Respiratory Protection Program

DARTMOUTH

In accordance with 29 CFR 1910.134

Revised and distributed by
Dartmouth College
Environmental Health and Safety

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Foreword

It is the intent of Dartmouth College to provide a safe, healthful environment for all work activities, research and learning. This program is designed to provide information and requirements regarding respiratory protection to achieve that goal. The use of respiratory protection at Dartmouth is largely directed by the requirements contained in the Occupational Safety and Health Administration (OSHA) regulations, specifically **29 CFR 1910.134.** A component of this regulation is the concept of achieving exposure control through the determination and implementation of engineering controls whenever feasible. When such controls are not feasible to achieve adequate exposure control, personal protective equipment and/or other protective measures must be used.
A respirator is any device intended to protect the user from airborne contaminants and/or oxygen deficient environments. The selection and proper usage of respiratory protection is a critical component of the desired result of exposure control. Significant amounts of information must be known about the contaminants, and the environment in which respirators will be utilized to provide adequate protection. Some of this information includes:

1. General use conditions, including determination of contaminant(s);
2. Physical, chemical, and toxicological properties of the contaminant(s);
3. Odor threshold data;
4. The smallest of the Permissible Exposure Limit (PEL), Recommended Exposure Limit (REL) and Threshold Limit Value (TLV) exposure limits
5. **Immediately dangerous to life or health (IDLH) concentration; No Dartmouth employee should ever enter an atmosphere that is known to be IDLH. If an atmosphere becomes IDLH after entrance, it must be evacuated immediately and not re-entered until the IDLH atmosphere is no longer present.**
6. Eye and skin irritation potential; and
7. Any service life information available (for cartridges and canisters).

All Dartmouth faculty, staff, or students who wear a respirator, either due to institute policy or by personal choice (see Voluntary use section), must do so in accordance with this Program and must inform ***Environmental Health and Safety*** of their activities.

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Definitions

American Conference of Governmental Industrial Hygienists (ACGIH): is a charitable scientific organization that advances occupational and environmental health.

Air-purifying respirator: a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned protection factor (APF): of a respirator reflects the level of protection that a properly functioning respirator would be expected to provide to a population 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.

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

Ceiling Limit Value: is the concentration that should not be exceeded during any part of the working exposure.

Continuous flow respirator: an atmosphere-supplying respirator that provides a continuous flow of breathable air to the respirator facepiece.

Demand respirator: an atmosphere-supplying respirator that admits breathing air to the face piece only when a negative pressure is created inside the face piece by inhalation.

Emergency situation: any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Employee exposure: exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

End-of-service-life indicator (ESLI): a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only respirator: a respirator intended to be used only for emergency exit. **Filter or air purifying element:** a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering face piece (dust mask): a negative pressure particulate respirator with a filter as an integral part of the face piece or with the entire face piece composed of the filtering medium.

Fit factor: a quantitative estimate of the fit of a particular respirator to a specific individual, and 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.)

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Helmet: a rigid respiratory inlet covering that also provides head protection against impact and penetration.

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 the 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, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Loose-fitting face piece: a respiratory inlet covering that is designed to form a partial seal with the face.

Maximum use concentration (MUC): the maximum concentration, not to exceed the IDLH concentration, of a specific contaminant in which a respirator can be worn. The MUC is calculated by multiplying the Protection Factor (PF) by the lowest of the PEL/TLV/REL.

National Institute of Occupational Safety and Health (NIOSH): a research agency focused on the study of worker safety and health, and empowering employers and workers to create safe and healthy workplaces.

Negative pressure respirator (tight fitting): a respirator in which the air pressure inside the face piece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Occupational Health and Safety Administration (OSHA): is an agency of the U.S. Department of Labor that promotes safe and healthful working conditions for working people by setting and enforcing standards and by providing training, outreach, education and assistance.

Oxygen deficient atmosphere: an atmosphere with an oxygen content below 19.5% by volume.

Peak (P): refers to acceptable maximum concentrations above acceptable ceiling concentrations for and 8-hour shift. Peak is never to be exceeded.

Permissible Exposure Limit (PEL): the limit that OSHA (legal limit) has set for employee exposure to regulated contaminants that a worker may be exposed to in a typical 40-hour work week (8 hours/day, based on a time weighted average).

Physician or other licensed health care professional (PLHCP): an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows them to independently provide, or be delegated the responsibility to provide, some or all the health care services required by paragraph (e) of this section.

Positive pressure respirator: a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator. **Powered air-purifying respirator (PAPR)**: an air-purifying respirator that uses a blower to force the

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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 face piece 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.

Recommended Exposure Limit (REL): the time weighted average concentration for up to a 10-hour workday during a 40-hour work week as published by the National Institute for Occupational Safety and Health (NIOSH). Like TLVs, RELs are guidance values.

Respiratory inlet covering: the portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a face piece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

Service life: the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Short-term Exposure Limit (STEL): a 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the 8-hour TWA is within the TLV–TWA. The TLV–STEL is the concentration to which it is believed that nearly all workers can be exposed continuously for a short period of time without suffering from adverse health effects.

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.

Threshold Limit Value (TLV): the TWA concentration for a conventional 8-hour workday and 40-hour workweek, to which scientific data indicates that nearly all workers may be repeatedly exposed, day after day, without adverse effect. TLVs are published annually by the ACGIH (American Conference of Governmental Industrial Hygienists) and are guidance values.

Tight-fitting face piece: a respiratory inlet covering that forms a complete seal with the face.

Time-Weighted Average (TWA): represents airborne concentrations of substances averaged regarding their duration.

User seal check: an action conducted by the respirator user to determine if the respirator is properly seated to the face.

Voluntary Use: when an employee chooses to wear a respirator, even though the use of a respirator is not required by either Dartmouth policy or by OSHA standard.

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Section 1. Responsibilities

1.1 Program Administrator

The primary function of Dartmouth's Respiratory Protection Program Administrator involves administering the program and evaluating its effectiveness. An individual is qualified to be a program administrator if they have appropriate training or experience in accord with the program's level of complexity. The administrator may rely on other employees to help run parts of the respiratory protection program (e.g., fit testing, medical evaluations). The Program Administrator is responsible for assuring that all the requirements of this program are applied to the Dartmouth workplace. The current Program Administrator for Dartmouth's Respiratory Protection Program is:

Lars Barr, Occupational Health Specialist
Phone: 603-646-2189 and 603-667-6138
E-mail Address: Lars.Barr@dartmouth.edu

1.2 Employees/Supervisors

It is the dual responsibility of each employee and their supervisor to be familiar with, and strictly adhere to the contents and requirements of this program. No employee shall engage in the utilization of respiratory protection (except for Filtering Face Pieces –see section 3.3) without the written approval of the Program Administrator. Individuals who believe respiratory protection is necessary, or desired, should contact the Program Administrator prior to utilizing respiratory protection.

1.3 Voluntary Respirator Users

Voluntary use is defined as a situation in which an employee chooses to wear a respirator, even though the use of a respirator is not required by either Dartmouth policy or by OSHA standard. Voluntary use **does not** exempt an employee from the notification requirements included in section 1.3. Further, Voluntary Respirator Users must follow the following procedures:

- The Voluntary User must notify the Program Administrator of the intended voluntary respirator use prior to the utilization of the respiratory protection.

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- The Program Administrator must determine that the respirator itself will not present a hazard to the employee due to misuse, other hazards or conditions in the workplace, or employee medical conditions.

- The Voluntary User must be provided with, sign, and date the advisory information included in **Appendix C** prior to the utilization of the respiratory protection by the Voluntary User.

- The Voluntary User has the option to complete a medical evaluation (at cost) and receive on-going evaluations as described in section 4 of this Program prior to the utilization of the respiratory protection. **Exception**: Voluntary Users are not required to to be in the written respiratory protection program whose only use involves the voluntary use of filtering face pieces (dust masks), but must be provided a copy of Appendix C.

