

Northwestern

Respiratory Protection

Risk Management

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I. Purpose

This program establishes procedures to eliminate potential inhalation exposure to hazardous materials through the use of effective engineering controls and safe use and maintenance of respirators. Respirators will only be used when engineering controls are not feasible or in emergency situations.

II. Scope

This program applies to the use of all respirators worn by designated Northwestern personnel (i.e., staff, faculty, and students, including voluntary users) who are supervisor-approved to wear a respirator. Northwestern will provide medical evaluations, respirators, and training at no cost to designated personnel. Northwestern does not recommend the use of shared respirators. This program does not apply to contractors; they should refer to their company's Respiratory Protection Program.

III. Responsibilities

A. Northwestern University Safety Professionals (NU Safety Professionals)

- i. In research areas, this refers to Research Safety; in non-research areas, this refers to Risk Management.
- ii. Conduct a hazard assessment (i.e., an evaluation to rank potential hazards by their estimated frequency and severity to determine proper employee protection), which is on Risk Management's [website](#), to identify exposures and provide respiratory protection recommendations, including the respirator type, cartridge type, and change out schedule.
- iii. Provide a list of respirator models for respirator users to choose from based on hazard assessment, medical evaluation, and fit test (see **Appendix 1**).
- iv. Provide respirator training and fit testing services.
- v. Provide consultation and guidance when necessary.
- vi. Provide a copy of this program to occupational healthcare providers.
- vii. Conduct evaluations of the workplace, as necessary, to ensure the provisions of the current written program are being effectively implemented and that it continues to be effective. Review and revise this program to reflect changes in regulatory requirements, as necessary.

B. Supervisors

- i. Purchase NIOSH-approved respirators for designated personnel, based on NU Safety Professionals' recommendations. Replace as needed. Supply replacement filters, cartridges, or canister elements as needed.
- ii. Ensure users are properly maintaining and inspecting their respirators according to **Section VIII**, and remove respirators from service when the inspection, maintenance, or user identifies any unsafe condition.
- iii. Ensure all filters, cartridges, and canisters are labeled and color-coded with the NIOSH approval label; the label is not removed and remains legible; and the correct cartridge is used for each task.
- iv. Ensure employees who are required to wear respirators have received a medical evaluation, training, and annual fit test prior to respirator use.
- v. Enforce proper use of respiratory protection.
- vi. Contact a NU Safety Professional to evaluate any safety concerns.

C. Respirator User

- i. Attend and pass medical evaluation, training, and fit test (in that order) prior to using a respirator.
- ii. For all tight-fitting respirators, perform a user seal check (see **Section VIII** for more information) each time a respirator is donned.
- iii. Inspect respirator according to **Section X** of this program.
- iv. Report all maintenance issues to your supervisor, and remove the respirator from service.
- v. Wash your face and respirator facepieces, as necessary, to prevent eye or skin irritation associated with respirator use. Clean and disinfect your respirator, as necessary, to maintain sanitary conditions.
- vi. Remove facial hair (i.e., a beard) that comes between the sealing surface of the facepiece and the face. Mustaches and goatees may be acceptable, if they do not interfere with the seal of the facepiece.
- vii. **Immediately dangerous to life and health (IDLH)** atmospheres are atmospheres with airborne contaminants that are likely to cause death or immediate or delayed permanent, adverse health effects, or prevent escape from such an environment. All oxygen deficient atmospheres (i.e., <19.5% O₂ by volume) are considered IDLH. **Do not enter IDLH atmospheres without a formal review from an NU Safety Professional.**

IV. Voluntary Use

Northwestern permits the voluntary use of respirators where employees are not exposed to harmful concentration of dusts or aerosols.

- A. If you want to wear a respirator, you must:
 - i. Obtain permission from your supervisor and Risk Management or Research Safety to use a respirator.
 - ii. Read and understand the information contained in this program.
 - iii. Review and sign the Voluntary Use of Respiratory Protection Form (**Appendix 4**).
 - iv. Inspect your respirator before each use, and clean it after each use.
 - v. Report any problems to your supervisor.
- B. Some respirators create a strain on the body because of increased breathing resistance or other effects. For these types of respirators, including any tight-fitting respirators:
 - i. Medical clearance is necessary to ensure you are not likely to be harmed by wearing the respirator.
 - ii. Medical Clearance Questionnaires will be provided by NU Safety Professionals and must be reviewed by a preferred licensed healthcare professional (PLHCP).
 - iii. You may need to have a medical evaluation.
 - iv. Additionally, a personal protective equipment hazard assessment must be conducted by a NU Safety Professional.
- C. NU Safety Professionals will require the following information to approve respirator use:
 - i. Your name, NetID, supervisor's name, and work phone number for our records.
 - ii. The type of work you will be doing while wearing the respirator, and the air contaminant of concern.
 - iii. The type of respirator you will use.

