiratory protection, completing any University or department required training, and for scheduling and completing all required medical evaluations and fit tests associated with areas that may have contaminants in excess of the TWA or PEL. Employees are also responsible for:

- contacting their supervisors and OHP should they experience any physical or mental health condition that may adversely affect their ability to wear a respirator or their ability to form a proper face seal.
- inspecting their respirators and maintaining them in good working order.

4.0 Program Elements

4.1 **Risk Assessment**
EHS, in conjunction with department Safety Coordinators, will determine the need for respiratory protection. This will be accomplished by review of job descriptions, task analyses, industrial hygiene sampling, institutional knowledge, or surrogate data from similar departments or industries.

4.2 **Engineering Controls**
Should it be determined that employees or departments have employee exposures greater than the TWA or PEL for contaminants, whichever is most conservative, engineering controls will be investigated first to determine the feasibility of designing out the exposure. Should engineering controls be determined as infeasible, respiratory protection, with the adequate protection factor to reduce the exposure, will be required.

4.3 **Medical Evaluation**
Any and all University employees that work in areas with contaminants above the TWA or PEL and that are required to wear a respirator will have an initial medical evaluation to determine their ability to safely wear a respirator. The frequency of subsequent medical evaluations will depend on the type of respirator worn, changes in the job environment that impacts the type of respirator required and/or if there are any alterations to the employee’s physical condition that could adversely affect their ability to either wear a respirator or to form a proper face-to-
respirator seal. In general, an updated medical evaluation is performed every three (3) years for filtering facepiece respirators and APRs and annually for ASRs, including SCBA units.

4.4 Fit Testing
Any and all University employees that work in areas with contaminants above the TWA or PEL and that are required to wear a tight fitting respirator will have an initial respirator fit test after completing a medical evaluation and obtaining medical clearance.

Annual fit testing is required for half and full facepiece APRs and ASRs, including SCBA units. Disposable filtering facepiece respirators, i.e. N95s, do not require annual fit testing.

4.5 Training
EHS, or departmental Safety Coordinators will provide training on the use, maintenance, and limitations of respiratory protection to all University employees who are required to wear respiratory protection while performing work for the University. Training will required at a minimum initially upon entrance into the Respiratory Protection Program and every three years thereafter.

4.6 Recordkeeping
Departments must maintain a current roster of employees required to wear respiratory protection. OHP will be the repository for all medical evaluations and fit testing records. EHS will track employee training.

4.7 Voluntary Use of Respirators
If the department, in coordination with EHS, determines that an employee is not required to wear a respirator but the employee requests to wear a filtering face piece respirator voluntarily, the department will provide to the employee a copy of “Information for Employees Using Respirators When Not Required” which can be found in the University Respiratory Protection Plan. When not required by working conditions, use of half or full-face piece APRs and ASRs including SCBA units is not permitted. Employees who voluntarily wear disposable filtering face piece respiratory protection, i.e. dusk masks or N95 respirators, are not subject to the medical evaluation, fit testing, and formal training.

4.8 Respiratory Protection Plan
The written University Plan describes how the Respiratory Protection Program is carried out. It is available on the EHS web page under Campus & Occupational Safety section.

5.0 Program Review
EHS and OHP will jointly conduct a program review and evaluation at least every two years and make revisions and update that will promote continuous improvement. For further details please consult the EHS Department.
6.0 Key References and Resources

For further information and description of similar programs see the following links.

- Iowa State University [http://www.ohs.iastate.edu/publications/manuals/respirator.pdf]
- University of Florida [http://www.ohs.ufl.edu/General/resppol.pdf]

For more information consult the University's Respiratory Protection Plan. Questions on this program should be directed to EHS or departmental Safety Coordinator.

Dr. Bob Harkins, Associate Vice President-Campus Safety and Security

Dr. Pat Clubb, Vice President-University Operations

Dr. Juan Sanchez, Vice President for Research
This Plan was developed by EHS in collaboration with safety professionals from the following departments Utilities and Energy Management, Facilities Services, the Division of Housing and Food Services, the HealthPoint Occupational Health Program, and the Office of Research Support.

Peter Schneider, Director, Environmental Health and Safety

Date 12/18/12
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### Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienist</td>
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<td>AIHA</td>
<td>American Industrial Hygiene Association</td>
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<tr>
<td>AL</td>
<td>Action Level</td>
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<tr>
<td>APF</td>
<td>Assigned Protection Factor</td>
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<td>APR</td>
<td>Air Purifying Respirator</td>
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<tr>
<td>ASR</td>
<td>Air Supplying Respirator</td>
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<tr>
<td>CBR</td>
<td>Chemical, Biological, and Radiological</td>
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<tr>
<td>CDC</td>
<td>Centers for Disease Control &amp; Prevention</td>
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<tr>
<td>CFM</td>
<td>Cubic Feet per Minute</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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<tr>
<td>EHS</td>
<td>The University of Texas Environmental Health and Safety Office</td>
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<td>EPA</td>
<td>United States Environmental Protection Agency</td>
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<tr>
<td>EPF</td>
<td>Effective Protection Factor</td>
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<tr>
<td>ESLI</td>
<td>End-of Service-Life Indicator</td>
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<tr>
<td>FR</td>
<td>Federal Register</td>
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<tr>
<td>HEPA</td>
<td>High Efficiency Particulate Air</td>
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<tr>
<td>IDLH</td>
<td>Immediately Dangerous to Life and Health</td>
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<td>MSDS</td>
<td>Material Safety Data Sheets</td>
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<td>MSHA</td>
<td>Mine Safety and Health Administration</td>
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<td>MUC</td>
<td>Maximum Use Concentration</td>
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<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health</td>
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<td>OEL</td>
<td>Occupational Exposure Limits</td>
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<td>OHP</td>
<td>Occupational Health Program</td>
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<td>OSHA</td>
<td>United States Occupational Health and Safety Administration</td>
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<td>PAPR</td>
<td>Powered Air Purifying Respirator</td>
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<td>PEL</td>
<td>Permissible Exposure Limit</td>
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<tr>
<td>PLHCP</td>
<td>Physician or Other Licensed Health Care Professional</td>
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<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>QLFT</td>
<td>Qualitative Fit Test</td>
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<tr>
<td>QNFT</td>
<td>Quantitative Fit Test</td>
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<td>REL</td>
<td>Recommended Exposure Limit</td>
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<td>RPE</td>
<td>Respiratory Protection Equipment</td>
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<td>RPP</td>
<td>Respiratory Protection Program</td>
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<td>SAR</td>
<td>Supplied Air Respirator</td>
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<td>SCBA</td>
<td>Self-Contained Breathing Apparatus</td>
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<td>SOP</td>
<td>Standard Operating Procedures</td>
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<tr>
<td>STEL</td>
<td>Short Term Exposure Limit</td>
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<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
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<tr>
<td>TWA</td>
<td>Time Weighted Average</td>
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<td>UT</td>
<td>The University of Texas at Austin</td>
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1.0 INTRODUCTION

1.1 Purpose & Applicability

The University's Respiratory Protection Program (RPP) applies to all The University of Texas at Austin facilities at all locations and to all employees who are required to wear respiratory protection due to the nature of their work for the University.

This program applies to all University workers requiring respiratory protection devices in working environments where permissible exposure limits of respiratory hazards are exceeded.

These procedures apply to all University faculty and staff. Non-University personnel working at The University of Texas at Austin must observe procedures that are equivalent to or exceed the requirements of The University Respiratory Protection Program.

1.2 Objectives

The University uses respiratory protection when effective engineering and/or administrative controls are not feasible, or while they are being implemented.

The objectives of the Respiratory Protection Program are to:

- Describe an evaluation process to determine atmospheric hazards;
- Describe control measures to reduce employee exposures to hazardous or potentially hazardous atmospheres;
- Reduce employee exposures to below acceptable published limits through the use of personal respiratory protective devices;
- Provide the right resources for the evaluation of the appropriate level of respiratory protection for affected employees;

2.0 EXPOSURE LIMITS

Hazard evaluations compare air contaminant levels with airborne exposure limits established by governmental and advisory organizations. The University will take steps to ensure that employees are not exposed to airborne exposure levels above action levels.
3.0 ROLES AND RESPONSIBILITIES

3.1 Environmental Health and Safety (EHS) Department

EHS has overall responsibility for the program including recommending engineering, administrative control measures, and the type of respiratory protection required to lower exposure to below action levels. EHS will also provide employee training, may conduct periodic review of the program and program elements, and will conduct respiratory assessments.