- The Voluntary User has the option to be fit tested for the type and style of respirator to be used. This procedure must satisfy the requirements presented in section 5 of this program.

Section 2.0 Respiratory Hazards

2.1 Introduction to Respiratory Protection

The respiratory system can tolerate exposures to gases, vapors and particulates, to an extent. In excessive amounts, however, contaminants can impair or destroy portions of the respiratory tract, be absorbed directly into the bloodstream from the lungs and/or damage organs and tissues. When air is inhaled, the chest muscles and diaphragm contract, lifting the rib cage and enlarging the chest cavity. As a result, the lungs expand and fill with air. Contaminants may be absorbed through nasal passages and linings of the respiratory tract or may continue through the trachea (windpipe) and into the lungs. In the lungs oxygen enriched blood is exchanged for carbon dioxide, which is diffused out to be exhaled. This blood has the potential to distribute contaminants throughout the body. Respirators, when properly fitted and of the appropriate design, have the capability of drastically reducing the amount of contaminants entering the respiratory system.

2.2 Oxygen Deficiency

"Normal Air" consists of 78% Nitrogen, 20.9% Oxygen, 0.03 % Carbon Dioxide and 1.07 % inert gases.

Atmospheres containing less than 19.5% oxygen are **oxygen deficient**. One or both of

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the following factors generally cause oxygen deficiency:

1. Displacement: Oxygen is displaced by another material (chemical).
2. Consumption: Oxygen is consumed in some type of process (rusting).

Regardless of the cause of the oxygen deficiency, if ventilation is not possible and/or effective in normalizing the oxygen concentration in the atmosphere (meaning the oxygen concentration in the space remains less than 19.5%) the atmosphere is both oxygen deficient and IDLH and entry into the environment must not occur.

Atmospheres containing oxygen concentrations greater than 23.5% also present hazards and should not be entered. The Dartmouth *Confined Space Entry Program* may be referenced for specific information regarding entry into hazardous atmospheres.

2.3 Chemical Contaminants

As previously discussed, chemical contaminants in the air can create a host of health-related concerns depending upon the dose, specific chemical and other factors. Identifying potential chemical hazards, as well as potential concentrations is critical. This information allows for the appropriate selection of respiratory protection. In certain areas chemical monitoring may be required to determine exposure levels. For purposes of respiratory protection, chemicals can be grouped into the following broad categories:

- Irritants: corrosive substances which injure and inflame tissue
- Asphyxiant: substances which displace oxygen or chemically prevent the use of oxygen in the body.
- Anesthetics: substances which depress the central nervous system, causing a loss of sensation or intoxication.
- Systemic poisons: substances, which can cause disease in various organ systems.

2.4 Aerosols

The term “aerosol” is used to describe fine particulates (solid or liquid) that are suspended in air. Aerosols can create serious health hazards depending upon their composition and concentration. Aerosols may be filtered by using an appropriately designed mechanical filtering device.

2.5 Dusts, Smoke and Particles

Dust and smoke are produced by a mixture of particulates in air. As with aerosols, the diameter of the particulate is to a large degree the determining factor in choosing appropriate respiratory protection. Smoke is generally liquid or solid particles created by the incomplete combustion of a material. Certain dusts can create explosive environments when present in appropriate concentrations.

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Section 3. Selection of Respirators

The selection of respiratory protection is a process that involves the evaluation and understanding of the work environment and potential hazards. At a minimum, the following items must be considered in the selection/evaluation of respiratory protection:

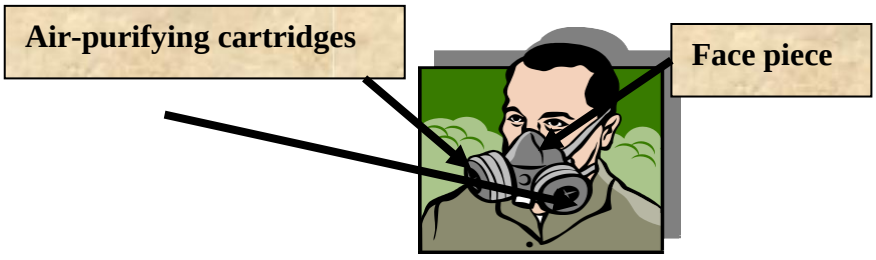
- Effectiveness of the device against the substance(s) of concern
- Estimated maximum concentration of the substance in the work area(s)
- General environment (confined space, open area etc.)
- Known limitations of each type of respiratory device
- Potential for oxygen deficiency
- Odor threshold data
- Eye and skin irritation potential
- Physical, chemical and toxicological properties of the contaminant(s)
- Immediately dangerous to life and health (IDLH) concentration
- Any available service life information (for cartridges and canisters)

3.1 Air Purifying Respirators (APR)

Air Purifying Respirators (APR's) function by passing atmospheric air through a purifying element. APR's generally fall into one of three categories:

- Particulate APR's which employ a mechanical filter element
- Gas/Vapor APR's that utilize chemical sorbents contained in cartridges or canisters
- Combination Particulate/Gas-Vapor respirators

APR's contain two major components: The face piece and the air-purifying element.



APR's are available in both:

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- Full-Face
- Half-mask styles

The face piece seals the respirator to the wearer. Attached to the face piece is the lens (in the case of a Full-Face respirator) and suspension straps for holding the mask to the face. Contained within air-purifying respirators are check valves and exhalation valves which prevent exhaled breath from entering the respirator through a valve other than through the cartridge(s). It is important to note each respirator manufacturer has unique ways of assembling respirator components and unique parts. Always use replacement parts that are of the same manufacturer and part number as the respirator.

APR's have several limitations, which are important to understand. First, APR's, by design, filter ambient air. **APR's are ineffective in oxygen deficient atmospheres**. Secondly, APR's filter only those contaminants they have been equipped to filter. That is, specific cartridges must be used with an APR designed to filter specific contaminants.
APR's also are designed with Maximum Use Concentrations (MUC) (the maximum concentration at which an APR can be utilized).

The **Maximum Use Concentration** is defined as:

MUC = PF x Lowest of the (STEL, PEL, Ceiling) values where

MUC = Maximum Use Concentration
PF = Protection Factor CO/CI (See section 4)
PEL = Permissible Exposure Limit
STEL = Short-term Exposure Limit
Ceiling = concentration that should not be exceeded during the workday

} Lowest of the three values

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

STEL: Not Established
PEL: 200 ppm
Ceiling: 300 ppm
Thus, utilizing the formula:

MUC = PF (If qualitative fit testing use Assigned Protection Factors in Appendix A) 10 (Half Mask) or 50 (Full Face piece) x 200 ppm (PEL)

MUC = **2,000 ppm (Half Mask) 10,000 ppm (Full Face piece)** (IDLH = 500 ppm)

If exposure concentrations are expected to exceed 10,000 ppm, or if the environment was potentially oxygen deficient, an APR could not be utilized in this example.

These factors necessitate that the user know both the hazardous constituent(s) present in an environment and the concentration of those constituent(s).

Air Purifying Respirators may be utilized only if all of the following conditions are met:

1. The identity and concentration of the contaminant(s) are known.
2. The oxygen content of the environment is greater than or equal to 19.5%
3. There is periodic monitoring of the work area, if required.
4. The chemical has adequate warning properties.
5. The respirator assembly is approved for protection against the specific contaminant and concentration level.
6. The type of respirator being used has been successfully fit tested on the wearer.
7. The Maximum Use Concentration (MUC) of the respirator and cartridge will not be exceeded.

