Northwestern
Respiratory Protection Program
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I. Program Goals and Objectives

Northwestern University is committed to maintaining a safe and healthy work environment. It is the policy of Northwestern University to eliminate potential inhalation exposure to hazardous materials through the use of effective engineering controls whenever possible. Respirators will only be used when effective engineering controls are not feasible or in emergency situations. This program establishes procedures for the safe use and maintenance of respirators.

II. Scope and Application

This program applies to the use of all respirators worn by all designated Northwestern University personnel (staff, faculty, and students, including voluntary users). 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, and they should refer to their company’s respiratory protection program.

III. Regulatory Authority and Related Information


IV. Definitions

A. Northwestern University Safety Professional (NU Safety Professional): This refers to:
   i. Office for Research Safety (ORS) regarding research areas
   ii. Risk Management Services regarding non-research areas

B. Designated personnel (staff, faculty, and students): A person who is supervisor-approved to wear a respirator.

C. IDLH: Immediately dangerous to life and health; exposure to airborne contaminants that are likely to cause death, immediate or delayed permanent adverse health effects, or prevent escape from such an environment. All oxygen deficient atmospheres (<19.5% O2 by volume) will be considered IDLH.

D. Assigned Protection Factor: The 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. 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.

E. Hazard Assessment: An evaluation to rank potential hazards by their estimated frequency and severity to determine proper employee protection. Northwestern’s hazard assessment can be found on the Risk Management website.

F. Tight-fitting (negative pressure) respirator: A respirator that needs a tight seal between the respirator and the face and/or neck of the respirator user in order to work properly. The air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator e.g. half-face mask, full-face mask.

G. Fit Test: Tests the seal between the respirator's facepiece and the user's face to evaluate the fit of a respirator on an individual.
H. **Qualitative fit test**: A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent. The qualitative fit test includes Bitrex, irritant smoke, or saccharin.

I. **Quantitative fit test**: An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator. The quantitative fit test includes using a University-owned Quantifit or Portacount.

V. **Responsibilities**

A. **NU Safety Professional**:
   i. Conduct a hazard assessment to identify exposures and provide respiratory protection recommendations, including the respirator type, cartridge type, and change out schedule.
   ii. Provide a list of respirator models for respirator users to choose from, based on hazard assessment, medical evaluation, and fit test. See Appendix 1 for more information.
   iii. Provide respirator training.
   iv. Provide respiratory fit testing services.
   v. Provide consultation and guidance when necessary.
   vi. Provide a copy of the written respiratory protection program to occupational healthcare providers.
   vii. Conduct evaluations of the workplace, as necessary, to ensure that 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 that users are properly maintaining respirators and inspecting according to Section VIII of this program, and remove respirators from service when the inspection, maintenance, or user identifies any condition that makes the unit unsafe to operate.
   iii. Ensure that all filters, cartridges, and canisters are labeled and color coded with the NIOSH approval label, that the label is not removed and remains legible, and that 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 tests prior to respirator use, and enforce proper use of respiratory protection.
   v. Contact NU Safety Professional to evaluate any safety concerns.

C. **Respirator User**:
   i. Attend and pass medical evaluation, training, and fit test prior to using a respirator.
   ii. For all tight-fitting respirators, perform a user seal check (see Appendix 3 for more information) each time a respirator is donned.
   iii. Inspect respirator according to Section VIII of this program.
iv. Report all maintenance issues to supervisor, and remove the respirator from service.

v. Wash face and respirator facepieces, as necessary, to prevent eye or skin irritation associated with respirator use. Clean and disinfect respirator, as necessary, to maintain sanitary conditions.

vi. Remove facial hair, such as 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. Do not enter IDLH atmospheres without a formal review from an NU Safety Professional.

VI. Voluntary Use

Northwestern University policy 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 department and Risk Management/ORS to use a respirator.
   ii. Read and understand the information contained in this program.
   iii. Inspect your respirator before each use, and clean it after each use.
   iv. Report any problems to your supervisor.

B. Voluntary use of any tight-fitting respirator requires a medical evaluation from a physician or clinician prior to use, and a PPE hazard assessment by an NU Safety Professional. Some respirators create a strain on the body because of increased breathing resistance or other effects. For these types of respirators, medical clearance is necessary to assure that you are not likely to be harmed by wearing the respirator.