EHS may use criteria established by a variety of sources. Established criteria sources include but are not limited to NIOSH RELs, ACGIH, OSHA, surrogate data, or benchmarked standards.

3.2 Individual Departments and Contractors

Each individual department and contractor is responsible for purchasing and maintaining respiratory protection devices for their employees who are required to wear it due to their job. UT departments will be responsible for notifying the HealthPoint Occupational Health Program (OHP), which of its employees are required to be in the respiratory protection program as determined by EHS or by their departmental Safety Coordinator. The OHP does not provide medical clearance for respiratory protection to contractors. Contractors should be referred to their company's own occupational health provider. The department is responsible for any costs incurred due to construction or installation of engineering controls.

3.3 Occupational Health Program (OHP)

The OHP or their designee is responsible for providing medical evaluations and fit testing, as applicable, for University employees required to wear respiratory protection devices.

3.4 Supervisor, Principal Investigator, Lab Manager Responsibilities

Each person in charge of a research project or other activity, trade, maintenance, or custodial crew that is engaged in activities where respiratory protective equipment is required is responsible for identifying potential respiratory hazards in their work area. Supervisors can request assistance from their department Safety Coordinator or EHS to assess potential respiratory hazards. Supervisors are responsible for:

- Ensuring that their employees have completed all necessary medical evaluations and fit testing for all respirators.
- Ensuring that their employees have completed all required training.
- Providing fiscal and administrative resources for the implementation of the Respiratory Protection Program.
3.5 Employees

Employees are responsible for complying with all guidance as to when to wear respiratory protection, for completing all University or department required training, and for scheduling and completing all required medical evaluations and fit tests.

Employees are also responsible for:

- Following the requirements for respirator use detailed in this program and in the manufacturer’s instruction manual.

- Notifying their supervisor of a change in health status (especially circulatory or respiratory health), weight gain or loss of 20 pounds or more, a change in dental situation or substantial scarring in the facial area that may alter the facepiece to face seal.

- Keeping all respirators in good operating condition and storing the respirator in a proper container that protects it from damage.

- Reporting to the supervisor any operation or job suspected requiring the use of respiratory protective equipment.

- Remaining clean-shaven where facial hair may prevent a good facepiece to face seal while wearing a tight-fitting respirator.

4.0 PROTECTION PROGRAM ELEMENTS

4.1 Exposure Assessment

An exposure assessment is one way to determine whether workers are required to wear respirators. Sometimes surrogate data from a similar industry or group may be used. In this case a hazard assessment is not performed. An example is using data from military or municipal police departments to determine if UTPD needs respiratory protection.

An exposure assessment may be performed to determine if respiratory protection is needed. The first step will be to gain an understanding of what activities may require respiratory protection. Interviewing and watching the activities may occur. Reviewing material safety data sheets (MSDS) for any chemicals involved with the process may also be required.

If an inhalation hazard is identified based on information from the exposure assessment, EHS will recommend the installation of control measures. Engineering and administrative controls will be used whenever feasible.

4.2 Control Measures

The RPP has four approaches to achieving respiratory protection:

1. The first is to substitute less hazardous materials.
2. The second is to implement engineering controls to eliminate the hazard.
3. The third is administrative. It may include analyzing the task to see if exposures can be minimized or eliminated and/or the possibility of job rotation to reduce the exposure of any one person to acceptable levels.
4. When the first three methods are not feasible, not yet in place, or cannot provide adequate protection, respiratory protection will be required.

Respirators are worn to reduce personnel exposures below permissible or recommended exposure limits. They can also be provided as an interim measure while controls are being sought or installed. Respirators provide adequate protection only if employers ensure that they are properly fitted and worn. Respirators protect the employees only from a specific hazard. They do not eliminate the hazard from the workplace. It is important to recognize that respirators may interfere with communication in the workplace.

4.2.1 Engineering Controls

Engineering controls consist of various measures for reducing a hazard at its source or for separating personnel from the hazard. In the laboratory, examples of engineering controls include the substitution of less hazardous chemicals in an operation, isolating a particular chemical operation, enclosing a potentially explosive reaction, or utilizing local exhaust such as a fume hood for an operation that produces airborne chemicals. Engineering controls function to reduce or eliminate a hazard at its source before it is created, they should be considered and utilized whenever possible as the first step in chemical hazard control within the laboratory.

4.2.2 Administrative Controls

Administrative controls consist of various policies and requirements such as worker rotation that are established at an administrative level. They may include:

- Replacing hazardous chemicals with less hazardous chemicals.
- Ensuring that all personnel have been provided with adequate training to enable them to conduct their duties safely.
- Restricting access to areas in which particularly hazardous chemicals are used.
- Posting appropriate signs to identify specific hazards within an area.
- Requiring that practices for chemical safety and good housekeeping be observed at all times.
- Worker rotation.

4.2.3 Personal Protective Equipment (PPE)

If engineering and administrative controls are determined as infeasible personal protective equipment will be used. Respiratory protection should reduce their exposure to airborne contaminants to below regulatory guidelines.

Respiratory protection will be used until engineering controls or administrative procedures can be implemented. Also, for tasks that are of short duration, infrequent, or non-routine, respiratory protection may be considered for use.

One size or model of respirator will not fit all types of faces by every employee. For assistance in selecting respirator make and model, contact your Department Safety Coordinator or EHS. HealthPoint can provide fit testing for only specific brands of respirators. It is best to use these brands first.
4.3 Respiratory Protection Devices

Respirators shall be selected based on the specific hazards to which the worker is exposed to. Selection is based on the Assigned Protection Factor (APF) of the respirator. Individuals who are required to wear a respirator must always wear the same size and model of respirator they were fit tested for during their respirator fit test.

APF means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees. Respirator users should refer to the manufacturer's recommendations for detailed information regarding selection of respirator types, cartridge types, hazards of use, and correct operating procedures.

Only respirators approved by the National Institute of Occupational Safety and Health (NIOSH) or the Mine Safety Administration (MSA) should be used. The respirators furnished should provide adequate respiratory protection against the particular hazard for which they are designed in accordance with the appropriate safety standards. Cartridges must be approved for that specific respirator. Employee modification of respirators is prohibited.

Air-purifying respiratory function by removing contaminants from air before inhalation. Contaminants are removed by filtration. Filters or cartridges designed for contaminant removal have limited effective service lives.

There are nine classifications of non-powered particulate air-purifying respirators certified under three filter classes: N, R, and P. Each class has three levels of filter efficiency: 95%, 99%, and 99.97% (designated 100 in this system). N, R, and P 100 filters are equivalent to HEPA filters. N refers to Not resistant to oil, R refers to Resistant to oil, and P refers to oil-Proof.

High-Efficiency Particulate Air or HEPA is a type of air filter. The filter must satisfy certain standards of efficiency such as those set by the United States Department of Energy (DOE). To qualify as HEPA by US government standards, an air filter must remove 99.97% of all particles greater than 0.3 micrometer from the air that passes through.

Cartridges: Air purifying respirators have cartridges that protect against different contaminants. The cartridges are color coded with the specific hazard they ameliorate.

Powered Air Purifying Respirators (PAPRs) use a motor and blower to pull air through the filter to provide a continuous flow of clean air to the user. This also provides a cooling effect in warm temperatures. PAPRs are manufactured with a tight-fitting facepiece (half-face and full-face), hoods, helmets, and a loose fitting facepiece.
PAPRs with a loose fitting facepiece may be evaluated as a reasonable accommodation for individuals who are either unable to shave due to a documented medical condition or due to religious observance must maintain facial hair.

PAPRs with hoods and helmets may be worn by individuals when conditions like facial hair prevent a good facepiece to face seal. There is a prohibition of having facial hair with PAPRs having tight fitting facepieces. PAPRs with loose fitting facepieces have partial sealing surfaces at the temple, cheek, or chin that help maintain positive pressure inside the facepiece. Any facial hair contacting these sealing surfaces will affect proper functioning of the respirator.