3.1(a) Powered Air Purifying Respirators (PAPR)

Powered Air Purifying Respirators (PAPR) are a type of air-purifying respirator that uses a mechanical device instead of lung-power to force air through the cartridge/canister and into the face piece. Since the delivered air creates no resistance, PAPR's should maintain a ***positive pressure*** at all times. (See Section 5)

PAPR's, although mechanically enhanced, filter ambient air. As such, like all APR's **PAPR's are ineffective in oxygen deficient atmospheres.**

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3.1(b) Identification/Selection of Respirator Cartridges/Canisters

Respiratory hazards can generally be divided into two categories: particulates and vapors/gases. Particulates are filtered by mechanical means, while vapors are removed by sorbents that are chemically reactive. Respirators using a combination of a mechanical filter and chemical sorbent will effectively remove both hazards.

Particulate Removing Filters

Particulates can occur as dusts, fumes, or mists. The hazards posed by particulates/gas-vapors can be referenced according to the material's Permissible Exposure Limit (PEL), Recommended Exposure Limit (REL) and/or Threshold Limit Value (TLV).

- **PEL - Permissible Exposure Limit:** is the limit that OSHA (legal limit) has set for employee exposure to regulated contaminants that a worker may be exposed to in a typical 40-hour work week (8 hours/day, based on a time weighted average).
  A complete list of OSHA PEL values is available at:
  https://www.osha.gov/annotated-pels/table-z-1
- **TLV - Threshold Limit Value:** the time weighted average concentration for a conventional 8-hour workday and 40-hour workweek, to which scientific data indicates that nearly all workers may be repeatedly exposed, day after day, without adverse effect. TLVs are published annually by the ACGIH (American Conference of Governmental Industrial Hygienists) and are guidance values.
- **REL- Recommended Exposure Limit:** the time weighted average concentration for up to a 10-hour workday during a 40-hour work week as published by the National Institute for Occupational Safety and Health (NIOSH). Like TLVs, RELs are guidance values. A complete list of REL values is available at:
  https://www.cdc.gov/niosh/npg/default.html

Particulate-removing cartridges contain a filter that reduces the inhaled concentration of toxic dusts and fiber, such as lead, asbestos, fumes, mists, and radioactive and biological materials. Due to the design of the cartridges, their efficiency increases with use as the trapped particulate acts to reduce the filter media screen size. However, when breathing becomes strained, the cartridges should be replaced. Particulate removing cartridges/filters are categorized into nine classes based on filter efficiency and resistance to oil.

3 levels of filter efficiency*:*

1. 95% (called "95")
2. 99% (called "99")
3. 99.97% (called "100")

3 categories of resistance to filter efficiency degradation:

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1. N (*N*ot resistant to oil)
2. R (*R*esistant to oil)
3. P (oil *P*roof)

If no oil particles are present, use any series (N, R, or P); If oil particles are present, use *only* R or P series; If oil particles are present and the filter is to be used for more than one work shift, use *only* P series.

Gas and Vapor Removing Cartridges

Respirators using Air Purifying Respirator cartridges are designed to protect the wearer from specific chemical hazards. Manufacturers are required to color code cartridges in a uniform manner in an attempt to standardize the selection process. Some of the uniform color codes are:

- **Black** -- organic vapors
- **White** -- acid gas
- **Green** -- ammonia gas/methylamine
- **Magenta** -- **p**articulate aerosols
- **Yellow** -- mixture of acid gases and organic vapors
- **Orange** -- mercury and chlorine

All gas and vapor removing cartridges have limitations. It is important to identify the maximum concentration of contaminant(s) for which the cartridge or canister is approved.

3.1(c) Service Life of Respirator Cartridges/Canisters

Each cartridge or canister has a finite capacity for removing contaminants. Once the included sorbent has reached a point of saturation the "cleaning" element will allow contaminants to pass through and enter the face piece. To ensure chemical cartridges are replaced before the service life ends, cartridges equipped with End-of-Service-Life Indicators (ESLI) should be used whenever possible**.** When ESLI technology does not exist or is not possible for a given contaminant**,** a cartridge change-out schedule must be developed and followed. EHS staff are available to assist departments in complying with this regulatory requirement. In all cases the cartridge/canister manufacturer should be contacted and/or referenced to determine specific service life and change out frequency recommendations.

Listed below are OSHA-recognized rules of thumb that can be used to estimate chemical cartridge service life:

- If the chemical's boiling point is >70°C (158°F) and the concentration is less than 200 ppm you can expect a service life of 8 hours at a normal work rate.
- Reducing concentration by a factor of ten (10) will increase the service life by a factor of five (5).

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- Humidity above 85% will reduce service life by 50%.

The following factors should also be considered when determining service life.

- The contaminant(s) that the respirator is to protect against
- The concentration of contaminants in the work area
- Frequency of use
- Work Rates
- The presence of potentially interfering chemicals

3.2 Supplied Air Respirators (SAR)

Supplied Air Respirators (SAR's) are used to provide breathing air from a source independent of the ambient atmosphere. There are two types of SAR's:

1. "Airline Respirators"
2. Self-Contained breathing apparatus (SCBA) – EHS USE ONLY

SAR's may be used in the following situations:

- The concentration and/or constituent(s) of a contaminant in an atmosphere are unknown - known, or potential IDLH atmospheres including oxygen deficient atmospheres **will not be entered.**
- The contaminant(s) have inadequate warning properties.
- Any of the requirements necessary for APR usage are not met.
- The cartridge/canister limitations are exceeded, or MUC is exceeded.
- Exposure to any of the OSHA listed carcinogens, found at https://www.osha.gov/carcinogens/standards is possible. (Observe the requirements in all applicable paragraphs and appendices since they each have unique respiratory protection requirements)

Compressed air is the only type of breathing air system that is approved for use at Dartmouth. Compressed air is provided either from compressed gas cylinders or air compressors at relatively high pressures. Approval must be obtained from ***Environmental Health and Safety*** prior to the use of any air compressor system intended to provide breathing air. Regulators are used to reduce the pressures delivered to the face piece to a safe level.

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Regulators **Air Source** **Facepiece**

Air Source

Breathing air, at a minimum, must meet the following composition requirements:

- Oxygen content must be at least 19.5% but no more than 23.5% of the total volume of air.
- Condensed hydrocarbons and particulate content must be 5 milligrams / cubic meter (mg/m^3) of air or less.
- Carbon monoxide level in breathing air must be 10 ppm or less.
- Carbon dioxide level in breathing air must be 100 ppm or less.
- The breathing air must not contain a noticeable odor.
- A dew point of 50 ^oF at 1 atmosphere of pressure is not exceeded.

Cylinders of breathing air must be tested and maintained according to Department of Transportation (DOT) regulations Parts 173 and 178. The frequency and types of testing required is contained in **Section 7.3**. Cylinders of breathing air that are purchased from commercial vendors must include certification paperwork stating that the compressed air meets the minimum criteria listed above, also known as Grade D breathing air. This verification is intended to prevent regulator freeze up due to excessive moisture content. Appropriate identifying labels must be on all cylinders at all times.

Regulators

Regulators reduce the pressure of supplied breathing air to levels safe for use. The use of improper or faulty regulators can lead to serious injury and even death. It is critical that only regulators designed for breathing air be used in supplied air systems. **Never use an oxygen regulator in a supplied air system** as quantities of oil and grease in the system can lead to fire and explosion hazards.

SAR's, which operate on the airline system, must include no more than 300 feet of airline. The air source must not be depletable (escape bottle).

3.2(a) Demand Respirators

When a SAR is in the demand mode, the inhalation of the wearer creates a negative pressure inside the face-piece and breathing tubes. The pressure gradient opens an admission valve and allows air to enter the face-piece and then be inhaled. It is possible, however, in the demand mode of an SAR, to inhale contaminants through any gaps that may be present in the face to face-piece seal.

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3.2(b) Pressure Demand Respirators

When an SAR is in the pressure demand mode, a positive pressure is always maintained inside the face-piece. If any leakage occurs, it is outward from the face piece.

