A Conservator's Guide to Respiratory Protection

A Special Insert Contributed by

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Conservators face many potentially harmful inhalation hazards from the varied chemicals and techniques they use in their work. Effective methods for reducing such exposures include administrative controls (removing workers from areas where the contaminant is present), replacement of hazardous materials with safer substitutes, engineering controls, and the use of respirators. Since administrative controls and substitution of materials are often not viable options for conservators, this article considers the use of engineering controls such as local exhaust ventilation and, where these methods provide inadequate protection, the use of respirators.

Ventilation Devices

Conservators can protect themselves with a variety of ventilation devices:

Laboratory Fume Hoods allow enclosure of the work process by placing relatively small pieces of work inside the hood. Keeping the face opening of the hood small by partially closing the sliding door or "sash" improves the overall performance of the hood. Placement of the work further into the hood can also increase the containment of the chemicals, provided that the item(s) does not block the exhaust slots or baffles at the back of the hood. To function effectively, fume hoods need proper airflow. Suggested face velocities range from 80–125 feet per minute. Often the manufacturer can supply meters to measure the face velocity upon request. Meters are also available at low cost from laboratory safety supply catalogs. Another inexpensive method for determining whether there is effective fume evacuation uses smoke generating cartridges, matches, or tubes. The smoke will show how well the contaminants are captured and how fast the hood clears the smoke. Smoke coming out the front may indicate that an expert should evaluate the hood because the flow may be too high, excess storage is blocking air circulation, or the plenum and ducts are blocked.

Paint Spray Booths have recommended air flow rates that vary with the task and toxicity of the solvents used. It is hard to generalize about adequate airflow rates since they can be affected by the booth design, the type of work, and the object being treated. Check with an industrial hygienist for specific information about spray booth safety guidelines.

Local Exhaust Devices with Flexible Trunks (snorkels or elephant trunks) allow ventilation to be moved to the point where work is done. This type of ventilation is very useful where the conservator must travel over a wide area within the work space. The capacity of the exhaust should be sufficient to reach laterally over the length of the work. Even if the vacuum cannot be perceived easily, the trunk still may be effectively evacuating fumes. If the user has concerns that the exhaust is not properly evacuating, smoke generating devices can be used to test the "pull" of the trunk. These items are available through the lab safety supply catalogs. Some industrial hygienists can quantitatively evaluate the effectiveness of local exhaust devices. It is important to keep the exhaust opening close to the work. A general guideline suggests that the hood be no more than one diameter of the exhaust opening away from the work.

Portable Exhaust Hoods need to be evaluated carefully, since there are many on the market. While they may be similar to fume hoods, how they treat the exhaust air should be considered, especially if they dump it back into the work area. If the process generates dust or other particles, a high-efficiency particulate air (HEPA) filter should be installed so that the particles are not recirculated. Removal of solvent vapors is more challenging. Typically, activated charcoal is used to remove many organic solvent vapors, but it will not remove all solvent vapors, nor does it last indefinitely. It is difficult to know when to replace the filters, given the wide variety of solvents with which conservators work. We hope they are not exposed to any solvents.

Unfortunately, engineering controls do not always solve the problem. These controls may be too costly, impractical, time consuming, or inapplicable in some operations. When engineering controls or work practices cannot reduce exposures sufficiently, sometimes respirators can. For effective protection it is important to select the proper device, use it correctly, and maintain it properly.

Respirators

There are two types of respirators: air-purifying and atmosphere-supplying. Air-purifying respirators filter the air contaminants with a particulate filter or chemical cartridge. Atmosphere-supplying respirators provide fresh air from an uncontaminated air source, either pressurized tanks or through a specialized compressor. Because there is no all-purpose respirator to protect against all contaminants and concentrations in all situations, it is important to match the expected respiratory protection needs with the protection offered by the various designs.

Air-Purifying Respirators are of two types: negative pressure (commonly used by conservators), in which the user inhales to draw air through the cartridge or filter, and powered air-purifying (PAPR), in which air is blown through the cartridge or filter by a power pack worn at the waist. Both types use chemical cartridges to remove specific vapors and gases, while filters remove particulate matter such as dusts, mists, or fumes. The air-purifying respirator consists of a chemical cartridge and/or a filter attached to a half facepiece (covering the mouth and nose), full facepiece (covering mouth, nose, and eyes), or hood (PAPRs only).