Nuisance dust masks without NIOSH approval will not be issued to employees of the University.

Gas and vapor removing air-purifying respirators remove specific individual contaminants or a combination of contaminants by catalytic reaction or sorption.

Supplied-air respirators (SARs) provide breathing air independent of the environment. The respirators are to be used in place of chemical cartridge air-purifying respirators when the contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate. Contact your department Safety Coordinator or EHS before using.

Self-Contained Breathing Apparatus (SCBA) provides the wearer with a independent supply of breathable air that is not connected to an outside air source. Pressure-demand SCBA are approved for IDLH (Immediately Dangerous to Life and Health) atmospheres.

To determine which respirator is the best choice for the specific task or job consult your supervisor, Departmental Safety Coordinator, or EHS.

4.3.1 Canisters, Cartridges, and Filters

Air purifying elements must be properly selected, stored, maintained, and replaced in order to provide adequate protection to the user.

Canisters
- Remove vapors and gases from the air
- Have a large sorbent volume and provide protection against higher concentrations of vapors and gases
- A component of a gas mask

Cartridges
- Contain less sorbent than a canister
- Lifetime is short

Combination Filters
In the event that a worker will be exposed to particulates and gases and vapors, combination cartridges are necessary because neither type is adequate for the other contaminant class (i.e., a particulate filter will not afford protection against gases and vapors).

4.3.2 Medical Evaluation

University employees required to use a respirator (including filtering facepieces) must be medically evaluated and cleared before using a respiratory protection device. Respirators may place a physiological burden on the employee and the purpose of this evaluation is to determine whether the employee is physically and psychologically able to perform their work while wearing a respirator. The voluntary use of a filtering facepiece respirator, i.e. N95, is not subject to medical evaluation and clearance requirements.

At a minimum, the medical evaluation consists of the employee completing of a respiratory medical evaluation questionnaire. At the discretion of the licensed health care provider reviewing the questionnaire, a physical exam or other follow-up tests may be required, including a pulmonary function test (PFT). Medical clearance must be obtained initially before an employee is allowed to wear a respirator. Medical re-evaluation is required:

- At the intervals specified by the licensed health care provider (e.g. every three years for filtering facepiece respirators and APRs and annually for ASRs, including SCBA units);
- When an employee reports medical signs or symptoms related to the ability to use a respirator safely;
- When observations are made that indicate a need for employee re-evaluation (i.e., by an employee’s supervisor during conduct of work, by OHP during fit-testing, etc.);
- When change(s) occur in workplace conditions that may result in substantial increase in the physiological burden placed on the employee during respirator use (e.g., increase in physical work effort, protective clothing, temperature, etc.).

The required respiratory medical evaluation questionnaire is found in Appendix I of this document and is modeled after the Medical Evaluation Questionnaire Form found in 29 CFR 1910.134.

EHS will provide a copy of the EHS Exposure Assessment to the licensed health care provider to assist the OHP in their determination of whether an employee is able to wear a respirator. Following evaluation of the questionnaire, exposure assessment, and/or physical examination, the licensed health care provider makes one of three decisions: 1) the employee is capable of wearing the designated respirator without limitations; or, 2) the employee is capable of wearing the designated respirator but with prescribed limitations; or, 3) the employee is not capable of wearing the respirator.

If the OHP determines that the employee can wear the respirator(s), the OHP will notify the employee. At the request of the employee’s department, a written copy of the authorization will be provided.
If the OHP determines that the employee is not able to wear a respirator, the OHP will provide a written denial to the employee, their supervisor, and EHS. The written denial will not contain confidential medical information. If an employee is disqualified from use of a respirator, the supervisor should contact Human Resource Services to explore reasonable accommodation, if any, and discuss potential impacts to employment.

4.3.3 Voluntary Use of Respiratory Protection

There are circumstances where employees may voluntarily use respirators in the course of their work that is exempt from most of the regulatory requirements. This is referred to as voluntary use and typically this is found when employees want to wear filtering facepiece respirators, often referred to as dust masks, N-95 respirators disposable respirators, or paper dust masks, for personal comfort when working in areas where nuisance dust is present. Loose fitting surgical masks are not considered a respirator.

Employees who voluntarily use dust mask respirators will not be required to have a medical review or respirator training. However, all voluntary dust mask users must read a short training policy sheet titled, “Instructions for Voluntary Dust Mask Respirator Use” (Appendix G). The following conditions must exist in order for dust mask respirators to be used voluntarily:
- Exposure to airborne contaminants is below OSHA permissible exposure limits (PELs)
- Exposure is only to non-toxic nuisance materials (plant dust, agar dust, etc.)
- There is no exposure to airborne infectious disease agents
- The dust mask is not worn to reduce exposure to gases or vapors

Industrial hygiene that demonstrates that employees who have been wearing respirators but the data does not support it may continue to wear it with their department’s approval. These employees would fall into the voluntary use category. Voluntary respiratory protection may be worn, at the department’s discretion, for full and half face APR and N95 only. Voluntary use is prohibited for PAPR, SCBA, and airline.

4.4 Selection of PPE

Each department is responsible for choosing and purchasing respiratory protection for their employees. Department Safety Coordinators or EHS will be a resource should a department require assistance in selecting appropriate respiratory protection.

General Considerations
The selection of a respirator shall be based on the following:

A. The characteristics of the hazardous operation
   1. Work area characteristics
   2. Materials used
   3. Worker activities

B. The nature of the respiratory hazard
   1. Type of hazard: a contaminant or an oxygen deficient atmosphere
   2. Physical and chemical properties of the contaminant
   3. Physiological effects on the body
   4. Actual concentration of the contaminant
   5. Established Permissible Exposure Limits (PEL's) or Threshold Limit Values (TLV's), or other published guidelines
6. Immediately Dangerous to Life and Health (IDLH) concentration
7. Warning properties of the contaminant

C. The period of time for which respiratory protection must be provided
   1. Routine use
   2. Emergency use

D. The activities of workers in the hazardous area
   1. Light, medium, or heavy work rate
   2. Intermittent or continuous work
   3. Temperature and Humidity

E. The physical characteristics, functional capabilities, and limitations of the various respirators (certain conditions require a specific respirator)

F. Assigned Respirator Protection Factor

4.4.1 Care of Respirator Protection Equipment

A. Fitting Respiratory Protection

A tight fitting facepiece is any respirator facepiece that relies on a “mask to face” seal to provide protection. This class includes quarter, half, and full facepiece masks used in both negative and positive pressure modes in air purifying and supplied air respirators. Excluded from this classification are hoods and helmet style respirators.

Fit testing is required for all employees using negative or positive pressure tight-fitting disposable or reusable APRs and ASRs where such respirators are required or where the employer requires the use of such a respirator.

B. Fit Testing

Fit testing will be conducted using a qualitative (QLFT) or quantitative fit test (QNFT). A QLFT is a pass/fail test to assess respirator fit based on the individual’s response to a test agent. It is appropriate to use the QLFT method for a lower fit factor respirator such as an N95. A QNFT assesses respirator fit by numerically measuring leakage into the respirator and is used when a higher fit factor is required.

At the University of Texas at Austin, annual fit testing is required for half and full facepiece air purifying respirators (APRs) and supplied air respirators (SARs), including SCBA units. Disposable filtering facepiece respirator, i.e. N95s, do not require annual fit testing. Fit testing should occur more frequently if a wearer gains or loses more than 20 lbs or if they experience any significant change to their face or jaw so as to change the seal. Fit testing is performed to evaluate a respirator’s fit on an individual and assure the wearer is provided a respirator with the proper style and size that maximizes the seal between the face and the facepiece. Employees, who voluntarily wear disposable filtering facepiece respirators, i.e. dust masks or N95s are not subject to initial or recurring fit test requirements.
All existing qualitative fit test methods such as Saccharin, Bitrex, Isoamyl Acetate (banana oil) and Irritant Smoke share the limitation that they can only be used when a fit factor of 100 or less is considered to be an acceptable pass level. This means that whenever a passing fit factor higher than 100 is needed, you must use a quantitative fit test method.