3.2(c) Continuous-Flow Respirators

In addition to demand and pressure demand modes, airline respirators are available in continuous flow configurations. Continuous flow airline respirators always maintain airflow, rather than only on demand. In place of a demand or pressure demand regulator, an airflow control valve or orifice partially controls airflow. A flow of at least 115 liters per minute (LPM) (tight fitting face piece) or 170 LPM (loose fitting hood or helmet) must be maintained at the lowest air pressure and longest hose length specified. By design, either the control valve cannot be closed completely, or a continually open bypass is provided to allow air to flow around the valve and maintain the required minimum rates.

3.2(d) Self-contained Breathing Apparatus (SCBA) – EHS USE ONLY

There are two types of Self-Contained Breathing Apparatus:

- *Closed Circuit*: Commonly referred to as a "re-breather", the device recycles exhaled breath. The air for breathing is mixed in a flexible breathing bag and allows the unit to require only a small oxygen supply.

- *Open Circuit:* An open circuit SCBA exhausts the exhaled air to the atmosphere and does not re-circulate it. The air source regulator and face-piece are all included in a portable unit.

All SCBA devices must be equipped with low pressure alarming devices, which alert the user to low air pressure. The alarm should be capable of alerting the user to 25% or less remaining breathable air. As with other respiratory equipment, periodic inspection is required. The details of SCBA inspection frequency requirements are outlined in **Section 7.3.**

3.3 Filtering Facepieces

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Filtering Facepieces and dust masks can provide protection from dusts, mists and certain other fibers. Only Filtering Facepieces approved by NIOSH may be utilized at Dartmouth. **Filtering Facepieces provide no protection from chemical contaminants and cannot be used in oxygen deficient atmospheres.** Filtering Facepieces must be maintained in a clean and functional manor. Damaged or soiled Filtering Facepieces must be discarded. Filtering Facepieces that are approved by NIOSH, may be used at Dartmouth on a voluntary basis without completing the medical requirements outlined in Section 4. Voluntary users of filtering facepieces must, however, notify the Respiratory Program Administrator of their intended use prior to introducing them into the workplace, and complete the information included in Appendix C of this program.

3.4 Respirator Selection Logic

The proper selection of a respirator is critical to exposure prevention. When selecting a respirator, the following ten points should be used as minimum selection criteria:

1. What is/are the *potential* contaminant(s) and at what concentration(s) will it be present?
2. What is the PEL/TLV/REL (lowest of the three values) for the given contaminant(s)?
3. Is the contaminant a gas, vapor, mist, dust or fume? Combination?
4. Could the contaminant concentration be termed immediately dangerous to life or health (IDLH)?
5. If the contaminant is flammable, does the estimated concentration approach the Lower Explosive Limit (LEL)?
6. Does the contaminant have adequate warning properties?
7. Will the contaminant irritate the eyes at the estimated concentration?
8. If the contaminant is a gas or vapor, is there an available cartridge/canister that will effectively filter it.
9. Can the contaminant be absorbed through the skin? If so, will it cause injury?
10. What is the nature of the work to be performed?

The following page contains a flowchart designed to aid in respirator selection.

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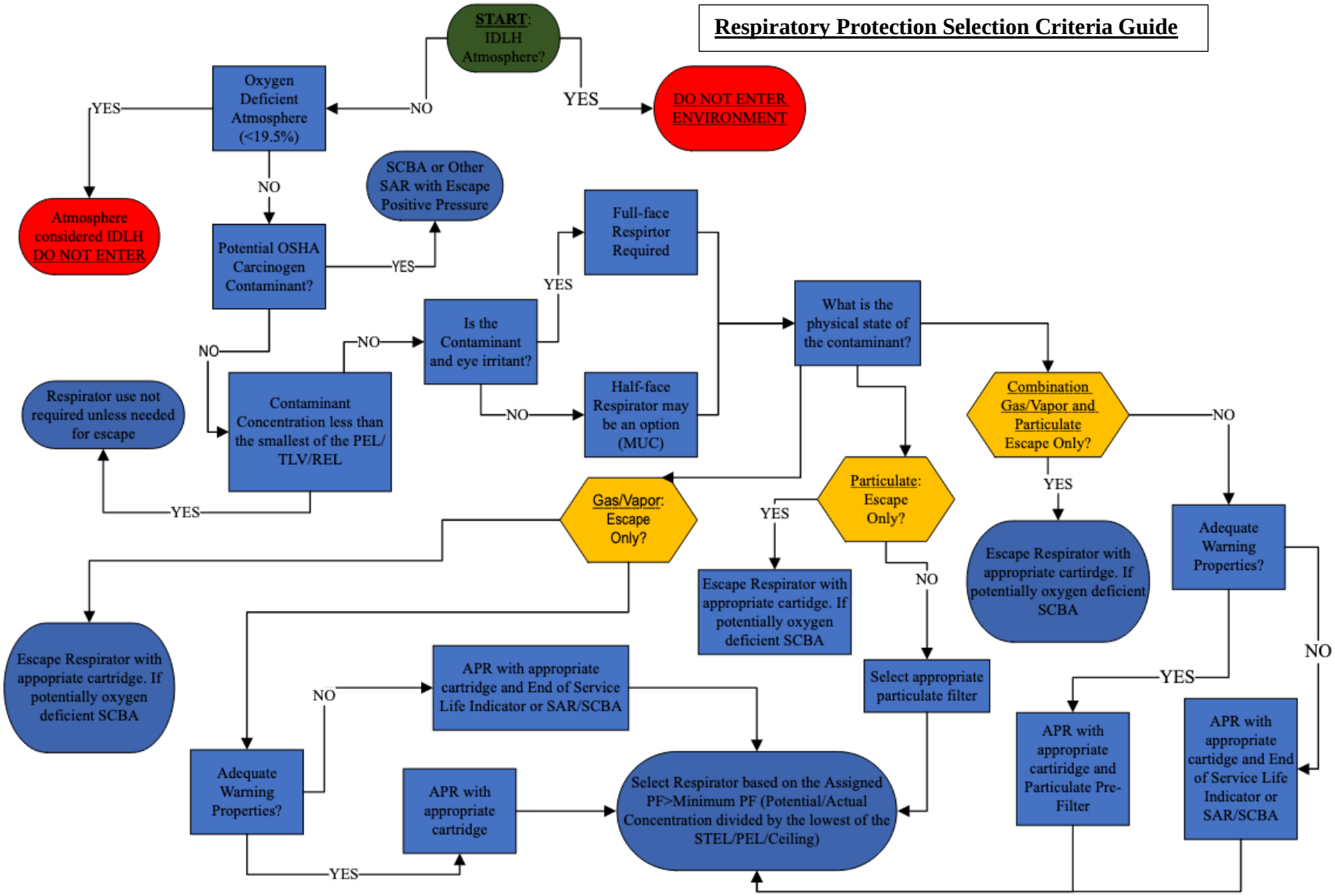
Respiratory Protection Selection Criteria Guide



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Section 4. Medical Evaluation

4.1 Initial (Pre-usage)

Due to the potential health related effects of respirator usage, all faculty, staff and students that may need to utilize respiratory protection at Dartmouth are required to receive a pre-usage medical evaluation prior to being "Fit Tested" (See Section 5) or utilizing a respirator at Dartmouth.