Air-purifying respirators are designed to remove particles from the air-using particulate filters. Recently, new categories of particulate filters were created. The nine new categories of filters fall into three "series" of filters: N, R, or P series. Each series has three levels or classes of filter efficiency. The three classes are 95 (95% efficient), 99 (99% efficient), and 100 (99.97% efficient). The efficiency level stated is for the most difficult particle size to filter. This means the filter efficiency when being used will be greater than that stated.

N-series filters are for use in atmospheres free of oil aerosols. They may be used for any solid or liquid airborne particulate hazard that does not contain oil. Generally, these filters should be used and reused subject only to consideration of hygiene, damage and increased breathing resistance.

R-series filters are intended for removal of any particle including oil-based liquid aerosol. They may be used for any solid or liquid airborne particulate hazard. If the atmosphere contains oil, the R-series filter should be used only for 8 hours of continuous or intermittent use.

P-series filters are intended for use against any particle including oil-based liquid aerosols. They may be used for any solid or liquid particulate airborne hazard. The filter must be discarded according to the time-use restriction supplied by the respirator manufacturer on all P-series filters. This time use limitation is longer than that for R-series filters, so the P-series filters can be used for much longer times when used in atmospheres containing oil mist. The following guide might be helpful in remembering which filter series to use:

- N for **N**ot resistant to oil
- R for **R**esistant to oil
- P for oil **P**roof

Air-purifying respirators use chemical cartridges to protect against gases and vapors. These cartridges contain a granular, porous material, typically activated charcoal for organic vapors that has a large surface area per gram of material. To increase its effectiveness for other gases and vapors, chemically treated activated charcoal is used. Although conservators may most often use organic vapor cartridges, other types are available to protect against acid gases, the combination of organic vapors and acid gases, ammonia, formaldehyde, and mercury vapor.

The cartridge service life varies with the chemical and its concentration in the air. A general guideline is that if the vapor has a boiling point of 70^{o}C and an airborne concentration less than 200 parts per million (ppm), the chemical cartridge should last at least 8 hours. (Solvents with a boiling point greater than 70^{o}C include toluene, xylene, methyl ethyl ketone, propyl and butyl alcohol, Cellosolv, ethanol, diacetone alcohol, dimethyl foramide, and most of the Shell aliphatic hydrocarbons. Acetone and methanol have boiling points below 70^{o}C.) However, this guideline of 8 hours assumes the cartridges are stored in a resealable plastic bag when not in use. A cartridge lying exposed on any exposed surface in a room in which there are solvent vapors will be using up a part of its service life even if it is not being worn. Also, if the conservator is working very close to the solvent the airborne concentration may be higher than 200 ppm, and in this situation, the eight-hour guideline may not apply. There are several ways to measure the concentration; one can have an industrial hygienist do a sampling study or purchase relatively inexpensive (less than $90) passive monitors that clip onto the conservator's shirt. The price includes analysis by the laboratory. This concentration information can then be used to obtain a better service life estimate so you know when to change the cartridge. Most respirator manufacturers have information or computer programs on their web page that allow you to use the concentration value to determine the cartridge's service life.

A few respirator cartridges are now available with a service life indicator. These indicators provide a visual clue, usually a color change in a small window on the cartridge, that indicate when it is time to change the cartridge. If cartridges with service life indicators are not available for a specific hazard, establish a cartridge change schedule.

A cartridge in most cases is expended very rapidly toward the end its service life. At that point the chemical breaks through, and the often suddenly noticeable odor, taste, or irritation may also indicate that it is time to replace cartridges. Although these warning signs may be noticed by most users, they may not be evident to all, since users' sense of smell vary. In addition, not all contaminants have an odor detectable at safe levels (below the threshold limit value [TLV] for that contaminant). The TLV value can be found on the Material Safety Data Sheet (MSDS). To understand TLVs, consult Monona Rossol's "Using TLVs for Common-Sense Risk Assessment for Solvents," *AIC News*, January 1993, pp. 1–5. Also, some individuals may experience olfactory fatigue. These reasons illustrate the importance of determining the cartridge service life and why the conservator should not rely on odor as the primary indicator for changing the cartridges. Odor thresholds are listed in a number of publications (American Industrial Hygiene Association 1989) and are required on Canadian MSDSs. This information allows the conservator to decide if odor should be used as a secondary or "backup" as an indicator to change the cartridges.