Quantitative Fit Test (QNFT) is a test in which a challenge agent is administered outside the face piece and the presence of the agent is detected and enumerated by analytical instrumentation. Agents used include corn oil, saccharin, and ambient room dust.

C. Inspection of Respirators

Respirators should be properly maintained at all times to ensure that they function properly and adequately protect the workers. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts should be replaced prior to use. No components should be replaced or repairs made beyond those recommended by the manufacturer. Repairs or adjustments to regulators, to reducing and admission valves, or to alarms of atmosphere-supplying respirators will be conducted only by the manufacturer or other person specifically trained by the manufacturer to perform these activities.

Users must conduct a Facepiece Positive and/or Negative Pressure Checks each time they put on a respirator.

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

Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

After use the respirator should be cleaned with a mild detergent that won’t damage the respirator or any of its components. Do not use alcohol-based cleaners to clean respirators, because the alcohol will dry out the plastic and reduce the elasticity of the mask. If at any time the respirator is found to be damaged or to have missing components it should be reported to the supervisor and replaced if it can’t be repaired in such a way as to return it to the manufacturer’s original state and function.
Respirators stored for emergency or rescue use should be inspected at least monthly in addition to before and after each use. Monthly inspections must be documented and include the date of inspection, name or signature of inspector, inspection findings, required remedial action and a serial number identifying the respirator. SCBA cylinders for emergency use shall be maintained in a fully charged state and recharged when pressure falls to 90% of the manufacturer's recommended pressure level, unless the SCBA is demonstrated as a training exercise. Inspections must include determinations that the regulator and warning devices function properly.

D. Maintenance of Respirators

No attempts should be made to modify or repair a respirator by unqualified individuals. This does not apply to routine maintenance of the equipment to replace filters and cartridges/canisters.

E. Cleaning of Respirators

Clean and disinfect respirators regularly using the following schedules:
1. Respirators issued for the exclusive use of one worker should be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
2. Respirators used by more than one worker should be thoroughly cleaned and disinfected before use by another worker.
3. Respirators for emergency use should be cleaned and sanitized after each use.
4. Respirators used in fit testing and training should be cleaned and disinfected after each use.
5. Manufacturer recommendations should be followed when cleaning respirators.

F. Storing Respirators

Clean respirators should be stored in nonporous, sturdy, airtight containers (like a "Ziploc" plastic bag). To avoid collecting dust, the respirator should be put away as soon as it is dry. Store the respirator at the end of each shift to protect it from dust, sunlight, heat, extreme cold, excessive moisture, and chemicals. Respirator face pieces and valves should be stored in a manner that does not distort the shape. Keep the respirator in a cool, dry cabinet specifically designated for storage.

4.5 Effects of Airborne Contaminates

Inhaled contaminants that adversely affect the lungs fall into three (3) categories:

- Aerosols and dusts, which, when deposited in the lungs can cause tissue damage, tissue reaction, disease, or physical obstruction.

- Toxic gases that produce adverse reactions in the tissue of the lungs themselves. Examples include chlorine and hydrogen fluoride which can irritate the mucous membranes and cause chemical burns.
Respiratory Protection Program

- Toxic aerosols or gases that do not affect the lung tissue, but are passed from the lung into the bloodstream, where they are carried to other organs or have adverse effects on the oxygen-carrying capacity of the bloodstream. Examples include mercury, lead, and carbon monoxide, respectively.

4.6 Departmental Areas Requiring Respiratory Protection

- UTPD
- EHS Spill Response
- Asbestos Abatement
- MBB-3.230 (BSL3 Lab)
- Animal Resource Center-Cage Washers

5.0 Training

5.1 Training Requirements

All employees who are enrolled in the RPP will receive initial training and refresher training every three years. The departmental supervisor or Safety Coordinator will notify employees who are required to receive training. The RPP training may be provided using various teaching methods including but not limited to in-person lecture, written materials and/or on-line training available through the TXClass system, or authorized external vendor. Departments may offer additional site specific training.

6.0 Recordkeeping

6.1 General Records

Each department should keep a list of their employees who are in the RPP; copies of this list will be sent to EHS.

EHS will be the repository for all respiratory exposure assessments. Any department or Safety Coordinator that performs exposure assessments should provide EHS a copy of the report.

6.2 Medical Evaluations

The OHP, or their designee, will be the repository for all medical evaluations and are kept separate from department personnel files. Occupational exposure and medical records are kept for the duration of employment plus thirty years.
7.0 PROGRAM EVALUATION

7.1 RPP Compliance Audits

EHS will conduct a program review every twelve to twenty-four months. This may be completed by a contractor. The review may include: spot inspections, re-sampling of assessment data, and audit of training records.
# 8.0 REVISIONS

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APPENDIX A

GLOSSARY
Glossary

Action Level: The concentration for a specific substance, calculated as an eight (8) hour time-weighted average that initiates certain required activities such as exposure monitoring and medical surveillance. Typically, it is one-half that of the Permissible Exposure Limit (PEL) for that substance.

Aerosol: A system consisting of particles, solids, or liquids suspended in air.

Air-Purifying Respirator (APR): A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Approved: Tested and listed as satisfactory jointly by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH).

Assigned Protection Factor (APF): The minimum anticipated protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users.

Atmosphere-Supplying Respirator: A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Breakthrough: The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing is often referred to as the percentage of the input concentration.

Canister or Cartridge: A container with a filter, sorbent, catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded during any part of the working exposure.

Clean-Shaven: A subject who has no interfering facial hair between the face and the sealing surface of the respirator and no facial hair interfering with the valve function of the respirator.

Concentration: The airborne concentration of a contaminant (gas, vapor, mist, aerosol, fume, particulate) expressed in parts per million (ppm) or milligrams per cubic meter of air (mg/m³)

Contaminant: Any harmful, irritating, or nuisance material that is foreign to the normal atmosphere. Contaminants can be particulates, gases, or vapors.

Continuous Flow: A respirator that maintains airflow at all times, rather than only on demand.
Demand Respirator: An atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

Dusts: A submicroscopic to visible solid which is mechanically produced by such processes as grinding, crushing, drilling, or blasting.

Dust Mask: A mask providing limited protection from dusts and/or mists.

Exhalation Valve: A device that allows exhaled air to leave a respiratory device and prevents outside air from entering through the valve.

Fit Factor: A quantitative estimate of the fit of a particular respirator to a specific individual. It typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit Test: The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative Fit Test (QLFT) and Quantitative Fit Test (QNFT).)

Fumes: A solid, normally less than one micrometer in diameter, usually formed in air above molten metal by vaporization of the metal, oxidation of the vapor, and condensation of the oxide.

Gases: Substances that are similar to air in their ability to diffuse or spread freely through an area at normal workroom temperatures.

High Efficiency Particulate Air (HEPA) Filter: A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are N100, R100, and P100 filters.

Hood: A respiratory inlet covering that completely covers the head and neck, and may also cover portions of the shoulders and torso.

Immediately Dangerous to Life or Health (IDLH): An atmosphere that poses an immediate threat to life, causes irreversible adverse health effects, or impairs an individual's ability to escape from a dangerous atmosphere.

Irritants: A chemical which causes a reversible inflammatory effect on living tissue particularly the skin, eyes, nose or respiratory system.

Mists: Submicroscopic to visible droplets rendered airborne by bubbling, boiling, spraying, splashing or by condensation from air supersaturated with the vapor of a substance.

N-95 Respirator: Respirator whose filtering efficiency has been determined to be at least 95% for the most penetrating sized particle (~0.3 um); an N-95 respirator may either be a disposable filtering facepiece respirator (the entire face piece serves as the filter) or a tight fitting elastomeric facepiece respirator equipped with an appropriate particulate filter cartridge.
Nanoparticle: Nanoparticles are ultrafine particles measuring in one dimension between 1 – 100 nanometers (nm).

Negative Pressure Respirator (tight fitting): A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen Deficient Atmosphere: Any atmosphere that contains less than 19.5% oxygen by volume. An oxygen deficiency becomes IDLH when the ambient partial pressure of oxygen becomes less than 110 mm Hg.