Specific medical conditions that may place an employee at increased risk of illness, injury or death include, but are not limited to:

- Cardiovascular and respiratory disease, such as high blood pressure, angina, asthma, chronic bronchitis or emphysema
- Cardiovascular damage caused by heart attack or stroke
- Reduced lung function caused by prior factors such as smoking or prior exposure to respiratory hazards
- Neurological disorders such as epilepsy
- Musculoskeletal disorders such as lower back pain
- Psychological conditions such as claustrophobia and severe anxiety

Dartmouth will provide initial medical evaluations at no cost to the employee and at a time and place that is convenient to the employee. A Physician or other Licensed Health Care Professional (PLHCP) will review the initial medical evaluation and will utilize the questionnaire or obtain the same information that is included in the questionnaire that is presented in Appendix C to OSHA regulation 29 CFR 1910.134. The contents of this questionnaire are available from ***Environmental Health and Safety***

The medical evaluation and portions of *Dartmouth's Respiratory Protection Program* for faculty and staff are currently being administered by:

Dartmouth Hitchcock Medical Center
Occupational and Environmental Medicine
1 Medical Center Drive
Lebanon, NH 03756
Tel (603) 653-3850 | Fax (603) 650-0928

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Environmental Health & Safety

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http://www.dartmouth.edu/~ehs/

The medical evaluation portion of *Dartmouth's Respiratory Protection Program* for **students** are currently being administered by:

Dartmouth College Health Center
5-7 Rope Ferry Road
Dartmouth College
Hanover, NH 03755
Tel (603) 646-9400 | Fax (877) 884-8110

The results of all medical evaluations will be kept confidential. The PLHCP will be made available to Dartmouth employees to discuss the contents of their medical evaluations. Dartmouth will provide the PLHCP with information specific to each employee's potential respiratory protection requirement. This information will include:

- The type and weight of the respirator to be worn by the employee
- The estimated duration and frequency of respirator use
- The tasks the employee may be completing while wearing the respirator
- The temperature and humidity extremes that may be encountered in the work area

The form included in **Appendix E** should be used to document this information. The form, once completed and signed by the PLHCP must be returned to the **Program Administrator**.

Based on the combination of information provided by Dartmouth, the contents of the medical questionnaire and any other factors in which the PLHCP deems as relevant to the medical evaluation, the PLHCP will furnish both Dartmouth and each employee a written determination regarding the employee's medical qualification to wear the respirator. This written determination will include:

- A determination of whether the employee is medically able to use a respirator
- Any limitations on the respirator use related to the medical condition of the employee or to the workplace conditions in which the respirator will be used.
- The need, if any, for follow up medical evaluations
- Verification that the PLHCP has provided a copy of the written determination to the employee

4.2 Follow-Up Medical Evaluations

Follow-up medical evaluations will be made available to Dartmouth employees whenever any of the following events occur:

1. The employee reports symptoms related to their ability to wear a respirator.
2. The PLHCP, the Respiratory Protection Program Administrator, or supervisor determines that a medical re-evaluation is necessary.
3. Information from this program suggests a need for re-evaluation.

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4. Workplace conditions change as to place an increased burden on the employee's health.

4.3 Record Keeping

All applicable medical evaluation records will be kept strictly confidential and will be made available to employees upon request.

Section 5. Fit Testing

Annual Fit Testing is a process that is designed to ensure that a specific type of respirator (Size, Brand, Style and Type) fits a specific individual adequately. If a respirator does not fit an individual appropriately contaminants may leak into the face-piece causing potential exposure. Fit Test procedures must be completed, at a minimum:

1. Prior to Initial use
2. Whenever an individual switches to a different type of respirator
3. When there is a significant physical change in the respirator wearer
4. At least annually

There are two types of Fit Tests: Qualitative and Quantitative. **Qualitative Fit Testing is not appropriate for all situations**. There are several concepts that are integral to proper respirator fit and selection:

Positive Pressure respirators maintain positive pressure inside the face piece throughout the user's breathing cycle. The air pressure inside the face piece exceeds the pressure outside of the face piece preventing contaminants from entering the face piece if leakage occurs.

Negative Pressure respirators, in contrast, do not afford such pressure protection. The air pressure outside of a negative pressure respirator exceeds the air pressure inside allowing contaminants to enter the face piece if leakage at the face-to-face piece seal occurs.

Fit Factor is a quantitative measure of how well a particular respirator fits an individual.

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It is defined as the ratio of the concentration of a contaminant in the environment to the concentration inside the mask. Fit Factors are obtained from ***Quantitative Fit Testing***.

$$FF = \frac{\text{Concentration Outside the mask (CO)}}{\text{Concentration Inside the mask (CI)}}$$

For example, if an employee was placed in a test chamber containing 300 ppm of a test agent and 3 ppm of the test agent was measured inside the face piece of the respirator, the Fit Factor/Protection Factor would equal 100.

The ***Assigned Protection Factor (APF)*** of a respirator reflects the level of protection 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 a user could expect to inhale no more than one tenth of the airborne contaminant present.

5.1 Qualitative

Qualitative Fit Testing is a non-numeric pass/fail test that relies on the respirator wearer's response to a substance (test agent) used in the test to determine respirator fit. To complete the test the respirator wearer generally stands in an enclosure and is subjected to a test agent such as Isoamyl Acetate, Saccharin, or Bitrex. If the respirator wearer can taste any Saccharin (sweet) or Bitrex (bitter) test agents, or smell isoamyl acetate (banana-like odor), the fit test is failed as an adequate face to face piece seal has not been established. In such cases (Qualitative Fit Test failures) another make, size or brand of respirator must be used until a sufficient seal has been established. Only OSHA-approved Qualitative Fit test protocols are acceptable at Dartmouth. These protocols can be obtained from ***Environmental Health and Safety.***

As was previously stated **Qualitative Fit Testing is not appropriate for all situations.** Qualitative fit testing may not be used to fit negative pressure respirators, either air purifying or atmosphere supplying, when exposure to more than ten times the Permissible Exposure Limit is possible. (Fit factors in excess of 100 are required).

5.2 Quantitative

Quantitative Fit Testing involves the numeric measurement of leakage into a respirator. Sampling probes or other measuring devices are used to record this measurement. For a respirator to be considered as fitting properly (when considering the quantitative method), quantitative analysis must show:

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- A Fit Factor equal to or greater than 100 for Half and quarter facepieces
- A Fit Factor equal to or greater than 500 for Full facepieces

As with qualitative fit testing, only OSHA-approved Quantitative Fit test protocols are acceptable at Dartmouth. These protocols can be obtained from ***Environmental Health and Safety.***

5.3 Acceptable Fit Test Methods

The following chart summarizes the acceptable methods for fit testing respirators of varying types.

	Acceptable Fit-testing Methods	
Respirator	**QLFT**	**QNFT**
Half-Face, Negative Pressure, APR (<100 fit factor)	**Yes**	**Yes**
Full-Face, Negative Pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	**Yes**	**Yes**
Full-Face, Negative Pressure, APR (>100 fit factor)	**No**	**Yes**
PAPR	**N/A**	**N/A**
Supplied-Air Respirators (SAR), or SCBA used in Negative Pressure (Demand Mode) (>100 fit factor)	**No**	**Yes**
Supplied-Air Respirators (SAR), or SCBA used in Positive Pressure (Pressure Demand Mode)	**Yes**	**Yes**
SCBA - Structural Fire Fighting, Positive Pressure	**Yes**	**Yes**
SCBA/SAR - IDLH, Positive Pressure	**Yes**	**Yes**

5.4 Record keeping

Respirator fit testing of Dartmouth employees will be documented and will contain, at a minimum, the type of respirator utilized (brand, make and model), size of the respirator, method of testing and test results, test date, and the name of the individual administering the test. **Appendix D** contains Dartmouth's "*Fit Test Documentation*

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Form".

Section 6. Respirator Usage

6.1 Preventing Leaks in the Face Piece Seal

The proper seal of a tight-fitting respirator to the face of the user is a critical element of exposure control. Additionally, the improper functioning of a respirator valve can result in exposure to contaminants. Specific conditions that can interfere with proper seals and valve functions can include:

- Facial hair
- Facial Scars
- Jewelry or headgear that projects under the face piece seal
- Corrective glasses, goggles or other personal protective equipment

6.2 User Seal Checks

To verify that leaks in the facepiece seal are not present and that all respirator valves are working appropriately, "user seal checks" should be completed before each usage.
Note: User Seal Checks do not take the place of appropriate fit test procedures. User Seal Checks should be utilized before each use.