V. Medical Clearance

- A. NorthShore OMEGA and Northwestern Medicine Corporate Health are the PLHCPs who will review medical clearance questionnaires and perform any necessary medical evaluations (see **Table 1**).

Table 1 – Preferred Licensed Healthcare Professionals Contact Information

Evanston	Chicago
NorthShore University Health System OMEGA	Northwestern Medicine Corporate Health
2650 Ridge Avenue, Suite 4225 Evanston, IL 60201	676 North St. Clair St, Suite 900 Chicago, IL 60611
northshore.org/corporate-occupational-health/omega-services/	corporatehealth.nm.org
Phone: 847-657-1700	Phone: 312-926-8282

B. Medical Clearance Questionnaires

- i. Will be provided by a NU Safety Professional with the completed hazard assessment and must be sent to the PLHCP for review.
- ii. Will be administered confidentially and in a manner that ensures the user understands its content during the user’s normal working hours or at a time and place convenient to the user.
- iii. If desired, the user will have the opportunity to discuss the medical clearance questionnaire results with the PLHCP.
- iv. The following information must be provided to the PLHCP before a recommendation is made concerning a user’s ability to use a respirator:
 - a. The type of respirator to be used;
 - b. The duration and frequency of respirator use (including use for rescue and escape);
 - c. The expected physical work effort;
 - d. Additional protective clothing and equipment to be worn; and
 - e. Temperature and humidity extremes that may be encountered.

C. Medical Evaluations

- i. Include a review of the medical clearance questionnaire, pulmonary function test, and any additionally deemed medical tests, consultations, and/or diagnostic procedures necessary to make a final medical clearance.
- ii. Are required for all users, and may be required annually thereafter at the discretion of the PLHCP.
- iii. Will be administered confidentially during the user’s normal working hours or at a time and place convenient to the user.
- iv. If desired, the user will have the opportunity to discuss the medical evaluation results with the PLHCP.
- v. Medical evaluations are to occur according to the following recommendations, or more frequently if there is a change in health history:

Table 2 – Medical Evaluation Frequency

Age	Light to Moderate Work	Strenuous Work with a SCBA
< 35 years	Every 3 years	Every 3 years
35-45 years	Every 2-3 years	Every 1-2 years
> 45 years	Every 2 years	Every year

- vi. Northwestern will provide additional medical evaluations if:
 - a. A user reports medical signs or symptoms that are related to the user's ability to use a respirator;
 - b. A PLHCP, supervisor, or NU Safety Professional determines the user needs to be reevaluated;
 - c. Information from this program, including observations made during fit testing and program evaluation, indicate a need for reevaluation; or
 - d. A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on the user.
- D. Based on the findings between the medical clearance questionnaire and medical evaluation, the PLHCP will provide a written recommendation to NU Safety Professionals regarding the user's ability to use the respirator, including:
 - i. Any limitations on respirator use related to the medical condition of the user, or relating to the workplace conditions in which the respirator will be used, including whether or not the user is medically able to use the respirator;
 - ii. The need, if any, for follow-up medical evaluations; and
 - iii. A statement they have provided the user with a copy of their recommendation.

VI. Training

- A. Each respirator user must complete annual online training, which must be assigned by a NU Safety Professional or, if applicable, Principal Investigator or safety designate. Upon completion of the online training, a NU Safety Professional will schedule the hands-on training and a demonstration specific to the respirator being used prior to use in conjunction with annual fit testing.
- B. Training must cover the following:
 - i. Why respirators are necessary and how improper fit, usage, or maintenance can compromise the protective effect of respirators.
 - ii. What the limitations and capabilities of respirators are.
 - iii. How to use respirators in emergency situations, including situations in which respirators malfunction.
 - iv. How to inspect, don and doff, use, and check the seals of respirators.
 - v. Maintenance and storage procedures for respirators.
 - vi. How to recognize medical signs and symptoms that may inhibit respirator effectiveness or require a medical evaluation prior to the next required one.
- C. Retraining must occur annually, and when the following situations occur:
 - i. Changes in the workplace or type of respirator used.
 - ii. Inadequacies in the employee's knowledge or use of the respirator.
 - iii. Any situation in which retraining seems necessary to ensure safe respirator use.