PAPR: A Powered Air Purifying Respirator which is battery-operated and draws particulate contaminated air through a filter and also delivers clean filtered air to the facepiece or hood at a required minimum flow.

Particulate Matter: A suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Particulate matter suspended in air is commonly known as an aerosol.

Positive Pressure Respirator: A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air through air-purifying elements to the inlet covering.

Powered Air-Purifying Respirator (PAPR): An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Pressure Demand Respirator: A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

Qualitative Fit Test (QLFT): A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative Fit Test (QNFT): An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory Cartridge Classification: Oil droplets in the air have been found to ruin the filtering ability of some filter material. To ensure that a suitable filter is being used, particulate filters now have an N, R, or P designation (Not resistant to oil, Resistant to oil and oil-Proof). R or P filters should be used when oil is present.

Self-Contained Breathing Apparatus (SCBA): An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Sensitizers: A material which causes an allergic reaction of the skin or respiratory system.

Service Life: The period of time that a respirator, filter, sorbent, or other respiratory equipment provides adequate protection to the wearer.
Supplied-Air Respirator (SAR) or Airline Respirator: An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Vapors: The gaseous state of substances that are liquid or solid at room temperature.

Warning Properties: This refers to the human senses of taste, smell, and eye or throat irritation. A substance has adequate warning properties if the substance's odor, taste, or irritant effects are detectable and persistent at concentrations at or below the Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV).
APPENDIX B

RESPIRATORY PROTECTION DECISION TABLE
### Respiratory Protection Program

**Assigned Protection Factor** is determined by Quantitative Testing Only. It does not apply to Qualitative Testing Procedures.

<table>
<thead>
<tr>
<th>Respirator Type(^1,2)</th>
<th>Advantages</th>
<th>Uses</th>
<th>Assigned Protection Factor(^5)</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
</tr>
</thead>
</table>
| Disposable Dust Masks   | • Light weight  
                        • Does not restrict mobility  
                        • Low cost (compared to other respirators)  
                        • Little training required | • Reduces exposure to splashes of large droplets  
                        • Easier to breathe through | 0 | • Cannot fit test  
                        • Difficult to obtain a good facepiece-to-face seal  
                        • Lacks eye protection  
                        • Does not reduce exposure to small inhalable particles | • Facial hair  
                        • Vapor  
                        • Mists  
                        • IDLH conditions  
                        • Oxygen Deficient Environment |
| N95 Respirator Filtering Facepiece | • Light weight  
                        • Does not restrict mobility  
                        • Low cost (compared to other respirators)  
                        • Little training required | | 10 | • Cannot be worn with facial hair  
                        • Harder to breathe through than a disposable dust mask  
                        • Lacks eye protection | • Facial hair  
                        • Vapor  
                        • Mists  
                        • IDLH conditions  
                        • Oxygen Deficient Environment |
| Reusable Half Mask Respirator | • Comparatively light weight  
                        • Does not restrict mobility  
                        • Relatively low cost (compared to other respirators)  
                        • Wear in hot and humid conditions | • Vapors  
                        • Dusts  
                        • Fumes  
                        • Mists  
                        • Gases  
                        • Can be worn in hot and humid conditions | \(10^3\) | • Cover only the nose and mouth  
                        • Can only be used with certain vapors | • Facial hair  
                        • IDLH conditions  
                        • Unknown atmospheric conditions |
**Assignment Protection Factor is determined by Quantitative Testing Only. It does not apply to Qualitative Testing Procedures.**

<table>
<thead>
<tr>
<th>Respirator Type ¹,²</th>
<th>Advantages</th>
<th>Uses</th>
<th>Assigned Protection Factor ⁵</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
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</table>
| Full-face Mask Respirator | • Comparatively light weight  
• Does not restrict mobility  
• Provides both respiratory and eye protection | • Approved for same contaminants as half mask respirators, but for higher concentrations | 50 | • Standard eyeglasses interfere with the mask to face seal  
• Harder to breathe through than a facemask  
• Can only be used with certain vapors  
• May interfere with voice communication  
• May fog up in hot and humid conditions | • Facial hair  
• IDHL conditions  
• Unknown atmospheric conditions |
<table>
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<th>Respirator Type 1,2</th>
<th>Advantages</th>
<th>Uses</th>
<th>Assigned Protection Factor⁵</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
</tr>
</thead>
</table>
| Half Mask PAPR    | • Provides greater protection than non-powered negative-pressure air-purifying respirators  
• More comfortable to wear and to breathe compared to non-powered negative-pressure air-purifying respirators  
• Air delivery to facepiece mask, helmet, or hood ensures that leakage of contaminated air is usually outward  
• Fit testing not required  
• Various chemical cartridges or canisters available to eliminate chemicals including organic vapors and acid gases | • May be used if the N95 respirator does not fit  
• Employee has facial hair or facial deformity that would interfere with mask-to-face seal  
• Desired for high-risk aerosol-generating procedures | 50 | • Covers only the nose and mouth  
• More expensive than other respirators  
• Bulky and noisy  
• Blower unit/battery typically worn on belt (weighs 1.5-3 lbs.)  
• Battery dependent  
• Can only be used with certain vapors  
• Is not a true positive-pressure device (i.e., some leakage of contaminated air into facepiece mask, helmet, or hood can occur)  
• Communication can be difficult | • Facial hair  
• IDHL conditions  
• Unknown atmospheric conditions  
• Should not be used when others must be protected from contamination by the wearer  
• Fire or explosion hazard |
<table>
<thead>
<tr>
<th>Respirator Type</th>
<th>Advantages</th>
<th>Uses</th>
<th>Assigned Protection Factor</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
</tr>
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</table>
| Full Facepiece PAPR | Provides greater protection than non-powered negative-pressure air-purifying respirators  
|                  | More comfortable to wear and to breathe compared to non-powered negative-pressure air-purifying respirators  
|                  | Air delivery to facepiece mask, helmet, or hood ensures that leakage of contaminated air is usually outward  
|                  | Fit testing not required  
|                  | Various chemical cartridges or canisters available to eliminate chemicals including organic vapors and acid gases  
|                  | Provides both respiratory and eye protection  

*May be used if the N95 respirator does not fit  
*Employee has facial hair or facial deformity that would interfere with mask-to-face seal  
*Desired for high-risk aerosol-generating procedures

| 1,000 | Standard eyeglasses interfere with the mask to face seal  
|       | More expensive than other respirators  
|       | Bulky and noisy  
|       | Blower unit/battery typically worn on belt (weighs 1.5-3 lbs.)  
|       | Battery dependent  
|       | Can only be used with certain vapors  
|       | Is not a true positive-pressure device (i.e., some leakage of contaminated air into facepiece mask, helmet, or hood can occur)  
|       | Communication can be difficult

**Facial hair**  
**IDHL conditions**  
**Unknown atmospheric conditions**  
**Should not be used when others must be protected from contamination by the wearer**  
**Fire or explosion hazard**
The University of Texas at Austin
Environmental Health and Safety Department
Respiratory Protection Program

Assigned Protection Factor is determined by Quantitative Testing Only. It does not apply to Qualitative Testing Procedures.