Chemical cartridge respirators cannot be used when:

- the cartridge is not effective against the solvent (breakthrough occurs to quickly for practical use)
- there is no cartridge available for the gas or vapor
- a chemical cartridge change schedule cannot be determined
- atmosphere-supplying (airline) respirators (see below) are required according to OSHA standards. (All employers with salaried employees are responsible for making sure those employees adhere to OSHA standards.)

Air-purifying respirators have a number of limitations. First they do not protect against oxygen deficiency. This situation could occur during fumigation using CO_2 or nitrogen, in which case an atmosphere-supplying respirator would be the only safe form of protection. Air-purifying respirators can only be used where the contaminant is present in relatively low concentrations. Finally, they must have the proper air-purifying element for removal of the contaminant. In cases where oxygen deficiency or high-contaminant concentrations may be present, it is best to consult an industrial hygienist.

Face fit is crucial. Beards, mustaches, sideburns, long bangs, facial jewelry, or glasses may prevent the respirator surface from sealing properly and completely. An incomplete seal between the respirator and skin can nullify the respirator's effectiveness. Individuals with facial hair or jewelry must consider a different type of PPE, such as a powered air-purifying respirator. Spectacle kits for full facepieces are available allowing prescription lenses to be mounted inside the respirator without breaking the face-to-facepiece seal. A typical half-facepiece respirator with six cartridges for organic vapors cost approximately $50. Full-face respirators typically cost about $200–$250 with six cartridges. Half-face and full-facepiece air-purifying respirators *do not provide a complete seal for those with facial hair, and they do not conform to OSHA standards for bearded workers.*

Powered air-purifying respirators (PAPRs) use the same types of cartridges as negative-pressure respirators. However these devices use a power source (usually a battery that needs to be charged after 8 hours of use) to operate a blower that passes air through the filter or cartridge into a half or full facepiece, loose-fitting facepiece, helmet, or hood. A wider variety of facepiece styles is available in PAPRs than in air-purifying respirator, and they are generally more protective. They are easier to breathe through, since the motor and blower do most of the work. PAPRs *with hoods and helmets* (not half- or full-face masks) conform to OSHA standards for those with facial hair or other facial features that would affect the sealing capability of a "facepiece" type respirator. Disadvantages include increased weight and size, complexity, and cost, usually around $600.

Supplied-Air (also called airline) respirators receive air from either pressurized tanks of Grade D air or from a special-use compressor that has suitable safeguards (i.e., inline filters or oil free lubrication) to provide Grade D air to the user. (For the specific requirements, see Compressed Gas Association 1997.) Air is delivered either continuously (continuous flow) or intermittently (pressure demand) in sufficient volume to meet the wearer's breathing requirements. Generally airline respirators offer the same degree of protection as PAPRs, but they are required if the user does not establish a chemical cartridge change schedule for gas and vapor exposures or there are no cartridges effective against the contaminant. It is important that the compressor intake be located in an uncontaminated area (i.e., not where the conservator is using solvents).

Continuous-flow airline respirators are available with either a half or full facepiece, loose-fitting facepiece, helmet, or hood. Pressure-demand airline respirators are equipped with either half or full facepieces. Since airline respirators do not rely on filters or cartridges, they are applicable for use with a wider range of chemicals than air-purifying respirators and PAPRs. Continuous-flow airline respirators with helmets and hoods can be used by workers with facial hair or other features that would affect the sealing capability of a half, full or loose-fitting facepiece. Airline respirators can be designed to provide cooling or heating to the worker, so they can be more comfortable to wear. Disadvantages include having to secure an air supply for the respirator, dragging an air hose around, and relatively complex maintenance. The cost may approach $1,000 or more, since air must be "purchased" either through a special-use compressor or by renting pressurized tanks of air.