C. For more details on Voluntary Use, see Appendix 8.

VII. Respiratory Protection Procedures

Prior to becoming a designated user, you must complete a medical evaluation, training, and fit testing in the following order:

A. Medical Evaluation

   NorthShore OMEGA (Evanston campus) and Northwestern Medicine Corporate Health (Chicago campus) are the preferred licensed healthcare professionals (PLHCPs) who will review medical clearance questionnaires.
   i. Medical clearance questionnaires will be provided by an NU Safety Professional with the completed hazard assessment and must be sent to the PLHCP for review.
   ii. A physical exam may be required. The PLHCP will determine if there is a need for follow-up medical examinations.
   iii. The PLHCP will provide a written recommendation regarding the user’s ability to use the respirator containing the following information:
      a. 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;
      b. The need, if any, for follow-up medical evaluations; and
c. A statement that the PLHCP has provided the user with a copy of the PLHCP’s written recommendation.

iv. Medical evaluations are to occur according to the following recommendations, or more frequently if there is a change in health history:

Table 1: Medical Evaluation Frequency

<table>
<thead>
<tr>
<th>Age</th>
<th>Light to Moderate Work</th>
<th>Strenuous Work w/ SCBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 35 yrs</td>
<td>Every 3 years</td>
<td>Every 3 years</td>
</tr>
<tr>
<td>35-45 yrs</td>
<td>Every 2-3 years</td>
<td>Every 1-2 years</td>
</tr>
<tr>
<td>&gt; 45 yrs</td>
<td>Every 2 years</td>
<td>Every year</td>
</tr>
</tbody>
</table>

v. Northwestern will provide additional medical evaluations if:
   a. A user reports medical signs or symptoms that are related to 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 user 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.

More detailed information on medical clearance can be found in Appendix 2.

B. Training
   i. Each respirator user will complete annual online and hands-on training and instruction specific to the respirator used, and training must be completed prior to use.
      a. Complete online training through myHR Learn Respiratory Protection.
      b. Upon completion of online training, an NU Safety Professional will schedule hands-on training and a demonstration in conjunction with annual fit testing.
   ii. Training must cover the following:
      a. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
      b. What the limitations and capabilities of the respirator are.
      c. How to use the respirator in emergency situations, including situations in which the respirator malfunctions.
      d. How to inspect, put on and remove, use, and check the seals of the respirator.
      e. Maintenance and storage procedures for the respirator.
      f. Recognizing medical signs and symptoms that may limit or prevent the effect use of respirators.
   iii. Retraining must occur annually, and when the following situations occur:
      a. Changes in the workplace or type of respirator used.
      b. Inadequacies in the employee’s knowledge or use of the respirator.
      c. Any situation in which retraining seems necessary to ensure safe respirator use.
C. Fit Testing  
   iv. Respirator users must be fit tested with the same make, model, style, and size of respirator that will be worn during work activities.  
   v. Fit testing methods include the following:

<table>
<thead>
<tr>
<th>Fit Test Type</th>
<th>Method</th>
<th>Respirator Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
<td>Irritant smoke, Saccharin, Bitrex</td>
<td>Particulate Respirator/Filtering facepiece (e.g. N-95)</td>
</tr>
<tr>
<td>Quantitative</td>
<td>Quantifit or Portacount</td>
<td>Half-face, Full-face, SCBA</td>
</tr>
</tbody>
</table>

vi. Respirator users must be fit tested when any of the following occur:  
a. Prior to initial use of respirator.  
b. Annually.  
c. When a different respirator (size, style, model or make) is used.  
d. When the respirator user’s physical appearance; such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or a significant change in facial features.  

vii. For more details on fit testing procedures or to schedule a fit test, please contact your NU Safety professional.

VIII. Respirator Maintenance  

A. Respirator Cleaning/Storage  
i. Respirator users will store to protect their respirators from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and will be packed or stored to prevent deformation of the facepiece and exhalation valve.  
ii. Respirators will be cleaned per the following:  
a. **Personal**: Clean and disinfect as often as necessary to maintain in a sanitary condition.  
b. **SCBA**: Clean and disinfect after each use.  