VII. Fit Testing

- A. A **fit test** is a test of the seal between the respirator's facepiece and user's face to evaluate the fit of a respirator on an individual (see **Table 3** for different types).
 - i. A **Qualitative Fit Test** is a pass/fail fit test to assess the adequacy of the respirator fit that relies on the user's response to the test agent.
 - ii. A **Quantitative Fit Test** is an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Table 3 – Fit Testing Methods

Fit Test Type	Method	Respirator Type
Qualitative	Irritant Smoke, Saccharin, Bitrex	Particulate Respirator/ Filtering Facepiece (e.g., N-95)
Quantitative	Quantifit or PortaCount	Half-face, Full-face, SCBA

Note: Northwestern uses Bitrex for qualitative fit tests; Risk Management uses a Quantifit and Research Safety uses a PortaCount for quantitative fit tests.

- B. Fit test can only be conducted when employees are clean shaven.
- C. Respirator users must be fit tested with the same make, model, style, and size of respirator that will be worn during work activities.
- D. Fit tests must be performed while wearing any applicable safety equipment that may be worn during actual respirator use that could interfere with the respirator fit.
- E. Employees must conduct negative- and positive-pressure seal checks (see **Section VIII**) prior to a fit test and each time the respirator is donned; a user seal check is not a substitute for a fit test.
- F. Failure of either seal check is cause to readjust the respirator or select an alternate respirator that fits the user better.
- G. Respirator users must be fit tested when any of the following occur:
 - i. Prior to initial use of respirator.
 - ii. Annually.
 - iii. When a different respirator (i.e., size, style, model, or make) is used.
 - iv. When the respirator user's physical appearance (e.g., facial scarring, dental changes, cosmetic surgery, or a significant change in facial features) changes.
- H. For more details on fit testing procedures or to schedule a fit test, please contact a NU Safety Professional.

VIII. Respirator User Seal Check

When using tight-fitting respirators, perform a user seal check to ensure an adequate seal is achieved each time the respirator is put on. Either positive- and negative-pressure checks or the respirator manufacturer's recommended user seal check method will be used:

- A. **Positive-pressure check:**
 - i. Close off the exhalation valve, and exhale gently into the facepiece.
 - ii. 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.
 - iii. 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.
- B. **Negative-pressure check:**
 - i. Close off the inlet opening of the canister or cartridge(s) by covering it with the palm of the hand(s) or replacing the filter seal(s), inhale gently so the facepiece collapses slightly, and hold your breath for ten seconds.
 - ii. 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.
 - iii. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand; in these instances, the test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.

C. **Manufacturer's Recommended User Seal Check Procedures**

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided it is demonstrated that the manufacturer's procedures are equally effective.

Note: User seal checks are not substitutes for qualitative or quantitative fit tests.

IX. Respirator Cleaning and Storage

- A. Respirator users must store their respirators to protect from damage or deformation (especially of the facepiece and exhalation valve), contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals.
- B. Respirators will be cleaned per the following:
 - i. **Personal respirators:** Clean and disinfect as often as necessary to maintain in a sanitary condition.
 - ii. **SCBAs:** Clean and disinfect after each use.
- C. These may be substituted by the cleaning recommendations provided by the respirator manufacturer, provided they are as effective as those outlined below and ensure the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.
 - i. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
 - ii. Wash components in warm (110°F/43°C maximum) water with a mild detergent or cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
 - iii. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
 - a. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 110°F/43°C;
 - b. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 110°F/43°C; or
 - c. Other commercially-available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
 - iv. Rinse components thoroughly in clean, warm (110°F/43°C maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
 - v. Components should be hand-dried with a clean, lint-free cloth or air-dried.
 - vi. Reassemble the facepiece, replacing filters, cartridges, and canisters where necessary.
 - vii. Test the respirator to ensure all components work properly.