Respirator Selection

Selecting the appropriate respirator requires considering the properties of the inhalation hazard and the capabilities and limitations of the various respirators. First, the potential airborne contaminants and the existing TLV or other occupational exposure limits must be determined. Exposure limits may not exist for many materials conservators use. In these cases, the conservator should use common sense to evaluate what level of respiratory protection may be desired or seek the help of an industrial hygienist. For example, if the contaminant has no TLV but the Material Safety Data Sheet lists it as a respiratory irritant only, a half-face respirator may be adequate. However, if the material has no TLV but it is an eye irritant or is toxic, then a PAPR or airline respirator with a full facepiece or hood may be more appropriate.

It is also necessary to determine if OSHA has a comprehensive health standard specific to the contaminant of concern (as they do for arsenic, lead, cadmium, formaldehyde and others). These are listed as 29CFR 1910.1000+ series, to be found at www.osha.gov. If so, conservators should follow the specifications listed there for achieving adequate respiratory protection from the material in various airborne concentrations. Next, it is important to determine if the potential for oxygen deficiency or chemical concentration exceeding the level immediately dangerous to life or health (IDLH) exists. If so, none of the respi-

Definitions Related to Airborne Contaminants

Dusts: Solid particles generated by handling, crushing, grinding, rapid impact, detonation, and decrepitation of organic or inorganic materials, such as rock, ore, metal, coal, wood, and grain. Dusts do not tend to flocculate, except under electrostatic forces; they do not diffuse in air but settle under the influence of gravity.

Fume: Airborne particulate formed by the condensation of solid particles from the gaseous state. Usually, fumes are generated after initial volatilization from a combustion process, or from a melting process (such as metal fume emitted during welding). Usually less than one micron in diameter.

Gas: A state of matter in which the material has very low density and viscosity, can expand and contract greatly in response to changes in temperature and pressure, easily diffuses into other gases, and readily and uniformly distributes itself throughout any container. A gas can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature (below the critical temperature).

Mists: Suspended liquid droplets generated by condensation from the gaseous state to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing. Formed when a finely divided liquid is suspended in air.

Vapors: The gaseous form of substances that are normally in the solid or liquid state (at room temperature and pressure). The vapor can be changed back to the solid or liquid state either by increasing the pressure or decreasing the temperature alone. Vapors also diffuse. Evaporation is the process by which a liquid is changed to the vapor state and mixed with the surrounding air. Solvents with low boiling points vaporize readily.

Definitions from Fundamentals of Industrial Hygiene, by Barbara A. Plog et al., 1996, published by the National Safety Council.

rators discussed here is acceptable, and an industrial hygienist should be consulted. The contaminant concentration should be measured or estimated, since the selection of respirators depends on concentration levels. Finally, the physical state of the contaminant (i.e., dust, mist, fume, gas, or vapor) should be determined. A particulate filter is needed for a dust, mist or fume. A chemical cartridge is required for a gas or vapor. Industrial hygienists can be consulted for guidance on air sampling to determine concentration levels, or the information can be obtained from the passive monitors mentioned earlier. There are also a number of industrial hygiene references to help make these determinations (American Industrial Hygiene Association 1989; National Institute for Occupational Safety and Health 2000).

Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) should be selected. This approval is the user's assurance that the respirator meets minimum performance criteria. Respirators are also given ratings called assigned protection factors (APFs). APFs are the expected workplace level of respiratory protection provided by a properly maintained and used respirator. Table 1 lists APFs for respirators that conservators might typically use. The number can be thought of as the level of reduction of the airborne concentration. An APF of 10 means the concentration is reduced 10 times, so one tenth of that in the air is actually breathed. Due to relatively small amounts of material used and/or the short duration of use (compared to industrial applications), exposure will probably be below 10 times the TLV. Therefore, a half facepiece respirator with an APF of 10 will generally be sufficient. Concern about possible higher concentrations can be addressed by personal dosimetry or and industrial hygiene survey.