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<th>Respirator Type 1,2</th>
<th>Advantages</th>
<th>Uses</th>
<th>Assigned Protection Factor&lt;sup&gt;5&lt;/sup&gt;</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
</tr>
</thead>
</table>
| Helmet / Hood PAPR  | • Provides greater protection than non-powered negative-pressure air-purifying respirators  
• More comfortable to wear and to breathe compared to non-powered negative-pressure air-purifying respirators  
• Air delivery to facepiece mask, helmet, or hood ensures that leakage of contaminated air is usually outward  
• Fit testing not required  
• Various chemical cartridges or canisters available to eliminate chemicals including organic vapors and acid gases  
• Provides both respiratory and eye protection  
• Hooded PAPRs do not need to be fit tested and can be worn with facial hair  
<sup>1</sup>  
<sup>2</sup>  
<sup>3</sup>  
<sup>4</sup>  
<sup>5</sup> | • The N95 respirator does not fit  
• Employee has facial hair or facial deformity that would interfere with mask-to-face seal  
• Desired for high-risk aerosol-generating procedures | 25 / 1,000<sup>4</sup> | • Limited visibility  
• Bulky and noisy  
• Battery dependent  
• Can only be used with certain vapors  
• Is not a true positive-pressure device (i.e., some leakage of contaminated air into facepiece mask, helmet, or hood can occur)  
• Communication can be difficult | • IDHL conditions  
• Unknown atmospheric conditions  
• Should not be used when others must be protected from contamination by the wearer  
• Fire or explosion hazard |
### Respirator Advantages

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<th>Respirator Type</th>
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<th>Uses</th>
<th>Assigned Protection Factor</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
</tr>
</thead>
</table>
| Supplied Air    | - Provides high level respiratory protection  
                  - Provides positive pressure to mask so almost all leakage is outward  
                  - Less bulky and can be used for longer periods than self-contained breathing apparatus  
                  - Provides both respiratory and eye protection  
                  - Can be used for long periods of time and provide a high degree of protection from a variety of air contaminants  
                  - Provide minimal breathing resistance and discomfort, Light weight, low bulk  
                  - Moderate initial cost and low operating costs  
|                | - We need constant air flow and longer exposure period. When need higher protection factor. | **1,000** | - Length of air hose may limit mobility  
                  - Air hose may be a trip hazard  
                  - Air hose may get tangled with objects  
                  - Clean source of breathing air required  
                  - Fit testing required  
                  - Immediately operable emergency escape respirator, escape hood, or escape mask is required  
                  - Communication can be difficult  
                  - Higher Cost  
<p>|                |                                                      |              | - IDLH Conditions if there is no emergency escape bottle attached |</p>
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<th>Respirator Type</th>
<th>Advantages</th>
<th>Uses</th>
<th>Assigned Protection Factor</th>
<th>Limitations</th>
<th>Prohibited Conditions</th>
</tr>
</thead>
</table>
| SCBA            | • Provides highest level of respiratory protection  
• Several different types available depending on need  
• Improved mobility over Supplied-Air Respirators  
• Provides both respiratory and eye protection | • Emergency use  
• IDLH  
• Unknown situations | 10,000 | • Standard eyeglasses interfere with the mask to face seal  
• Heavy to wear  
• Reduced oxygen supply limits duration of use  
• Fit testing required  
• Communication can be difficult  
• Air supply is limited because of the small size of the tank  
• Higher Cost  
• More training required  
• Mental strain |
Notes:

1. Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

2. The assigned protection factors in this Table are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

3. This APF category includes filtering facepiece, and half masks with elastomeric facepiece.

4. The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a workplace protection factor (WPF) or simulated workplace protection factor (SWPF) study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

5. These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).
APPENDIX C

CONTACT LENSES
CONTACT LENSES

1. Contact lenses may be worn with respirators, under the following conditions:
   a. The individual has previously demonstrated that he or she has had successful experience wearing contact lenses; or
   b. The contact lens wearer practices wearing the respirator while wearing the contact lenses before entering an atmosphere that requires the use of a respirator.

2. A contact lens that falls out of the eye while wearing a half face respirator can become contaminated by contacting any surface such as the ground, clothes, or gloves and must not be reused.

3. If a contact lens falls from the eye while wearing a full face respirator, the wearer must immediately leave the work area and follow proper decontamination and cleaning procedures before the contact lens is replaced.
APPENDIX D

RESPIRATOR SELECTION
Respirator Selection

1. Respirators and cartridges will be selected based on:
   a. the nature of the hazardous activity or process
   b. the type of respiratory hazard including physical, chemical, and physiological properties of the air contaminant(s)
   c. the concentration of contaminant likely to be encountered
   d. the period of time for which respiratory protection must be worn
   e. determination of a published TLV, PEL, immediately dangerous to life or health (IDLH) concentration, or any other available exposure limit or estimate of toxicity for the contaminant(s)
   f. the existence of a comprehensive health standard (i.e., lead, asbestos) for the contaminant(s) requiring specific respirators
   g. the oxygen content and the potential for an oxygen-deficient environment exists
   h. the activities of workers in the hazardous area
   i. the physical characteristics and functional capabilities and limitations of the various types of respirators
   j. the ability of the cartridge to protect against the contaminants and
   k. respirator assigned protection factors

2. If there is no manufacturer information or regulatory information available on cartridge selection, the following guidelines should be used to select the appropriate respiratory protection.
   a. Measure the concentration of contaminant to which the employee will be exposed (the concentration of the airborne contaminant that would occur if the employee were not using a respirator). Compare this to the appropriate occupational exposure limit to determine the protection factor needed for the respiratory device. Contact EHS for assistance.
   b. Ensure that the use of an APR is appropriate for the specific contaminant at the specific exposure concentration.
   c. A respirator with air-purifying cartridges should not be selected to protect an employee against a chemical contaminant with poor warning properties (see the AIHA publication, "Odor Thresholds for Chemicals with Established Occupational Health Standards.") unless:
      1) employee exposure concentration is determined;
2) the exposure concentration is at all times less than 10 times the PEL or TLV, and is less than 100 ppm, notwithstanding the value of the PEL or TLV; and

3) air-purifying cartridges will effectively remove the contaminant.

### Selection of Respirators

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen deficiency</td>
<td>Self-contained breathing apparatus. Hose mask with blower. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.</td>
</tr>
<tr>
<td>Gas and vapor contaminants immediately dangerous to life and health</td>
<td>Self-contained breathing apparatus. Hose mask with blower. Air-purifying full facepiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.</td>
</tr>
<tr>
<td>Not immediately dangerous to life and health</td>
<td>Air-line respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge.</td>
</tr>
<tr>
<td>Particulate contaminants immediately dangerous to life and health</td>
<td>Self contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with appropriate filter. Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.</td>
</tr>
<tr>
<td>Not immediately dangerous to life and health</td>
<td>Air-purifying, half-mask or mouthpiece respirator with filter pad or cartridge. Air-line respirator. Air-line abrasive-blasting respirator. Hose-mask without blower.</td>
</tr>
<tr>
<td>Combination gas, vapor, and particulate contaminants immediately dangerous to life and health</td>
<td>Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with chemical canister and appropriate filter (gas mask with filter). Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air-supply or an air-storage receiver with alarm.</td>
</tr>
<tr>
<td>Not immediately dangerous to life and health</td>
<td>Air-line respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge and appropriate filter.</td>
</tr>
</tbody>
</table>
APPENDIX E

CAPABILITIES AND LIMITATIONS OF RESPIRATORS
Capabilities and Limitations of Respirators

Atmosphere-Supplying Respirators

Atmosphere-supplying respirators provide protection against oxygen deficiency and toxic atmospheres. The breathing atmosphere 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 the skin. Facepieces present special problems to individuals required to wear prescription lenses. Use of atmosphere-supplying respirators in atmospheres immediately dangerous to life or health is limited to specific devices under specified conditions.

a) Self-Contained Breathing Apparatus (SCBA): The wearer carries their 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 atmospheric pressure (service life of open-circuit devices is cut in half by a doubling of the atmospheric pressure), and the 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 an irrespirable atmosphere. Chief limitations of SCBA devices are their weight or bulk, or both, limited service life, and the training required for their maintenance and safe use.

i. 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 respiratory-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.

ii. 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.

b) 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 atmospheres from which the wearer can escape unharmed without the aid of the respirator. The wearer is restricted in movement by the hose and must return to a respirable atmosphere by retracing his route of entry. The hose is subject to being severed or pinched off.

i. Hose mask: The hose inlet or 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 exists in the facepiece during inhalation.

b) **Hose mask without blower.**

Maximum hose length may restrict application of device.

II. **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 the skin or that may be absorbed through the unbroken skin.

**Limitations:** 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.

III. **Combination Airline Respirators with Auxiliary Self Contained 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 auxiliary self-contained air supply is approved for escape and may be used for entry when it contains at least a 15-minute auxiliary self-contained air supply.

**Air-Purifying Respirators**

**General limitations:** Air-purifying respirators do not protect against oxygen-deficient atmospheres or against skin irritations, or 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 and capability 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 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 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 and 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 have the 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 specific conditions.