B. Respirator Inspection & Certification  
i. Inspection Frequency:  
a. Respirators used in routine situations: before each use and during cleaning.  
b. Respirators maintained for use in emergency situations, including self-contained breathing apparatus: at least monthly, in accordance with the manufacturer’s recommendations, before and after each use.  
c. Emergency escape-only respirators: before being carried into the workplace for use.  
ii. Inspection Components  
a. A check of respirator function  
b. Tightness of connections  
c. Condition of the various parts including, but not limited to, the following:
1. Facepiece
2. Head straps
3. Valves
4. Connecting tube
5. Cartridges, canisters or filters; and
6. A check of elastomeric parts for pliability and signs of deterioration.

d. Self-contained breathing apparatus:
   1. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer’s recommended pressure level.
   2. Regulator and warning devices function properly.
   3. See Appendix 5 for more information.

e. Emergency Escape-Use Breathing Apparatus:
   1. Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and
   2. Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.
   3. See Appendix 6 for more information.

iii. Post-Inspection
   a. Respirators that fail an inspection or are otherwise found to be defective must be removed from service and discarded or repaired according to the following procedures:
      1. Repairs or adjustments are to be made only by persons appropriately trained to perform such operations.
      2. Repairs or adjustments must only use the respirator manufacturer’s NIOSH-approved parts designed for the respirator.
      3. Repairs will be made according to the manufacturer’s recommendations and specifications for the type and extent of repairs to be performed; and
      4. Reducing and admission valves, regulators, and alarms will be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

C. Cartridge Change-Out Schedule
   i. Cartridges will be changed out per the following schedule:
      a. At the frequency established during the hazard assessment
      b. If present, an end-of-service life indicator is activated
   ii. If chemical warning properties, such as smell or taste, are detected, then the cartridge must be replaced immediately.
   iii. See Appendix 7 for more information.
IX. Recordkeeping

A. Respirator User’s Medical Clearance
   i. Record held by NU Safety Professionals.
   ii. Record maintained for employment, plus 30 years.

B. Training
   i. Record held by NU Safety Professionals.
   ii. Record maintained until retraining is completed.

C. Fit Testing
   i. Fit test to include the following: employee name; type of fit test performed; specific
      make, model, style, and size of respirator tested; date of test; pass/fail results for
      qualitative fit tests or fit factor and strip chart recording or other recording of test
      results for quantitative fit tests.
   ii. Record held by NU Safety Professionals.
   iii. Record maintained until the next fit test is administered.

D. Inspections
   i. Record held in department by supervisor.

E. Written Respirator Program
   i. Written copy held by NU Safety Professionals.
   ii. Reviewed and revised to reflect changes in program content and regulatory
      requirements, as necessary, or every two years.

X. Contact

For questions, contact the following NU Safety Professional:

<table>
<thead>
<tr>
<th>Non-Research Areas</th>
<th>Research Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Management Services</td>
<td>Office for Research Safety (ORS)</td>
</tr>
<tr>
<td>Gwen Butler – Director, Environmental</td>
<td>Brett Berg – Senior Health &amp; Safety Specialist</td>
</tr>
<tr>
<td>Health &amp; Safety</td>
<td></td>
</tr>
<tr>
<td><a href="mailto:gwen.butler@northwestern.edu">gwen.butler@northwestern.edu</a></td>
<td><a href="mailto:brett-berg@northwestern.edu">brett-berg@northwestern.edu</a></td>
</tr>
<tr>
<td>847-491-4936</td>
<td>847-491-5581</td>
</tr>
</tbody>
</table>
Protect Yourself
Respirators

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.

Single-strap dust masks are usually not NIOSH-approved. They must not be used to protect from hazardous atmospheres. However, they may be useful in providing comfort from pollen or other allergens.

Approved filtering facepieces (dust masks) can be used for dust, mists, welding fumes, etc. They do not provide protection from gases or vapors. DO NOT USE FOR ASBESTOS OR LEAD; instead, select from the respirators below.

Half-face respirators can be used for protection against most vapors, acid gases, dust, or welding fumes. Cartridges/filters must match contaminant(s) and be changed periodically.

Full-face respirators are more protective than half-face respirators. They can also be used for protection against most vapors, acid gases, dust or welding fumes. The face-shield protects face and eyes from irritants and contaminants. Cartridges/filters must match contaminant(s) and be changed periodically.