X. Respirator Inspection and Certification

A. Inspection Frequency

- i. **Respirators used in routine situations:** before each use and during cleaning.
- ii. **Respirators maintained for use in emergency situations, including SCBAs:** at least monthly, in accordance with the manufacturer's recommendations, and before and after each use.
- iii. **Emergency escape-only respirators:** before carrying into the workplace for use.

B. Inspection Components

- i. Check the respirator to verify it still functions properly.
- ii. Check the tightness of the connections.
- iii. Check the condition of the various parts:
 - a. **Facepiece** – cracks, tears, or holes; facemask distortion; and cracked or loose lenses/face shield
 - b. **Head straps** – breaks, tears, and broken buckles
 - c. **Valves** – residue, dirt, and cracks or tears in valve material
 - d. **Air supply systems** – breathing air quality/grade, condition of supply hoses, hose connection, and settings on regulators and valves
 - e. **Cartridges, canisters, or filters** – approval designation, gaskets, cracks or dents in the housing, and proper cartridge for hazard
 - f. **Elastomeric parts** – pliability and signs of deterioration
- iv. For self-contained breathing apparatuses:
 - a. Air and oxygen cylinders must be maintained in a fully-charged state and recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.
 - b. Verify the regulator and warning devices function properly.
 - c. See **Appendix 2** for a maintenance log.
- v. For emergency escape-use breathing apparatuses:
 - a. Certify the respirator by completing the maintenance log (see **Appendix 3**); and
 - b. Provide this information on a tag or label that is attached to the storage compartment for the respirator, kept with the respirator, or included in inspection reports stored as paper or electronic files; this information must be maintained until it is replaced by a subsequent certification.

C. Post-Inspection

- i. Damaged or defective respirators must be removed from service and discarded or repaired according to the following procedures:
 - a. Repairs or adjustments can only be made by people who are appropriately trained to perform such operations;
 - b. Repairs or adjustments can only use the respirator manufacturer's NIOSH-approved parts that are designed for the respirator;
 - c. Repairs must be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and
 - d. Reducing and admission valves, regulators, and alarms can only be adjusted or repaired by the manufacturer or a technician trained by the manufacturer.

D. Defective Respirators

- i. Respirators that are defective or have defective parts must be taken out of service immediately.
- ii. If, during the inspection, an employee discovers a defect in a respirator, the employee must bring the defect to the attention of a supervisor. The supervisor must decide whether to:
 - a. Temporarily take the respirator out of service until it can be repaired,
 - b. Perform a simple fix on the spot (i.e., replace a head strap), or
 - c. Dispose of the respirator, due to an irreparable problem or defect.
- iii. When a respirator is taken out of service for an extended period of time, it must be tagged out of service, and the employee will be given a replacement of similar make, model, and size.

E. Cartridge Change-Out Schedule

- i. Cartridges will be changed out per the following schedule:
 - a. At the frequency established during the hazard assessment according to the respirator cartridge change-out schedule (see **Table 1**), which is based on OSHA's standards and manufacturers' recommendations.
 - b. If present, an end-of-service life indicator is activated.
- ii. If chemical warning properties (i.e., smell or taste) are detected, the cartridge must be replaced immediately.

Table 4 – Respirator Cartridge Change-Out Schedule

Contaminant	Change-Out Schedule
Organic vapors	Maximum 8 hours of use total (up to 200 ppm)
All cartridges for emergency use	Discard after each use
HEPA filters	Restricted breathing or visibly dirty, wet, or compromised
Filtering facepiece/dust masks	Visibly dirty or contaminated
Acrylonitrile	End of shift
Ammonia	Maximum 8 hours of use total (up to 125 ppm)
Benzene	End of shift
Butadiene	Every 1, 2, or 4 hours, depending on concentration (refer to 29 CFR 1910.1051 Table 1), or end of shift
Formaldehyde	3 hours or end of shift (whichever comes first)
HCl, SO ₂ , Chlorine	End of shift
Methylene Chloride	Must use supplied air
Nitric Acid	Must use supplied air
Vinyl Chloride	End of shift

XI. Emergency Planning and Pandemic Preparedness

Supplies of NIOSH-approved particulate respirators/filtering facepieces (e.g., N-95) can become depleted during a pandemic or wide-spread respiratory pathogen or infectious disease outbreak. In the event of a situation like this, Northwestern faculty and staff should refer to a pandemic plan for direction regarding appropriate use of personal protective equipment.