For the **Negative Pressure** check:

1. Cover the respirator inlets (Cartridges, Canisters or seals)
2. Gently Inhale
3. Hold the breath for ten (10) seconds

The face piece should "collapse" on your face and remain collapsed with no air leakage.

For the **Positive Pressure** check:

1. Cover the respirator's exhalation valves
2. Exhale

The respirator should hold the positive pressure for a few seconds. During this time no leakage should occur in the face-to-facepiece seal.

If, at any point, during normal usage, an individual believes that their respirator is not properly functioning, they should immediately leave the area until further inspection can be completed on the respirator.

6.3 Immediately Dangerous to Life and Health (IDLH) Atmospheres

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No Dartmouth employee should ever enter an atmosphere that is known to be IDLH. If an atmosphere becomes IDLH after entrance, it must be evacuated immediately and not re-entered until the IDLH atmosphere is no longer present.

Section 7. Respirator Maintenance

7.1 Cleaning/Disinfecting

Dartmouth employees who utilize respirator protection, and who are included within the scope of this program, are responsible for the cleaning/disinfecting of their own respirator(s). Since affected employees are assigned personal respirators (respirators should not be shared between employees) the frequency of respirator cleaning/disinfecting must be such that the respirator(s) is maintained in a clean and sanitary fashion. The proper procedures for cleaning/disinfecting a respirator are:

1. Remove all cartridges, canister or filters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assembly's hoses, and all other components recommended by the respirator's manufacturer.
2. Wash the components in warm water with a mild detergent, preferably containing a disinfecting agent. (If the detergent does not contain a disinfecting agent, a solution can be made by adding approximately one milliliter of household bleach to one liter of water).
3. Rinse the components in clean, warm water. Be sure to rinse the components completely as failure to do so could result in skin irritation and the premature failure of respirator components.
4. Components should be hand dried with a clean, lint free cloth or air-dried.
5. Reassemble the respirator.
6. Perform seal checks to verify that all components are returned to working order.

Respirator cleaning/storage kits like the one pictured below are commercially available and include all the necessary components to adequately clean and disinfect respiratory equipment.

7.2 Storage

Respirators must be stored in a manner that protects them from contamination, dust, sunlight, extreme temperatures, extreme moisture damaging chemicals and other destructive forces at all times while not in use. Filter cartridges should be stored separately from cleaned respirators to prevent contamination of the interior of the face piece from hazardous particulate matter that may have accumulated on a filter cartridge. Also, respirators should be stored such that it retains its original configuration.

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Synthetic materials and even rubber will warp if stored in an unnatural shape, thus, affecting the fitting characteristics of the facepiece.

7.3 Inspection

To ensure respiratory equipment remains in reliable, adequately functioning condition, inspections must be completed per the following schedules. Note: The table contains the ***minimum*** requirements.

Type of Respirator	Routine Use	Emergency Escape
APR	Must be inspected **before each use and during cleaning**. Inspection should include respirator function, tightness of connections condition of various parts such as the facepiece, headstraps, valves, connecting tube, and cartridges. Synthetic or rubber components must be evaluated for pliability and signs of deterioration.	Must be inspected **before entering the work area and during cleaning**. Inspection should include respirator function, tightness of connections condition of various parts such as the face piece, headstraps, valves, connecting tube, and cartridges. Synthetic or rubber components must be evaluated for pliability and signs of deterioration.
SAR	Must be inspected **before each use and during cleaning**. Inspection should include respirator function, tightness of connections condition of various parts such as the facepiece, headstraps, valves, connecting tube, and cartridges. Synthetic or rubber components must be evaluated for pliability and signs of deterioration.	Must be inspected **before entering the work area and during cleaning**. Inspection should include respirator function, tightness of connections condition of various parts such as the facepiece, headstraps, valves, connecting tube, and cartridges. Synthetic or rubber components must be evaluated for pliability and signs of deterioration.

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SCBA **EHS USE ONLY**	**Must be inspected at least monthly.** Breathing air cylinders must be maintained in a fully charged state and recharged when the pressure falls below 90% of the manufacturer's recommended pressure level. The regulator, and all warning devices must be inspected to ensure proper function. Straps and other items must be inspected for signs of deterioration. Check hydrostatic test date on air bottle(s) Records of monthly inspections must be completed using the form included in **Appendix B**.	**Must be inspected at least monthly.** Breathing air cylinders must be maintained in a fully charged state and recharged when the pressure falls below 90% of the manufacturer's recommended pressure level. The regulator, and all warning devices must be inspected to ensure proper function. Straps and other items must be inspected for signs of deterioration. Check hydrostatic test date on air bottle(s). Records of monthly inspections must be completed using the form included in **Appendix B**.

7.4 Repair

Respirators that fail to pass inspection or are otherwise found to be defective must be removed from service, and discarded, repaired, or adjusted. Due to the complex nature of components such as reducing and admission valves, regulators, and alarms only the respirator manufacturer, or technicians trained by the manufacturer, may complete respirator repairs on respirators used by Dartmouth employees. Only NIOSH and manufacturers approved parts will be used to repair respirators. If a respirator must be sent out for repair and/or service, the employee will be given a replacement respirator of the same make, model, and size.

Section 8. Employee Training and Information

8.1 Scope and Applicability

Training is an essential part of appropriate respiratory protection selection, usage and maintenance. Dartmouth has established a training program that includes (at a minimum):

- The general requirements of OSHA's respiratory protection standard
- Respiratory hazards identification
- Proper respirator selection
- Procedures for inspecting, wearing and seal checking a respirator
- Information regarding the potential consequences of improper fit, usage and/or maintenance
- Respirator limitations

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- Proper procedures for maintenance and storage
- Recognizing medical signs and symptoms that may limit or prevent the use of respirators

8.2 Frequency

Respiratory training is required for individuals under the following conditions:

- Before a respirator is used by an individual at Dartmouth (Initial)
- Situations in which changes in the type of respirator assigned to an employee render previous training obsolete.
- Any situations that may arise that show that the employee lacks sufficient respiratory protection knowledge to have adequate protection.
- At least annually

Section 9. Program Evaluation

9.1 Conducting Program Evaluations

Environmental Health and Safety will conduct periodic evaluations, as necessary, to ensure employees are following the provisions of this program. The evaluations will be used to determine the effectiveness of training programs and to ensure that respiratory protection is being utilized correctly.

9.2 Employee Consultations

Employee consultations may be utilized by ***Environmental Health and Safety*** to ascertain employee's views on program effectiveness and to identify any problem areas. Such consultations may also include respirator inspections designed to ensure that proper usage, maintenance and selection processes are being observed.

Section 10. References

OSHA Regulations (standards – 29 CFR), Respiratory Protection Program – 1910.134

Appendix A: Assigned Protection Factors

Table of APFs for various types of Respirators

Respirator Class and Type	*OSHA* .	*NIOSH*
Air Purifying		
Filtering Facepiece	10	10
Half-Mask	10	10
Full-Facepiece	50	50
Powered Air Purifying		
Half-Mask	50	50
Full-Facepiece	250	50
Loose Fitting Facepiece	25	25
Hood or Helmet	25	25
Supplied Air		
Half-Mask-Demand	10	10
Half-Mask-Continuous	50	50
Half-Mask-Pressure Demand	1,000	1,000
Full-Facepiece Demand	50	50
Full-Facepiece Continuous Flow	250	50
Full-Facepiece Pressure Demand	1,000	2,000
Loose Fitting Facepiece	25	25
Hood or Helmet	25	25
Self-Contained Breathing Apparatus (SCBA)		
Demand	50	50
Pressure Demand	>1,000	10,000

Appendix B: SCBA Monthly Inspection Report Form
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Monthly SCBA Checklist

The two SCBA units must be inspected monthly using the following points. The units will be housed in the Ford Transit during summer months and in room 061 of the Life Sciences Center during winter. This checklist was created in accordance with the manufacturers recommendations and NFPA 1852 – Standard on Selection, Care and Maintenance of Open-Circuit Self-Contained Breathing Apparatus
[SCBA].