Loose-fitting powered-air-purifying respirators (PAPR) offer breathing comfort from a battery-powered fan which pulls air through filters and circulates air throughout helmet/hood. They can be worn by most workers who have beards. Cartridges/filters must match contaminant(s) and be changed periodically.

A Self-Contained Breathing Apparatus (SCBA) is used for entry and escape from atmospheres that are considered immediately dangerous to life and health (IDLH) or oxygen deficient. They use their own air tank.

For more complete information:
OSHA Quick Card
U.S. Department of Labor
www.osha.gov (800) 321-OSHA
These are the general guidelines to be used by the NU Safety Professional user in selecting an appropriate respirator for the hazard. Types of respirators include air purifying and supplied atmosphere. Air purifying respirators remove contaminants (particulate or gas/vapor) from an otherwise-breathable atmosphere. Supplied atmosphere systems provide breathable air.

### Table 3: Respirator Selection

<table>
<thead>
<tr>
<th>Respirator Type</th>
<th>Example</th>
<th>Description</th>
<th>APF*</th>
</tr>
</thead>
</table>
| Dust mask (non-NIOSH-approved)                      | ![Image](image1.png) | a. A flexible pad held over the nose and mouth by an elastic or rubber strap to protect against dusts encountered during construction or cleaning activities, such as dusts from drywall, brick, wood, or sweeping.  
  b. This is a loose-fitting mask for single use only.  
  c. Non-NIOSH-approved disposable dust masks are not approved devices for use on Northwestern's campus. | N/A  |
| Particulate respirator/filtering face piece (NIOSH-approved) | ![Image](image2.png) | a. Examples: N95, N99, P100  
  b. A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. It captures particles in the air, such as dusts, mists, and fumes, but does not protect against gases or vapors.  
  c. Filtering facepiece respirators should be disposed of and replaced with a new one each time they are removed.  
  d. Medical clearance is not required for a filtering facepiece mask. | 5    |
| Half-face mask                                       | ![Image](image3.png) | a. A tight fitting, air purifying filtration respirator that does not provide eye or face protection.  
  b. Can be used with particulate filters,  
  c. Can be used with gas/vapor canisters  
    1. Are normally used when there are only hazardous gases and vapors in the air.  
    2. Use chemical filters (called cartridges or canisters) to remove dangerous gases or vapors. Cartridges must be matched to the hazard.  
    3. Do not protect against airborne particles.  
    4. Are made to protect against specific gases or vapors.  
    5. Provide protection only as long as the filter's absorbing capacity is not depleted. | 310  |
| Half-face mask (cont) | 6. The service life of the filter depends upon many factors and can be estimated in various ways.  

d. Can be used with combination particulate filter/gas canister. |
|---------------------|---------------------------------------------------------------------------------------------------------------|
| **Full-facepiece**   | a. A type of tight fitting, air purifying filtration respirator that provides eye and face protection when properly fit and sealed.  
b. Can be used with particulate filters,  
c. Can be used with gas/vapor canisters, which  
1. Are normally used when there are only hazardous gases and vapors in the air;  
2. Use chemical filters (called cartridges or canisters) to remove dangerous gases or vapors. Cartridges must be matched to the hazard.  
3. Do not protect against airborne particles;  
4. Are made to protect against specific gases or vapors;  
5. Provide protection only as long as the filter's absorbing capacity is not depleted; and  
6. The service life of the filter depends upon many factors and can be estimated in various ways.  
d. Can be used with combination particulate filter/gas canister. |
| **Powered air purifying respirator (PAPR)** | a. An air-purifying respirator that uses a blower to force the ambient air through the air-purifying elements to the inlet covering. The blower 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 workers with facial hair.  
b. Another type of PAPR is the tight-fitting full facepiece PAPR. This PAPR has an elastomeric facepiece made of rubber or silicone. It has 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.  
c. There are also half-mask PAPRs as well as PAPRs that have a helmet or hood.  
d. PAPR is a common substitute for users deemed medically unable to wear other types of respirator |
| Half-face mask: 50  
Full-facepiece: 1,000  
Helmet/hood: 425/1,000  
Loose-fitting facepiece: 25 |
**Self-contained breathing apparatus (SCBA)**

- a. These respirators provide breathing air independent of the environment. Such respirators 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.
- b. While this type of unit 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 to be used only in emergency situations and other IDLH applications.
- c. All work locations where there are atmospheres that are categorized as Immediately Dangerous to Life or Health (IDLH) require the use of a full facepiece, positive pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes or a combination full facepiece pressure demand supplied air respirator (SAR) with an auxiliary self-contained air supply.