When facing depleted inventories as a result of these types of events and there is an imminent need for healthcare staff and emergency responders, Northwestern faculty and staff should consider a combination of approaches to conserve supplies of N-95 respirators, including:

- A. Minimize the number of individuals who need to use respiratory protection through the preferential use of engineering and administrative controls. Risk Management and Research Safety can provide guidance on alternative control methods to reduce the need for respiratory protection.
- B. Use alternatives to N-95 respirators (e.g., other classes of filtering facepiece respirators, elastomeric half-mask and full-facepiece air purifying respirators, and powered air purifying respirators) where feasible.
- C. Implement CDC-approved practices allowing extended use and/or limited reuse of N-95 respirators. When working with highly toxic compounds where N-95 respirators are required, N-95 respirators must always remain single-use.
- D. Prioritize the use of N-95 respirators for those personnel at the highest risk of contracting or experiencing complications of infection.

XII. Recordkeeping

- A. Medical clearances, training records, and fit testing records are all maintained by NU Safety Professionals.
 - i. Respirator users' medical clearances must be maintained for length of employment, plus 30 years.
 - ii. Training records must be maintained until retraining is completed.
 - iii. Fit testing records must be maintained until the next fit test is administered. For qualitative fit tests, refer to **Appendix 5**. For quantitative fit tests, fit factor and strip chart recording must be maintained.
- B. Respirator inspections are maintained by the department supervisor.

XIII. Regulatory Authority

Northwestern will comply with Occupational Safety and Health Administration's (OSHA) standards and any other applicable codes and standards, including:

[OSHA 29 CFR Part 1910.134 – Respiratory Protection](#)

XIV. Contact

For questions in non-research areas, contact Gwen Butler, Director, Environmental Health and Safety, at gwen.butler@northwestern.edu or (847) 491-4936.

For questions in research areas, contact Anne Hsiao, Laboratory Safety Specialist, Research Safety, at anne.hsiao@northwestern.edu or (847) 467-2660.

Appendix 1 – Respirator and Cartridge Selection

Respiratory protection must be worn whenever you are working in a hazardous atmosphere. The appropriate respirator will depend on the contaminant(s) to which you are exposed and the protection factor (PF) required. Required respirators must be NIOSH-approved, and medical evaluation and training must be provided before use.

These general guidelines are to be used by the NU Safety Professional and user in selecting an appropriate respirator for the hazard. Types of respirators include:

- **Air-purifying respirators**, which remove contaminants (particulate or gas/vapor) from an otherwise-breathable atmosphere, and
- **Supplied-atmosphere systems**, which supply breathable air.

Assigned Protection Factors (APFs) are the level of protection a properly functioning respirator would be expected to provide to a population of properly fitted and trained users (e.g., an APF of 10 means a user could expect to inhale no more than one tenth of the airborne contaminant present). NU Safety Professionals must use the APFs listed in **Table 5** to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), NU Safety Professionals must ensure the APF is appropriate to the mode of operation in which the respirator is being used.

Table 5 – Respirator Selection

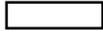
Respirator Type	Example	Description	APF
Dust mask (non-NIOSH approved)		<ul style="list-style-type: none"> • Loose-fitting mask for single-use only. • Flexible pad held over the nose and mouth by an elastic or rubber strap to protect against dusts encountered during construction or cleaning activities (i.e., dusts from drywall, brick, wood, or sweeping). • Cannot protect against hazardous atmospheres. • <i>Non-NIOSH-approved, disposable dust masks are not approved for use at Northwestern.</i> 	N/A
Particulate respirator/ filtering facepiece (NIOSH-approved)	 (e.g., N-95, N-99, P-100)	<ul style="list-style-type: none"> • Negative-pressure particulate respirator (i.e., respirator that needs a tight seal between the respirator and face and/or neck of the user to work properly that has negative air pressure with respect to the ambient air pressure outside the respirator during inhalation) with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. • Captures particles in the air (i.e., dusts, mists, fumes), but does not protect against gases or vapors. • Should be disposed of and replaced with a new one each time they are removed. • Medical clearance is not required for voluntary use. 	5