1. 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 uncomfortably high temperature indicates a high concentration of gas or vapor and requires an immediate return to fresh air.

Use should be avoided in atmospheres where the contaminant(s) lack sufficient warning properties (that is: odor, taste, or irritation at a concentration in air at or above the permissible exposure limit). (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.

a) **Full Facepiece Respirator:** Provides protection against eye irritation in addition to respiratory protection.

b) **Quarter-Mask and Half-Mask Facepiece Respirator:** A fabric covering (facelet) available from some manufacturers shall not be used.

c) **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.

2. Particulate-Removing Respirators

Limitations: Protection against nonvolatile 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.

a) **Full Facepiece Respirator:** Provides protection against eye irritation in addition to respiratory protection.

b) **Quarter-Mask and Half-Mask Facepiece Respirator:** A fabric covering (facelet) available from some manufacturers shall not be used unless provided for use with respirator.

c) **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.
3. Combination Particulate- and Vapor- and Gas-Removing Respirators

The advantages and disadvantages of the component sections of the combination respirators as described above apply.

4. Combination Atmosphere-Supplying and Air-Purifying 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.
APPENDIX F

RESPIRATORY PROTECTION FACTOR
PROTECTION FACTORS

The assigned protection factor (APF) reflects the level of protection that a properly functioning respirator would be expected to provide to a population of properly fitted and trained users. For example, an APF of 10 for a respirator means that the user could expect to inhale no more than one tenth of the airborne contaminant present. Various groups such as American National Standards Institute (ANSI), OSHA and NIOSH have proposed factors for the different types of respirators available.

**Step 1:** Start by having this information available for each contaminant and exposure duration of concern:

- Those exposure evaluation results that indicate employee exposure above a Permissible Exposure Limit (PEL) value.
- When no PEL values have been established for an airborne contaminant, use relevant available information and informed professional judgment to determine an acceptable exposure limit value to use for calculating hazard ratios. For example, you may use exposure limit values established by the American Conference of Governmental Industrial Hygienists (ACGIH).

**Step 2:** Substitute the values from Step 1 into the following formula and calculate separate hazard ratios for each airborne contaminant and exposure duration of concern.

\[
\text{Hazard ratio} = \frac{\text{Exposure evaluation result} * \text{PEL}}{\text{PEL}}
\]

Also stated as:

\[
\text{Hazard ratio} = \frac{\text{Airborne Contaminant Concentration}}{\text{Occupational Exposure Limit}}
\]

Use the following key to understand the terms used in the formula:

<table>
<thead>
<tr>
<th>The term</th>
<th>Is the</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure evaluation result</td>
<td>Estimated or measured concentration of an airborne contaminant for an 8-hour or other exposure period. This result comes from an exposure evaluation.</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit (PEL) established for the airborne contaminant. Use the PEL value (such as TWA, STEL, or Ceiling limit) applicable to your exposure evaluation result.</td>
</tr>
<tr>
<td>*</td>
<td>Measurement unit, such as parts per million (ppm), associated with the exposure evaluation result and PEL values. The measurement units for both values must match. Ppm is the measurement unit commonly used to express concentrations of gases or vapor. Other measurement units may be used. For example, milligrams per cubic meter (mg/ m³) is commonly used to express particle contaminant concentrations.</td>
</tr>
</tbody>
</table>
Step 3: Decide which of the following applies to the exposure of concern and proceed as instructed.

- Exposure is to a single contaminant and you have calculated one hazard ratio. Skip to Step 5.
- Exposure is to a single contaminant and you have calculated two or more hazard ratios. Select the higher hazard ratio value and skip to Step 5.
- Exposure is to a mixture of airborne contaminants and you have determined health effects are additive. Follow Step 4.
- Exposure is to a mixture of airborne contaminants and you have determined health effects are not additive. Select the highest hazard ratio value and skip to Step 5.

Step 4: When the contaminants of an airborne mixture have additive health effects:

- Add the hazard ratios of all additive contaminants to get a total for each exposure duration.
- When you have one total, use this to represent the overall hazard ratio when completing Step 5.
- When you have more than one total, select the highest total and use this to represent the overall hazard ratio for the exposures of concern.

Step 5: Compare your hazard ratio (or overall hazard ratio) to the Assigned Protection Factors (APFs):

- Identify any respirator types in with an APF at least as high as your hazard ratio. These respirator types are capable of providing a sufficient protection level for your workplace exposures, pending further respirator selection restrictions.
The **Maximum Use Concentration** is defined as:

\[
MUC = PF \times \text{Lowest of the (TLV or PEL or REL) values}
\]

where

- **MUC** = Maximum Use Concentration
- **PF** = Protection Factor CO/Ci
- **TLV** = Threshold Limit Value
- **PEL** = Permissible Exposure Limit
- **REL** = Recommended Exposure Limit

*Lowest of the three values*

**Example:**

If an individual was considering respiratory exposure to Benzene, the following exposure limits would apply:

- TLV: .5 PPM
- REL: .1 PPM
- PEL: 1 PPM

Thus utilizing the formula:

\[
MUC = PF \times \text{REL}
\]

10 (Half Mask) or 50 (Full Face piece) x .1 PPM (REL)

\[
MUC = 1 \text{ PPM (Half Mask)} \ 5 \text{ PPM (Full Face piece)} \ (\text{IDLH} = 500 \text{ PPM})
\]

If exposure concentrations are expected to exceed 5 PPM, or if the environment was potentially oxygen deficient, an APF could not be utilized in this example.
Chemical Cartridges: Gas and Vapor Contaminants.

1. **Acidic (acid gases).** Substances that are acids or that react with water to produce an acid. In water, they produce positively charged hydrogen ions (H+) and a pH of less than 7. They taste sour and many are corrosive to tissues (e.g., hydrogen chloride, sulfur dioxide; hydrogen sulfide - escape only).

   **NOTE:** Air-purifying respirators are not appropriate for all acid gases. For example, fluorine is classified as being acidic; however, due to its poor warning properties, supplied air is the warranted protection. Hydrogen cyanide is characterized by a very low IDLH and thus requires supplied air. Air-purifying respirators with custom filters are rated as adequate protection for chlorine dioxide but the full-face respirator is recommended. Air-purifying respirators with filters for protection from hydrogen sulfide are only good for short duration exposures and should not be used as PPE for worker protection.

2. **Alkaline.** Substances that are bases or that react with water to produce a base. In water, they result in the production of negatively charged hydroxyl ions (OH-) and a pH greater than 7. They taste bitter and many are corrosive to tissues (e.g., ammonia, methylamine, butylamine, ethylamine).

   **NOTE:** Within the category of alkaline substances, air-purifying respirators are appropriate only for ammonia and certain amines (usually the same cartridge, check manufacturer's specifications). Other alkaline compounds such as stibine, phosphine and arsine (all hydrides) require the use of supplied air systems.

3. **Mercury Vapor.** A specialized cartridge is available to protect wearers against mercury vapors.

4. **Organic (organic vapors, OV).** Compounds that are composed of carbon and hydrogen. These include aliphatic hydrocarbons, alcohols, ethers, ketones, organic acids, nitriles, amines, aldehydes, aromatics, and cyclic ethers and epoxides. In the various groups, there may be compounds for which OV cartridges are satisfactory and ones which necessitate the use of supplied air equipment. Care must be exercised in selecting the proper protection.