If the contaminant is a particle (i.e., dust, mist, fume), select a filter based on the presence or potential of oil mists in the air. For example, if the contaminant is a solvent containing mist (i.e., lacquer spray) or water containing mist, select a respirator with an N, R, or P series particulate filter. If there is a question whether the material contains oil, check the MSDS to see if lists any oils. The respirator manufacturer can also be consulted as they often have selection guides that indicate which materials are oils. If oil mist is present such as from using oil-lubricated, pneumatic hand tools or spraying an oil finish, select a respirator with either an R or P series particulate filter. Typically any filter class (95, 99, or 100) is acceptable. The 95 class will typically be easier to breathe through. However, if an OSHA standard requires a HEPA filter, then a Class 100 filter must be used. If the contaminant is a gas or vapor and a cartridge change schedule can not be determined or the service life is so short that the use of a chemical cartridge is not practical, select an airline respirator. For example, a 200 ppm concentration of methanol can break through an organic vapor cartridge in 10 minutes, so an airline respirator may be the most appropriate choice when working with this solvent.

If the contaminant is a gas or vapor, ask the respirator manufacturer if there is a chemical cartridge suitable for the contaminant. Some manufacturers publish selection guides to assist in choosing the right respirator for the task. If there are questions about the suitability of a respirator for a given task, consult the respirator manufacturer and/or an industrial hygienist. Table 2 lists some chemicals commonly used by conservators along with information needed to select a respirator. This information is often found in respirator selection guides. Please note that conservators spraying varnishes or other coatings should use a respirator with a combination cartridge consisting of an organic vapor cartridge integrated with a particulate filter or an organic vapor cartridge fitted with an approved pre-filter.

To be effective, respirators must fit well and be worn properly during all times of exposure. Not wearing the respirator for even a short time while the chemical is present can practically eliminate the benefit of wearing it. *This time period can be as short as 6 minutes for a one hour time exposure.* Respirator

Table 1. Assigned Protection Factors for Selected Respirators

	RESPIRATORY INLET COVERING			
TYPE OF RESPIRATOR	Half facepiece[1]		Full facepiece	
Air-purifying	10		100	
	Half facepiece	Full facepiece	Helmet/Hood	Loose-fitting facepiece
Powered air-purifying	50	1000	1000	25
Airline				
• Pressure demand	50	1000	---	---
• Continuous flow	50	1000	1000	25

[1] Includes one-quarter mask, disposable half mask, and half mask with elastomeric facepieces.

Note: For combination respirators, e.g., airline respirators equipped with air-purifying filters, the mode of operation in use will dictate the assigned protection factor to be applied.

Table 2. Respirator Selection Guide

CHEMICAL	ODOR THRESHOLD	TLV	BOILING POINT	RESPIRATOR	COMMENTS
Acetone	3.6-653 ppm	500 ppm TWA	56.5°C	Organic vapor	Short service life
Ammonia	0.043-53 ppm	25 ppm TWA	Not applicable	Ammonia	Eye irritation
Cadmium	Not applicable	0.005 mg/m^3 TWA	Not applicable	N, R, or P 100	OSHA requirement
Cellosolv®	2.7 ppm	5 ppm TWA	135 °C	Organic vapor	Skin absorption
Hydrochloric acid	0.255-10.16 ppm	5 ppm ceiling	Not applicable	Acid gas	Irritation warning
Methyl alcohol	4.2-5960 ppm	200 ppm	64.7 °C	Airline	Ineffective cartridge
Methylene chloride	160 ppm	50 ppm TWA	39.75 °C	Airline	OSHA requirement
Nuisance particulates	Not applicable	10 mg/m^3 TWA	Not applicable	N, R, or P95	
Toluene	0.16-37 ppm	50 ppm	110.6 °C	Organic vapor	
Xylene	20 ppm	100 ppm TWA	139.3 °C	Organic vapor	

manufacturers provide training aids, such as videos and posters, and instructions on how to properly put on and adjust the respirator to the face.