Respirator Type	Example	Description	APF
<p>Half-face mask</p>		<ul style="list-style-type: none"> • Tight fitting, air-purifying filtration respirator that does not provide eye or face protection. • Can be used with particulate filters. • Can be used with gas/vapor canisters. <ul style="list-style-type: none"> ○ Are normally used when there are only hazardous gases and vapors in the air. ○ Use chemical filters (i.e., cartridges or canisters) to remove dangerous gases or vapors; cartridges must be matched to the hazard. ○ Do not protect against airborne particles. ○ Only protect against specific gases or vapors. ○ Provide protection only as long as the filter’s absorbing capacity is not depleted. ○ Service life of the filter depends upon many factors and can be estimated in various ways. • Can be used with combination particulate filter/gas canisters. 	<p>10</p>
<p>Full-facepiece</p>		<ul style="list-style-type: none"> • Tight fitting, air-purifying filtration respirator that provides eye and face protection from irritants and contaminants when properly fitted and sealed. • Can be used with particulate filters. • Can be used with gas/vapor canisters. <ul style="list-style-type: none"> ○ Are normally used when there are only hazardous gases and vapors in the air. ○ Use chemical filters (i.e., cartridges or canisters) to remove dangerous gases or vapors; cartridges must be matched to the hazard. ○ Do not protect against airborne particles. ○ Only protect against specific gases or vapors. ○ Provide protection only as long as the filter’s absorbing capacity is not depleted. ○ Service life of the filter depends upon many factors and can be estimated in various ways. • Can be used with combination particulate filter/gas canisters. 	<p>50</p>

Respirator Type	Example	Description	APF
Powered air purifying respirator (PAPR)		<ul style="list-style-type: none"> • Air-purifying respirator that uses a battery-powered blower to force ambient air through the air-purifying elements to the inlet covering and then pushes the filtered air into the facepiece, which covers all of the user's face. • Since it is loose-fitting, it does not need to be fit tested and can be used by most workers with facial hair. • Another type is the tight-fitting full-facepiece PAPR, which has an elastomeric facepiece made of rubber or silicone, filters, and a blower that operate as they do on a loose-fitting facepiece PAPR; because this PAPR has a tight-fitting facepiece, it must be fit tested. • There are also half-mask PAPRs and PAPRs that have a helmet or hood. • PAPR is a common substitute for users deemed medically unable to wear other types of respirators. 	<p>Half-face mask: 50</p> <p>Full-facepiece: 1,000</p> <p>Helmet/hood: 425/1,000</p> <p>Loose-fitting facepiece: 25</p>
Self-contained breathing apparatus (SCBA)		<ul style="list-style-type: none"> • Provide breathing air independent of the environment. • Are to be used when the contaminant has insufficient odor, taste, or irritating warning properties or when the contaminant is of such high concentration or toxicity that an air-purifying respirator is not adequate. • While this offers the greatest degree of protection, it is also the most complex; training and practice in its use and maintenance is essential, and it is only for in emergency situations and oxygen-deficient or Immediately Dangerous to Life or Health (IDLH) atmospheres. • All work locations where there are atmospheres that are categorized as IDLH require the use of a full-facepiece, positive-pressure, demand SCBA certified by NIOSH for a minimum service life of 30 minutes or a combination full-facepiece, pressure-demand, supplied-air respirator (SAR) with an auxiliary self-contained air supply. 	<p>Half-face mask: 10</p> <p>Full-facepiece (demand mode): 50</p> <p>Full-facepiece (pressure-demand): 10,000</p> <p>Helmet/hood (demand mode): 50</p> <p>Helmet/hood (pressure-demand): 10,000</p>
Emergency escape-use breathing apparatus		<ul style="list-style-type: none"> • Self-contained, compressed air apparatus for escape from a contaminated environment (e.g., 10-minute escape). 	<p>N/A</p>

Air-purifying cartridges must be matched to the contaminant of concern. Cartridges are color-coded to indicate their intended function (see **Table 6**).