   Organic compounds also encompass halogenated organics (1,1,1-trichloroethane, chloroform, carbon tetrachloride), amides (formamide) and isocyanates (toluene diisocyanate). Many of these compounds have poor warning properties and thus, OV cartridges are unacceptable or extremely limited in protection capacity.
<table>
<thead>
<tr>
<th>Organic Groups</th>
<th>Use Air-Purifying For:</th>
<th>Use Supplied Air For:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aliphatics, Saturated</td>
<td>Octane</td>
<td>Methane (simple asphyxiant)</td>
</tr>
<tr>
<td></td>
<td>n-Hexane</td>
<td>Butane (poor warning properties)</td>
</tr>
<tr>
<td></td>
<td>Nonane</td>
<td></td>
</tr>
<tr>
<td>Alcohols and Ethers</td>
<td>n-Butyl alcohol</td>
<td>Allyl alcohol</td>
</tr>
<tr>
<td></td>
<td>Ethyl alcohol</td>
<td>Dimethyl ether (very short OV service life)</td>
</tr>
<tr>
<td></td>
<td>Isopropyl alcohol</td>
<td>Methanol (poor warning properties)</td>
</tr>
<tr>
<td></td>
<td>Isopropyl ether</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n-Propyl alcohol</td>
<td></td>
</tr>
<tr>
<td>Ketones</td>
<td>Acetone</td>
<td>Chloroacetone (warning unknown)</td>
</tr>
<tr>
<td></td>
<td>Methyl ethyl ketone</td>
<td>Dipropyl ketone (warning unknown)</td>
</tr>
<tr>
<td></td>
<td>Methyl isobutyl ketone</td>
<td></td>
</tr>
<tr>
<td>Organic Acids</td>
<td>Acetic acid</td>
<td>Formic acid (questionable warning)</td>
</tr>
<tr>
<td></td>
<td>Chlorosulfonic acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Propionic acid</td>
<td></td>
</tr>
<tr>
<td>Nitriles</td>
<td>Acetonitrile</td>
<td>Acrylonitrile (poor warning)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Methylacrylonitrile</td>
</tr>
<tr>
<td>Amines</td>
<td>Methylamine</td>
<td>Diethylene triamine (warning unknown)</td>
</tr>
<tr>
<td></td>
<td>Butylamine</td>
<td>Ethyleneimine (poor warning)</td>
</tr>
<tr>
<td></td>
<td>Ethanolamine</td>
<td>Triethanolamine</td>
</tr>
<tr>
<td></td>
<td>Ethyamine</td>
<td></td>
</tr>
<tr>
<td>Aldehydes</td>
<td>Crotonaldehyde</td>
<td>Acetaldehyde (short OV service life)</td>
</tr>
<tr>
<td></td>
<td>Formaldehyde</td>
<td>Acrolein</td>
</tr>
<tr>
<td></td>
<td>Glutaraldehyde</td>
<td></td>
</tr>
<tr>
<td>Aromatics</td>
<td>Benzene</td>
<td>Aniline (questionable warning)</td>
</tr>
<tr>
<td></td>
<td>Naphthalene</td>
<td>Benzoic chloride</td>
</tr>
<tr>
<td></td>
<td>Nitrobenzene</td>
<td>Picoline</td>
</tr>
<tr>
<td></td>
<td>Pyridine</td>
<td>o-, m-, and p-Toluidine</td>
</tr>
<tr>
<td></td>
<td>Quinoline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Toluene</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Xyylene</td>
<td></td>
</tr>
<tr>
<td>Cyclic Ethers and Epoxides</td>
<td>Tetrahydrofuran</td>
<td>Propylene oxide (short service life for cartridge)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dioxane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ethylene oxide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Epichlorhydrin</td>
</tr>
</tbody>
</table>

* Full-face respirator is recommended. A cartridge specifically rated for formaldehyde MUST be
Organic Groups | Use Air-Purifying For: | Use Supplied Air For:
--- | --- | ---
used.

\$ Supplied air is recommended due to poor warning properties; however, OSHA allows an air-purifying respirator.

\% A cartridge designated for both organic vapors and particulates should be used.

Source: NIOSH Pocket Guide to Chemical Hazards, 1997
3M 2000 Respirator Selection Guide
Draeger Respiratory Protection Selection Guide

5. **NIOSH-Prohibited Cartridges.** NIOSH prohibits the use of chemical cartridges for the following chemicals because of their toxicity, poor warning properties, reactivity or other hazardous characteristics:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Chemical</th>
<th>Chemical</th>
<th>Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrolein</td>
<td>Hydrogen cyanide</td>
<td>Methylene bisphenylisocyanate</td>
<td>Phosgene</td>
</tr>
<tr>
<td>Aniline</td>
<td>Hydrogen fluoride</td>
<td>Nickel carbonyl</td>
<td>Phosphine</td>
</tr>
<tr>
<td>Arsine</td>
<td>Hydrogen selenide</td>
<td>Nitrobenzene</td>
<td>Phosphorus trichloride</td>
</tr>
<tr>
<td>Bromine</td>
<td>Hydrogen sulfide</td>
<td>Nitrogen oxides</td>
<td>Stibine</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>Methanol</td>
<td>Nitroglycerin</td>
<td>Sulfur chloride</td>
</tr>
<tr>
<td>Dimethylaniline</td>
<td>Methyl bromide</td>
<td>Nitromethane</td>
<td>Toluene diisocyanate (TDI)</td>
</tr>
<tr>
<td>Dimethyl sulfate</td>
<td>Methyl chloride</td>
<td>Ozone</td>
<td>Vinyl chloride</td>
</tr>
</tbody>
</table>

D. **Combination Filters.**

In the event that a worker will be exposed to particulates and gases and vapors, combination cartridges are necessary because neither type is adequate for the other contaminant class (i.e., a particulate filter will not afford protection against gases and vapors).
APPENDIX G

VOLUNTARY USE OF RESPIRATORS
Voluntary Use of Respirator

Information for Employees Using Respirators When Not Required Under the Respiratory Program at the University of Texas at Austin

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 the University, OSHA or other national standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

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

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

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

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

Reference: Appendix D to Sec. 1910.134
American National Standards Institute (ANSI) "Practices for Respiratory Protection"


NIOSH web site: http://www.cdc.gov/niosh/

NIOSH/OSHA Pocket Guide to Chemical Hazards Available from: National Institute for Occupational Safety and Health Phone Number: (800-356-4674)


NIOSH Safety and Health Phone Number: (800-356-4674)


Respiratory Protection and Contact Lenses:

http://rehs.rutgers.edu/lslab_contacts.html

http://www.ccohs.ca/oshanswers/prevention/contact_len.html

APPENDIX I

HEALTHPOINT RESPIRATORY EVALUATION QUESTIONNAIRE
Respiratory Medical Evaluation Questionnaire
Please complete and submit to HealthPoint OHP. Fax: 512-471-2666

Part A: Section 1 - Demographics. The following information must be provided by every employee who is required to use a respirator at the University of Texas at Austin as part of their job duties.

<table>
<thead>
<tr>
<th>Name</th>
<th>EID</th>
<th>Sex: Male / Female</th>
<th>Date of Birth</th>
<th>Height</th>
<th>Weight</th>
<th>Age (nearest year)</th>
<th>Dept Name</th>
<th>Bldg.</th>
<th>Job Title</th>
<th>Work Phone</th>
<th>Shift</th>
<th>Supervisor Name</th>
<th>Date</th>
<th>Email Contact</th>
<th>Supervisor Phone</th>
</tr>
</thead>
</table>

Check the type of respirator you currently wear or plan to wear. Please use the pictures below to help you identify the correct respirator(s). You may check more than one category:

a. _____ N, R, or P disposable respirator, e.g. filter-mask, non-cartridge type only (N95)
b. _____ Air Purifying Respirator (APR), e.g. □ half or full face piece type, □ loose fitting powered-air purifying respirator (PAPR), □ tight fitting powered-air purifying respirator (PAPR), □ FR-64 gas mask
c. _____ Air Supplying Respirator (ASR), e.g. □ supplied-air (airline), □ self contained breathing apparatus (SCBA)

### Types of Respirators

**Air Purifying**
- Disposable
- Reusable Half-face and Full-face
- Powered Air Purifying Respirator (PAPR)

**Air Supplying**
- Airline
- Self-contained Breathing Apparatus (SCBA)

Have you worn a respirator in the past? (circle one): Yes / No  
If "Yes", what type(s): __________

Part A: Section 2 - Health Assessment. Questions 1-9 must be answered by every employee who has been selected to use any type of respirator. Questions 10-15 must be answered by ASR and APR respirator users. 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. Bronchitis (Yes)  
     - Yes  
     - No
   - B. Diabetic (Yes)  
     - Yes  
     - No
   - C. Allergic reactions that interfere with your breathing  
     - Yes  
     - No
   - D. Claustrophobia (Yes)  
     - 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