Conduct a *user seal check* each time the respirator is put on. A user seal check consists of putting on the respirator, covering the cartridge or filters, and sucking in or blowing out air. If the user can do this easily, the respirator is not adjusted properly, may be missing valves, or filters are not properly installed. Tight-fitting respirators (i.e., half or full facepiece respirators) must be fit *tested* in addition to performing a *user seal check*. Fit *tests* are used to determine which size and make of respirator fits the worker. One type, a qualitative fit test, uses a material that can be detected by taste or smell by the wearer. If the wearer detects the material during a properly conducted test, the respirator does not fit and a different size or brand should be tried. The other type of fit testing is a quantitative fit test in which either air leakage is evaluated or a test substance is measured both inside and outside of the respirator. The quantitative fit test provides a calculated protection factor for the respirator and is more objective than a qualitative fit test, though it requires special equipment and is more expensive. The procedures for proper fit testing can be found in OSHA standards or respirator protection manuals (Colton et al. 2001; American National Standards Institute 1992). For further information on fit testing standards, check the American National Standard for Respirator Fit Testing Methods (ANSI Z88.10–2001). If the conservator does not feel qualified to do the fit testing, industrial hygiene consultants and some respirator manufacturers will provide this service. Workers with facial hair (24 hours growth or more) must not be fitted, since they cannot wear this type of respirator safely.

Most people should be able to find a respirator with adequate fit, since half and full facepieces come in many sizes to fit a wide variety of face types and shapes. However, for those who cannot be properly fitted, a helmet or hood-type respirator can be used.

Respirator Maintenance

Respirators should be cleaned and sanitized, inspected for defects, and stored properly. If the respirator will be used by more than one worker, it must be cleaned and sanitized after each use. This involves removing the cartridges and filters, washing the respirator in warm water with a mild detergent, and sanitizing it with household bleach (2 tablespoons per gallon of water). Commercial sanitizing wipes are also available, but those containing alcohol are not suitable for use on nonsilicone respirators, which they can damage. Also, alcohol alone may not be an adequate germicidal agent for many serious biohazards like TB, hepatitis and HIV. Even if the respirator is used exclusively by one worker, it should be properly cleaned and sanitized after each day's use.

If defects are found, repairs must use replacement parts designated for that specific respirator. When the respirator is not in use (and is dry), it should be stored in a resealable plastic bag to prevent damage to the elastic material from temperature extremes, damaging chemicals, and excessive moisture. Silicone respirators are usually more resistant to organic solvents than PVC or rubber models. Do not store respirators in lockers or toolboxes unless they are free from contamination, distortion, or other damage. Seal cartridges in plastic if they are to be reused, and store in a place where they will not absorb additional contaminants.

While at first the process of appropriate respirator selection may seem overwhelming, there are many sources of information and help. In addition to the respirator manufacturer, two additional references are worth consulting: Colton et al. (2001) and the American National Standards Institute (1992). By selecting the proper respirator, using it correctly, keeping it in good repair, and wearing it during all times of exposure, conservators can reduce inhalation hazards.

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Note: this article was first published in the *AIC News*, March, 1995 ([20]2, pp. 1–6). It was recently revised to help conservators dealing with the September 11 disasters in NYC and Washington, D.C.

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Primary Providers of Air-Purifying Respiratory Protection Equipment

Brand Name	Contact Information
3M	3M Occupational Health & Environmental Safety (800) 243–4630 www.3m.com/occsafety
Wilson	Wilson Products A Bacou-Dalloz Company—Bacou USA International 7828 Waterville Road San Diego, CA 92154 (619) 671–1470 www.bacou-dalloz.com/us
Survivair	3001 South Susan Street Santa Ana, CA 92704 (800) 821–7236 www.survivair.com
North Safety	2000 Plainfield Pike Cranston, RI 02921 Customer Service: (800) 430–4110 www.northsafety.com
AO Safety	Aearo Company Technical Support (800) 444–4774 www.aearo.com/industrial.htm
Mine Safety Appliances (MSA)	MSA Customer Service (800) MSA–2222 www.msanet.com

The Health and Safety Committee would like to encourage members to arrange for respirator fit testing on a regional or local level. We requested information from the membership of the Association of Occupational and Environmental Clinics (AOEC) and the American Industrial Hygiene Association (AIHA) for parties that were willing to provide medical evaluation services and respiratory fit testing services for conservators. Many organizations were interested and those that were able to provide suitable descriptions of their services are included below.