**Emergency Escape-Use Breathing Apparatus**

- a. Example: 10-min escape
- b. A self-contained compressed air apparatus for escape from a contaminated environment.

*Assigned Protection Factors (APFs): Employers must use the assigned protection factors listed in the above table 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), employers must ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.*

Air-purifying cartridges must be matched to the contaminant of concern. Cartridges are color-coded to indicate their intended function.

**Table 4: Respirator Cartridge Selection**

<table>
<thead>
<tr>
<th>Color</th>
<th>Type of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Organic vapor cartridge</td>
</tr>
<tr>
<td>White</td>
<td>Acid gas cartridge</td>
</tr>
<tr>
<td>Yellow</td>
<td>Organic vapor &amp; acid gas cartridge</td>
</tr>
<tr>
<td>Green</td>
<td>Ammonia &amp; methyl amine cartridge</td>
</tr>
<tr>
<td>Olive Green</td>
<td>Organic vapor &amp; formaldehyde cartridge</td>
</tr>
<tr>
<td>Orange</td>
<td>Mercury vapor &amp; chlorine gas</td>
</tr>
<tr>
<td>Purple (Magenta)</td>
<td>Dust, fumes, mists, asbestos, radionucleotides, &amp; highly toxic particulates (P100) filter</td>
</tr>
<tr>
<td>Black/Purple</td>
<td>Organic vapor &amp; P100 combination</td>
</tr>
<tr>
<td>White/Purple</td>
<td>Acid gas &amp; P100 combination</td>
</tr>
<tr>
<td>Yellow/Purple</td>
<td>Organic vapor/acid gas &amp; P100 combination</td>
</tr>
<tr>
<td>Green/Purple</td>
<td>Ammonia/Methyl amine &amp; P100 combination</td>
</tr>
<tr>
<td>Olive Green/Purple</td>
<td>Organic vapor/formaldehyde &amp; P100 combination</td>
</tr>
<tr>
<td>Pre-filters</td>
<td>Use with dusts, fumes, mists, pesticides, &amp; plants</td>
</tr>
</tbody>
</table>

Respiratory Protection Program
September 2017
Appendix 2  Medical Evaluation

NorthShore OMEGA (Evanston campus) and Northwestern Medicine Corporate Health (Chicago campus) are the preferred licensed healthcare professionals (PLHCPs) who will review medical clearance questionnaires. Medical clearance questionnaires will be provided by an NU Safety Professional and must be sent to the PLHCP for review. A physical exam may be required. The PLHCP will determine if there is a need for follow-up medical examinations, which will include any medical tests, consultations, or diagnostic procedures necessary to make a final medical clearance.

The medical questionnaire and necessary follow-up examinations will be administered confidentially during the user’s normal working hours or at a time and place convenient to the user. The medical questionnaire will be administered in a manner that ensures the user understands its content. If desired, the user will have the opportunity to discuss the questionnaire and examination results with the PLHCP.

The following information must be provided to the PLHCP before a recommendation is made concerning a user’s ability to use a respirator:

i. The type of respirator to be used;
ii. The duration and frequency of respirator use (including use for rescue and escape);
iii. The expected physical work effort;
iv. Additional protective clothing and equipment to be worn; and
v. Temperature and humidity extremes that may be encountered.

The PLHCP will provide a written recommendation regarding the user’s ability to use the respirator containing the following information:

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 that the PLHCP has provided the user with a copy of the PLHCP’s written recommendation.