Backframe and Harness	**Unit 1**		**Unit 2**	
	Pass	Fail	Pass	Fail
Harness straps & backframe checked for cuts,tears,abrasion,heat or chemical damage	☐	☐	☐	☐
Buckles,fasteners and adjustments checked for operation	☐	☐	☐	☐
Cylinder retention system checked for damage and operation	☐	☐	☐	☐
Cylinder checked for secure attachment to backframe	☐	☐	☐	☐
Harness straps checked for full extension	☐	☐	☐	☐

Cylinder	**Unit 1**		**Unit 2**	
	Pass	Fail	Pass	Fail
Current hydrostatic test date (within 5 years)	☐	☐	☐	☐
Gauge checked for damage	☐	☐	☐	☐
Cylinder body checked for cracks,dents,weakened areas,heat or chemical damage	☐	☐	☐	☐
Composite portion of cylinder checked for cuts,gouges,loose materials,absence of resin	☐	☐	☐	☐
Cylinder valve outlet sealing surface and threads checked for damage	☐	☐	☐	☐
Valve hand wheel checked for damage,alignment,serviceability and attachment	☐	☐	☐	☐
Burst disc outlet area checked for debris	☐	☐	☐	☐
Cylinder fully charged	☐	☐	☐	☐

Hose	**Unit 1**		**Unit 2**	
	Pass	Fail	Pass	Fail
Hose checked for cuts,abrasions,bubbling,cracks,heat or chemical damage	☐	☐	☐	☐
External fittings checked for visual signs of damage	☐	☐	☐	☐
Hose checked for tight connections	☐	☐	☐	☐

EOSTI – (End Of Service Time Indicator)	**Unit 1**		**Unit 2**	
	Pass	Fail	Pass	Fail
EOSTI alarm & mounting hardware checked for damage,secure attachment,dirt,debris	☐	☐	☐	☐
EOSTI checked for proper activation	☐	☐	☐	☐

Regulator	**Unit 1**		**Unit 2**	
	Pass	Fail	Pass	Fail
Regulator controls checked for damage and proper function	☐	☐	☐	☐
Pressure relief devices checked visually for damage	☐	☐	☐	☐
Housing and components checked for damage	☐	☐	☐	☐
Regulator checked for unusual sounds (whistling,chattering,clicking,rattling) during operation	☐	☐	☐	☐
Regulator and bypass checked for proper function when each is operated	☐	☐	☐	☐

Pressure Indicator	**Unit 1**		**Unit 2**	
	Pass	Fail	Pass	Fail
Pressure indicator checked for damage	☐	☐	☐	☐
Cylinder pressure gauge and remote gauge checked to read within 10% of each other	☐	☐	☐	☐

PASS Device	Unit 1		Unit 2	
	Pass	Fail	Pass	Fail
Wear and damage assessment	☐	☐	☐	☐
Covers and compartments checked for secure attachment	☐	☐	☐	☐
All operating modes checked for proper function	☐	☐	☐	☐
Low battery warning signal	☐	☐	☐	☐

Heads Up Display (HUD)	Unit 1		Unit 2	
	Pass	Fail	Pass	Fail
All five lights illuminate upon startup	☐	☐	☐	☐
After startup rectangular lights indicate level of supply air	☐	☐	☐	☐

Rapid Intervention Crew/Company Universal Air Connection (RIC UAC)	Unit 1		Unit 2	
	Pass	Fail	Pass	Fail
Coupling and relief valve in good condition	☐	☐	☐	☐
Secure attachment	☐	☐	☐	☐

Pressure Retention Test	Unit 1		Unit 2	
	Pass	Fail	Pass	Fail
System retains pressure? (Close all regulator valves,open cylinder valve and close cylinder valve)	☐	☐	☐	☐

Comments:

Inspected by:
Date: Click here to enter a date.

Created: October 12, 2011
Modified: January 22, 2015

Appendix C: Voluntary Use Informational Form

In accordance with OSHA regulation **29 CFR 1910.134,** the following information is provided for your review. Signing of this form indicates that you have received the regulatory appendix, and understand its content.

Appendix D to Sec. 1910.134 (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, of 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 respirator's 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. (63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998)

Employee Signature:_____ **Date:**_____

Witness:_____ **Date:**_____

Appendix D: Fit Test Documentation Form

Name of Employee:_____ **Date:**_____

Employee Signature:_____

Fit-Test Conducted by:_____ **Date:**_____

Signature:_____

Testing Result Information

☐ Qualitative Fit-Test Record Type

of Mask:_____

Manufacturer:_____

Model:_____

Size_____

Irritant used: Isoamyl Acetate
Saccharin Bitrex
Other:_____

Pass **Fail**

(circle one)

Additional Comments:_____

_____

_____

_____

Next Fit-Test Due Before:
_____/_____/_____

☐ Quantitative Fit-Test Record

Type of Mask:_____

Manufacturer:_____

Model:_____

Size_____

Results:_____

_____

Pass **Fail**

(circle one)

Additional Comments:_____

_____

_____

_____

Next Fit-Test Due Before:
_____/_____/_____

Appendix E:
User Profile for Licensed Health Care Professional

Respirator Medical Evaluation Questionnaire
Adapted from Appendix C to Sec. 1910.134: OSHA

To meet the requirements in the Dartmouth College Respiratory Protection Program, you must complete the following questionnaire annually, after which it will be reviewed by a licensed clinical provider at Occupational Medicine at Dartmouth Hitchcock Medical Center.

INSTRUCTIONS: Fully complete Section A below as well as the attached medical questionnaire.

Section A

Name: _____

Dept: **Supervisor:** _____

Email: _____ Phone: _____

Note: You must be clean shaven to wear any tight fitting respirator, including N95

Type of respirator/s worn – Check all that apply:

- ☐ Tight fitting half face
- ☐ Powered Air Purifying Respirator
- ☐ Filtering facepiece (N95)
- ☐ Tight fitting full face
- ☐ Other: _____

Job description while wearing respirator to include: description of work activities including contaminant(s) that may be encountered, duration and frequency of respirator use, expected physical work effort, additional protective clothing and equipment to be worn, and temperature and humidity extremes that may be encountered. Include weight of respirator if known.

A licensed healthcare provider will review the completed medical questionnaire. If you have questions or wish to discuss this evaluation, please call (603)653-3850.

Healthcare Provider Use Only (Return form to EHS prior to fit test)

☐ This individual is medically able to wear a respiratory device at this time.

☐ This individual is NOT medically able to wear a respiratory device at this time.

Health service provider signature: _____

Date of review: _____

Appendix E:
User Profile for Licensed Health Care Professional

Respirator Medical Evaluation Questionnaire
Adapted from Appendix C to Sec. 1910.134: OSHA

To meet the requirements in the Dartmouth College Respiratory Protection Program, you must complete the following questionnaire annually, after which it will be reviewed by a licensed clinical provider at the Dartmouth College Health Service.

INSTRUCTIONS: Fully complete Section A below as well as the attached medical questionnaire.

Section A

Name: _____

Dept: Supervisor: _____

Email: _____ Phone: _____

Note: You must be clean shaven to wear any tight fitting respirator, including N95

Type of respirator/s worn – Check all that apply:

- ☐ Tight fitting half face
- ☐ Powered Air Purifying Respirator
- ☐ Filtering facepiece (N95)
- ☐ Tight fitting full face
- ☐ Other: _____

Job description while wearing respirator to include: description of work activities including contaminant(s) that may be encountered, duration and frequency of respirator use, expected physical work effort, additional protective clothing and equipment to be worn, and temperature and humidity extremes that may be encountered. Include weight of respirator if known.