Table 6 – Respirator Cartridge Selection

Color	Type of Protection
Black 	Organic vapor
White 	Acid gas
Yellow 	Organic vapor/acid gas
Green 	Ammonia/methyl amine
Olive Green 	Organic vapor/formaldehyde
Orange 	Mercury vapor/chlorine gas
Purple (Magenta) 	Dust, fumes, mists, asbestos, radionucleotides, and highly-toxic particulates (P100)
Black/Purple 	Organic vapor and P100 combination
White/Purple 	Acid gas and P100 combination
Yellow/Purple 	Organic vapor/acid gas and P100 combination
Green/Purple 	Ammonia/methyl amine and P100 combination
Olive Green/Purple 	Organic vapor/formaldehyde and P100 combination
Pre-filters	Use with dusts, fumes, mists, pesticides, and plants

Appendix 2 – SCBA Maintenance Log

Manufacturer: _____

Regulator Serial Number: _____

Tank Serial Number: _____

Visual Inspection													
Month/Year: (MM/YYYY)													
Rate the following:													
Valve:	Good	Bad	Good										
Tubes:	Good	Bad	Good										
Tank:	Good	Bad	Good										
Regulator:	Good	Bad	Good										
Pressure Gauge:	Good	Bad	Good										
Any signs of:													
Deterioration:	Yes	No	Yes										
Rust:	Yes	No	Yes										
Corrosion:	Yes	No	Yes										
Dents:	Yes	No	Yes										
Cut or Tears:	Yes	No	Yes										
Is pressurization check completed without issue?	Yes	No	Yes										
Is the tank air at least 90%?	Yes	No	Yes										
Are the regulator and warning devices working properly?	Yes	No	Yes										
Comments:													
Date of Inspection:													
Name of Inspector:													
Signature of Inspector:													

- Posi-check testing due every 2 years
- Hydrostatic testing due every 5 years
- Cylinders need replacement every 15 years

Appendix 3 – Emergency Escape-Use Breathing Apparatus Maintenance Log

Manufacturer: _____

Regulator Serial Number: _____

Tank Serial Number: _____

Visual Inspection														
Month/Year: (MM/YYYY)														
Rate the following:														
Valve:	Good	Bad												
Tubes:	Good	Bad												
Tank:	Good	Bad												
Regulator:	Good	Bad												
Pressure Gauge:	Good	Bad												
Any signs of:														
Deterioration:	Yes	No												
Rust:	Yes	No												
Corrosion:	Yes	No												
Dents:	Yes	No												
Cut or Tears:	Yes	No												
Is pressurization check completed without issue?	Yes	No												
Is the tank air at least 90%?	Yes	No												
Are the regulator and warning devices working properly?	Yes	No												
Comments:														
Date of Inspection:														
Name of Inspector:														
Signature of Inspector:														

- Posi-check testing due every 2 years
- Hydrostatic testing due every 5 years
- Cylinders need replacement every 15 years

Appendix 4 – Voluntary Use of Respiratory Protection Form

Some Northwestern personnel may choose to wear NIOSH-approved particulate respirators/filtering facepieces (e.g., N-95 or P-100 disposable dust masks) on a voluntary basis during activities that involve exposures to low-level, non-hazardous nuisance dust or other similar particulates. According to OSHA and the Northwestern Respiratory Protection Program, anyone wearing a filtering facepiece voluntarily must be provided with the following information:

29 CFR 1910.134 Appendix D:

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, 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:

- A. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
- B. 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.
- C. 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.
- D. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

The filtering facepiece respirator you have elected to use is approved, when fitted properly, for use against nuisance, non-hazardous particulate (e.g., fiberglass, drywall dust, sawdust, dirt, pollen, animal dander). It will not provide protection from any chemical vapors (i.e., those associated with spray paints or solvents). It is not intended for use during work that may involve exposure to airborne asbestos fibers, silica dust, or heavy metal particles; work that may involve these substances should be reviewed by an NU Safety Professional before the project proceeds.

For questions in non-research areas, contact Gwen Butler, Director, Environmental Health and Safety, at gwen.butler@northwestern.edu or (847) 491-4936. For questions in research areas, contact Anne Hsiao, Laboratory Safety Specialist, Research Safety, at anne.hsiao@northwestern.edu or (847) 467-2660.

Please complete the section below:

Print Name: _____ Net ID: _____

Job Title: _____ Work Phone Number: _____

Department: _____ PI/Supervisor: _____

Type of Mask: _____ Location of use: _____

Reason for using mask (describe nature of work and type of dust): _____

I have read and understood the information provided above:

Employee Signature: _____ Date: _____