If the respirator is a negative pressure respirator (see Appendix 1 for more information) and the PLHCP finds a medical condition that may place the user’s health at increased risk if the respirator is used, the PLHCP will determine if a Powered Air Purifying Respirator (PAPR) can be used. If the PLHCP determines that a PAPR (see Appendix 1 for more information) can be used by the user, the respirator user’s department will provide the PAPR. If a subsequent medical evaluation finds the user medically able to use a negative pressure respirator, then Northwestern is no longer required to provide a PAPR.
The occupational health clinics can be contacted with the information below:

<table>
<thead>
<tr>
<th>Evanston</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td>NorthShore University HealthSystem OMEGA</td>
<td>Northwestern Medicine Corporate Health</td>
</tr>
<tr>
<td>2650 Ridge Avenue, Suite 4225 Evanston, IL</td>
<td>676 North St. Clair St, Suite 900 Chicago, IL</td>
</tr>
<tr>
<td>847-657-1700</td>
<td>312-926-8282</td>
</tr>
</tbody>
</table>
Appendix 3  Respirator User Seal Check Procedures

These procedures are for individuals using tight-fitting respirators.

Perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method will be used.

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

A. Facepiece Positive and/or Negative Pressure Checks
   i. Positive pressure check:
      a. Close off the exhalation valve and exhale gently into the facepiece.
      b. 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.
      c. 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.
   ii. Negative pressure check:
      a. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds.
      b. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.
      c. 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.

B. 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 that the employer demonstrates that the manufacturer's procedures are equally effective.
Appendix 4  Respirator Cleaning Procedures

These procedures are provided for employer use when cleaning respirators. These may be substituted by the cleaning recommendations provided by the respirator manufacturer, provided such procedures are as effective as those listed here. Equivalent effectiveness simply means that the procedures used must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

Procedures for Cleaning Respirators

A. 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.

B. Wash components in warm (43° C [110° F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43° C [110° F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
   i. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43° C (110° F); or,
   ii. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43° C (110° F); or,
   iii. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43° C [110° F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.
## SCBA Maintenance Log

**Today’s date**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulator Serial Number</td>
<td></td>
</tr>
<tr>
<td>Tank Serial number</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month-Year</th>
<th></th>
</tr>
</thead>
</table>

**Visual Inspection - Rate the following (Good or Bad):**

<table>
<thead>
<tr>
<th>Valve?</th>
<th>Good / Bad</th>
<th>Good / Bad</th>
<th>Good / Bad</th>
<th>Good / Bad</th>
<th>Good / Bad</th>
<th>Good / Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubes?</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
</tr>
<tr>
<td>Tank?</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
</tr>
<tr>
<td>Regulator?</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
</tr>
<tr>
<td>Pressure Gauge?</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
</tr>
</tbody>
</table>

**Any Signs of:**

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<th>Yes / No</th>
<th>Yes / No</th>
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<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rust</td>
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<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Corrosion</td>
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<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Dents</td>
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<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Cut or Tears</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is Pressurization check completed without issue?</th>
<th>Yes / No</th>
<th>Yes / No</th>
<th>Yes / No</th>
<th>Yes / No</th>
<th>Yes / No</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is tank air at least 90% ?</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Are regulator and warning devices working properly?</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
</tbody>
</table>

**Comments:**

<table>
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<tr>
<th>Date of Inspection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Inspector</td>
<td></td>
</tr>
<tr>
<td>Signature of Inspector</td>
<td></td>
</tr>
</tbody>
</table>

*Posi-Check Testing Due: MM/YYYY (every 2 yrs)*

*Hydrostatic Testing Due: MM/YYYY (every 5 yrs)*

*Cylinders Need Replacement: MM/YYYY (every 15 yrs)*
### Appendix 6  
**Emergency Escape-Use Breathing Apparatus Maintenance Log**

#### Today's date

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th></th>
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<tbody>
<tr>
<td>Regulator Serial Number</td>
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</tr>
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**Visual Inspection - Rate the following (Good or Bad):**

<table>
<thead>
<tr>
<th>Valve?</th>
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<td>Good / Bad</td>
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<td>Good / Bad</td>
<td>Good / Bad</td>
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<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
</tr>
<tr>
<td>Pressure Gauge?</td>
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<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
<td>Good / Bad</td>
</tr>
</tbody>
</table>

**Any Signs of:**

<table>
<thead>
<tr>
<th>Deterioration</th>
<th>Yes / No</th>
<th>Yes / No</th>
<th>Yes / No</th>
<th>Yes / No</th>
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<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Corrosion</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Dents</td>
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<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
<tr>
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<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
<td>Yes / No</td>
</tr>
</tbody>
</table>