Name and Contact Information	Able to Provide	
	Medical Evaluations	Fit Testing[1]
Medical Surveillance Program Department of Epidemiology and Preventive Medicine One Shields Avenue, TB 154 University of California Davis, CA 95616–8638 (530) 752–1281; Fax: (530) 752–3239	X	X
Duke Occupational Medicine Clinic Division of Occupational and Environmental Medicine Duke University Medical Center PO Box 3834 Durham, NC 27710 (919) 286–1722; Fax: (919) 286–1021	X	X
WVU, SoM, Community Medicine Institute of Occupational & Environmental Health 3860 Robert C. Byrd Health Sciences Center So. Morgantown, WV 26506–9190 (304) 293–3693; Fax: (304) 293–2629	X	X
National Jewish Medical and Research Center 1400 Jackson Street, Room A324A Denver, CO 80206 (303) 398–1622; Fax: (303) 270–2289	X	X
Center for Occupational Health University of Cincinnati P.O. Box 670458 Cincinnati, OH 45267–0458 (513) 475–7716; Fax: (513) 475–7711	X	X
Comprehensive Health Services, Inc. 8810 Astronaut Blvd., Suite 145 Cape Canaveral, FL 32920 (321) 783–2720		X
Finger Lakes Occupational Health Services 980 Westfall Road, Suite 210 Rochester, NY 14618 (585) 256–0853; Fax: (585) 256–2271	X	X
Sandler Occupational Medicine Associates, Inc. 966 Hungerford Drive, Suite 20 Rockville, Maryland 20850 (301) 217–0092; Fax: (301) 217–0413 www.somaonline.com		X
Eastern NY Occupational and Environmental Health Center 1873 Western Avenue Albany, NY 12203 (518) 690–4420; Fax: (518) 690–4427	X	X

[1] *Providers have indicated that they can make at least 3 different sizes (small, medium, and large) of a minimum of two different brands of respirators available for fit testing. They have also indicated that fit testing can be performed for generally less than $50 per person.*

The organizations will likely need some input as to the hazards that are encountered at a particular location or operation in order to best provide fit testing and medical evaluation services. Conservators and their organizations should perform an initial evaluation of the types of hazards in the working environment prior to contacting these providers solely for respirator fit testing and medical evaluation services. Many of these providers can also provide industrial hygiene and workplace hazard evaluation services.

Additional providers may be available in other areas of the country. Costs may vary with the number of individuals to be fit tested, travel budget (if the fit testing is to be performed at a central location, such as a regional guild meeting), and the variety of respirator brands available for fit testing.

If you request a medical evaluation that meets the requirements of the Occupational Health and Safety Administration (OSHA) regulations, the provider should be able to inform you if they can provide that service. A more complete list of health providers in your area can be compiled by consulting local telephone books and online resources for occupational health services.

For additional resources that provide respirator fit testing, check with local occupational health providers, in the telephone book for industrial hygiene services, or by using the consultants list at the AIHA website (www.aiha.org) which can be searched by either specialty (respiratory protection) or by location. Many providers will request that you provide information relative to your work site hazard assessment in order to determine which respirators will be the most suitable for your needs.

If you decide to pursue medical evaluation and fit testing services from other providers you may want to ask the following types of questions:

1. Do you provide medical evaluations for respirator use?
2. Do you provide qualitative respirator fit testing? If so, please indicate approximate costs: For individuals? For a group?
3. Do you provide quantitative respirator fit testing? If so, please indicate approximate costs: For individuals? For a group?
4. Do you have a full range of sizes (small, medium, and large) available for fit testing? Do you have more than one brand of respirators available for fit testing?
5. Are you able to set up a program so that individual conservators who use your services can get re-fit on an annual basis, as per OSHA requirements?
6. Can your organization travel offsite to meet with an organization or a group of conservators for a pre-arranged training and/or fit testing?

—*Danny Ertel and Lisa Goldberg, members of the AIC Health & Safety Committee*