A licensed healthcare provider will review the completed medical questionnaire. If you have questions or wish to discuss this evaluation, please call 603-646-9400.

Healthcare Provider Use Only (Return form to EHS prior to fit test)

○ This individual is medically able to wear a respiratory device at this time.

○ This individual is NOT medically able to wear a respiratory device at this time.

Health service provider signature: _____

Date of review: _____

Appendix F: Mandatory OSHA Medical Questionnaire
Page intentionally left blank.

Respiratory Protection Program, OSHA Mandatory Medical Questionnaire

1. Today's date:

2. Name (last, first, MI)	3. Date of Birth	4. Sex	5. Height ft in

6. Weight Lbs.	7. Job title	8. Phone number where you can be reached by the health care professional who will review this questionnaire (include area code)	9. Best time to reach you at this number

10. Has your employer told you how to contact the health care provider who will review this questionnaire? ☐ yes ☐ no	11. Type(s) of respirator you will use (mark all that apply): a. ☐ N, R, or P disposable respirator (filter-mask, non-cartridge type only) b. ☐ other type (for example, half- or full-facepiece type, powered-air purifying, supplied air, self contained breathing apparatus	12. Have you worn a respirator? ☐ yes ☐ no If yes, what type(s)

Medical History	YES	NO
Questions 1 through 9 below must be answered by every Employee who has been selected to use any type respirator. Please mark "X" yes or no for each.		
1. Do you currently smoke tobacco, or have you smoked tobacco during the past month?	☐	☐
2. Have you ever had any of the following conditions?	☐	☐
a. seizures (fits, convulsions, epilepsy)	☐	☐
b. diabetes (high blood sugar disease)	☐	☐
c. allergic reactions that interfere with your breathing	☐	☐
d. claustrophobia (fear of closed-in places)	☐	☐
e. trouble smelling odors	☐	☐
f. latex (rubber) allergy	☐	☐
3. Have you ever had any of the following pulmonary (lung) conditions?		
a. asbestosis	☐	☐
b. asthma	☐	☐
c. chronic bronchitis	☐	☐
d. emphysema	☐	☐
e. pneumonia	☐	☐
f. tuberculosis	☐	☐
g. silicosis	☐	☐
h. beryllium disease	☐	☐
i. sarcoidosis	☐	☐
j. pneumothorax (collapsed lung)	☐	☐
k. lung cancer	☐	☐
l. broken ribs	☐	☐
m. any chest injury or surgeries	☐	☐
n. any other lung problem that you've told about	☐	☐
4. Do you currently have any of the following symptoms of pulmonary or lung disease?		
a. shortness of breath	☐	☐
b. shortness of breath when walking fast on level ground or walking normal speed up a slight hill or incline	☐	☐
c. shortness of breath when walking with other people at an ordinary pace on level ground	☐	☐
d. have to stop for breath when walking at your own pace on level ground	☐	☐
e. shortness of breath when washing or dressing yourself	☐	☐
f. shortness of breath that interferes with your job	☐	☐

Medical History continued	YES	NO
g. coughing that produces phlegm (thick sputum)	☐	☐
h. coughing that wakes you up early in the morning	☐	☐
i. coughing that occurs mostly when you are lying down	☐	☐
j. coughing up blood in the last month	☐	☐
k. wheezing	☐	☐
l. wheezing that interferes with your job	☐	☐
m. chest pain when you breathe deeply	☐	☐
n. any other symptoms that you think may be related to lung problems	☐	☐
5. Have you ever had any of the following cardiovascular (heart) problems?		
a. heart attack	☐	☐
b. stroke	☐	☐
c. angina (heart pain)	☐	☐
d. heart failure	☐	☐
e. swelling in you legs or feet (not caused by walking)	☐	☐
f. heart arrhythmia (irregular heart beat)	☐	☐
g. high blood pressure	☐	☐
h. abnormal stress test -- approximate date:	☐	☐
i. cardiac (heart) catheterization – approximate date:	☐	☐
j. any other heart problem about which you have been told	☐	☐
6. Have you ever had any of the following cardiovascular (heart) symptoms?		
a. frequent pain or tightness in your chest	☐	☐
b. pain or tightness in your chest during physical activity	☐	☐
c. pain or tightness in your chest that interferes with your job	☐	☐
d. in the past two years, have you noticed your heart skipping or missing a beat	☐	☐
e. heartburn or indigestion that is not related to eating	☐	☐
f. any other symptoms that you think may be related to heart or circulation problems	☐	☐
7. Do you currently take any medication for any of the following problems?		
a. breathing	☐	☐
b. heart trouble	☐	☐
c. blood pressure	☐	☐
d. seizures (fits, convulsions, epilepsy)	☐	☐

Continued on page 2.

Respiratory Protection Program, OSHA Mandatory Medical Questionnaire

Medical History continued	YES	NO
Have you ever used a respirator? (If NO, skip to question 9.)	☐	☐
8. If you have used a respirator, have you ever had any of the following problems?		
a. eye irritation	☐	☐
b. skin allergies or rashes	☐	☐
c. anxiety (caused by wearing respirator)	☐	☐
d. general weakness or fatigue	☐	☐
e. any other problem that interferes with your use of a respirator	☐	☐
9. Would you like to talk to the healthcare professional who will review this questionnaire about your answers?	☐	☐
Answer questions 10 through 15 below only if you use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA)		
10. Have you ever lost vision in either eye (temporarily or permanently)?	☐	☐
11. Do you currently have any of the following vision problems?		
a. wear contact lenses	☐	☐
b. wear glasses	☐	☐
c. color blind	☐	☐
d. any other eye or vision problems	☐	☐
12. Have you ever had an injury to your ears, including a broken ear drum?	☐	☐
13. Do you currently have any of the following hearing problems?	☐	☐
a. difficulty hearing	☐	☐
b. wear a hearing aid	☐	☐
c. any other hearing or ear problem	☐	☐
14. Have you ever had a back injury?	☐	☐
15. Do you currently have any of the following musculoskeletal problems?		
a. weakness in your arms, legs, hands, or feet	☐	☐
b. back pain	☐	☐
c. pain or stiffness when you lean forward or backward at the waist	☐	☐
d. difficulty fully moving your arms and legs	☐	☐
e. difficulty moving your head up or down	☐	☐
f. difficulty moving your head side-to-side	☐	☐
g. difficulty bending at your knees	☐	☐
h. difficulty squatting to the ground	☐	☐
i. difficulty climbing a flight of stairs or a ladder carrying more than 25 pounds	☐	☐
j. any other muscle or skeletal problem that interferes with using a respirator	☐	☐
16. Another health condition that you think may affect your ability to use a respirator safely? Answer below.	☐	☐
If you answered yes to any of the questions 1-16, please explain		

Medical Clinic Use Only:	YES	NO
Medically fit to wear respirator *Positive responses to questions 1-8 of the Medical History portion require a follow-up medical examination.	☐	☐
Referred for further evaluation If, YES, specify condition or concern:	☐	☐

Reviewed by: _____

Date:

Examiner's comments on positive responses:

Targeted physical exam (performed upon physician's recommendation):

BP:_____/_____ Pulse:_____ ☐ Reg ☐ Irreg

	Normal	Abn
HEENT	☐	☐
Neck – incl. carotid upstrokes and JVD	☐	☐
Lungs	☐	☐
Heart	☐	☐
Extremities – incl. peripheral pulses and edema	☐	☐
Other – specify:	☐	☐

Medically fit to wear respirator?	☐ Yes	☐ No

Signature of worker