**Is Pressurization check completed without issue?**

| Yes / No | Yes / No | Yes / No | Yes / No | Yes / No | Yes / No | Yes / No |

**Is tank air at least 90% ?**

| Yes / No | Yes / No | Yes / No | Yes / No | Yes / No | Yes / No | Yes / No |

**Are regulator and warning devices working properly?**

| Yes / No | Yes / No | Yes / No | Yes / No | Yes / No | Yes / No | Yes / No |

**Comments:**

**Date of Inspection**

**Name of Inspector**

**Signature of Inspector**

*Posi-Check Testing Due: MM/YYYY  (every 2 yrs)*  
*Hydrostatic Testing Due: MM/YYYY  (every 5 yrs)*  
*Cylinders Need Replacement: MM/YYYY  (every 15 yrs)*
A respirator cartridge change-out schedule is used to determine how often cartridges should be replaced. All air-purifying respirators used for protection against gases and vapors must have an end-of-service-life indicator (ESLI). In the absence of an ESLI, reference Table 5, a cartridge change-out schedule that is based on OSHA standards and manufacturer’s recommendations.

**Table 5: Respirator Cartridge Change-Out Schedule**

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Change-Out Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic vapors</td>
<td>Maximum 8 hours use total (up to 200 ppm)</td>
</tr>
<tr>
<td>All cartridges for emergency use</td>
<td>Discard after each use</td>
</tr>
<tr>
<td>HEPA filters</td>
<td>Restricted breathing or visibly dirty, wet, or compromised</td>
</tr>
<tr>
<td>Filtering facepiece/dust masks</td>
<td>Visibly dirty/contaminated</td>
</tr>
<tr>
<td>Acrylonitrile</td>
<td>End of shift</td>
</tr>
<tr>
<td>Ammonia</td>
<td>Maximum 8 hours use total (up to 125 ppm)</td>
</tr>
<tr>
<td>Benzene</td>
<td>End of shift</td>
</tr>
<tr>
<td>Butadiene</td>
<td>Every 1, 2, or 4 hours depending on concentration (29CFR 1910.1051 Table 1), or End of shift</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>3 hours or end of shift (whichever comes first)</td>
</tr>
<tr>
<td>HCl, SO2, Chlorine</td>
<td>End of shift</td>
</tr>
<tr>
<td>Methylene Chloride</td>
<td>Must use supplied air</td>
</tr>
<tr>
<td>Nitric Acid</td>
<td>Must use supplied air</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>End of shift</td>
</tr>
</tbody>
</table>
Appendix 8 Voluntary Use

Some respirators create a strain on the body because of increased breathing resistance or other effects. For tight-fitting respirators, medical clearance is necessary to assure that you are not likely to be harmed by wearing the respirator. Medical Clearance Questionnaires will be provided by Northwestern University Safety Professionals and must be sent to OMEGA for review. You may need to have a physical exam.

Requirement

OSHA requires the following information be provided to anyone considering the voluntary use of a respirator:

Federal citation: 1910.134 Appendix D

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 respirators 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 such as 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 performed that may involve airborne asbestos fibers, silica dust, or heavy metal particles should be reviewed by an NU Safety Professional before the project proceeds. If you have questions concerning any of this information, please contact the following NU Safety Professional:
<table>
<thead>
<tr>
<th>Non-Research Areas</th>
<th>Research Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Management Services</td>
<td>Office for Research Safety (ORS)</td>
</tr>
<tr>
<td>Gwen Butler – Director, Environmental</td>
<td>Brett Berg – Senior Health &amp; Safety Specialist</td>
</tr>
<tr>
<td>Health &amp; Safety</td>
<td></td>
</tr>
<tr>
<td><a href="mailto:gwen.butler@northwestern.edu">gwen.butler@northwestern.edu</a></td>
<td><a href="mailto:brett-berg@northwestern.edu">brett-berg@northwestern.edu</a></td>
</tr>
<tr>
<td>847-491-4936</td>
<td>847-491-5581</td>
</tr>
</tbody>
</table>

**Risk Assessment**

Northwestern University Safety Professionals will require the following information to approve respirator use.

- Your name, NetID, supervisor’s name, and work telephone number for our records.
- The type of work you will be doing while wearing the respirator and the air contaminant of concern.
- The type of respirator you will use.