Respiratory Protection Newsletter: February 2016

Special Note: **Respirator Selection & Cartridge Change Out Schedule Workshop**:
April 27 - 28, 2016 in Cincinnati
Fit Testing Refresher & Advanced Topics:
June 2, 2016 in Cincinnati

"A common problem with respirator fit testing is that poorly fitting respirators may pass when the operator doesn't administer the test correctly. This is particularly true for qualitative fit testing, but also applies to quantitative fit testing." - Roy McKay, Ph.D.

NIOSH Study Supports Annual Fit Testing
Currently the U.S. Occupational Safety and Health Administration (OSHA) requires at least annual fit testing of tight fitting respirators for use in areas that require respiratory protection. There are several reasons for at least annual fit testing. One of the most important reasons is to verify that the respirator wearer can properly position the respirator, adjust the straps, nose band, and/or other components and obtain an acceptable seal. Fit testing can also identify respirator damage not recognized by visual inspection of elastomeric facepieces. Other reasons to repeat fit testing on a regular (i.e., annual) basis include weight gain or lose, especially in the facial region. Some employers consider fit testing an economic burden and/or don't recognize the value of a properly fitted facepiece. Healthcare, in particular, is one industry that frequently challenges the need for annual fit testing. Recently, NIOSH researchers (Zhuang, Bergman & Krah) released results from a three year study designed to support or refute the need for annual fit testing of N95 filtering facepiece respirators (FFRs). For this study, NIOSH researchers focused on N95 FFRs because they are the most commonly-worn respirator in the healthcare industry and the need for annual fit testing is often debated by hospital administrators.

Results from this study confirmed the necessity of the current OSHA fit testing requirement, both annually and when physical changes (i.e., weight lose) have occurred. These results complement other studies that have confirmed the need for annual fit testing of elastomeric facepieces. In addition, the NIOSH study concluded that respirator users who have lost more than 20 pounds should be re-tested to ensure the respirator in use still provides an acceptable fit.

Continued on Page 2, column 1 ➜➜➘➘

Pregnancy and Fit Testing. Is it Necessary to Repeat Fit Testing During Pregnancy?
Previously, this newsletter summarized the physiological effects of wearing an N95 filtering facepiece respirator (FFR) during pregnancy. Therefore, this information will not be repeated here. Instead, this article will discuss the impact of respirator fit during pregnancy. It is well recognized that significant weight gain occurs during pregnancy and a question for respirator program administrators and fit testers is whether or not this affects respirator fit. As mentioned in the companion article of this newsletter (page 1, column 1), OSHA requires at least annual fit testing of tight fitting respirators worn in areas that require respiratory protection. In addition, OSHA requires fit testing be repeated whenever an employee reports, or a licensed health care professional, supervisor, or program administrator makes visual observations of changes in the employee's physical condition that could affect respirator fit (e.g. facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight). Certainly, pregnancy alters body weight. However, weight gain during pregnancy is different

Continued on Page 2, column 2 ➜➜➘➘

Respirator Program Administrator Training
Attend at least four days of respirator training from three different training categories and earn a certificate for Respirator Program Administrators. For additional information, email us at info@DrMcKay.com

NIOSH Study Supports Annual Fit Testing

Continued from page #1, column 1:

As mentioned above, OSHA requires at least annual fit testing of tight fitting respirators worn in areas that require respiratory protection. In addition, OSHA requires that fit testing be repeated whenever an employee reports, or the employer or the physician or other licensed health care professional, supervisor, or program administrator makes visual observations of changes in the employee's physical condition that could affect respirator fit (e.g. facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight. The NIOSH study found that respirator fit changed over time with weight loss. The greater the weight loss, the greater likelihood that respirator fit will become unacceptable. NIOSH investigators also concluded that N95 FFR wearers who lose more than 20 pounds should prioritize scheduling a fit test to ensure proper respirator fit. Therefore, this NIOSH study supports the current OSHA requirement for annual fit testing. Repeat fit testing is also necessary when the wearer fails a seal check and/or leakage is suspected.

This three year study examined changes in N95 filtering facepiece respirator (FFR) fit at six-month intervals and the relationship between fit and changes in body weight. Unacceptable fit was observed for 14, 10, 7, 12, 15, and 16% of subjects during visits 2 through 7, respectively. In addition, the predicted risk of an unacceptable fit increased with increasing length of time between fit tests, from 10% at Year 1 to 20% at Year 2 and to 25% at Year 3. Twenty-four (24) percent of subjects who lost 20 or more pounds had an unacceptable fit. In summary, this study supports the current OSHA requirement for annual fit testing of N95 FFRs and suggests that respirator users who lose more than 20 pounds should be re-tested. Source: "*NIOSH Science Blog*", posted January 5, 2016.
http://blogs.cdc.gov/niosh-science-blog/2016/01/05/fit-testing/

Fit Testing **Refresher & Advanced Topics**

This 1-day course is specifically designed for the person who has been conducting fit testing, but needs a better understanding as to why poorly fitting respirators pass and why good fitting respirators fail. This class provides an opportunity to discuss advanced topics not covered during a typical 2-day fit testing workshop due to time limitations. This course is also valuable for respirator program administrators who need a better understanding of fit testing procedures and assurance that their fit testing program is being run properly. June 2, 2016

Pregnancy and Fit Testing

Continued from page #1, column 2:

than weight gain or loss due to diet, exercise, disease, and/or other factors. It has been reported that 7.9 million workers in the U.S. wear respiratory protective equipment as part of their employment. Of these, about 47% are estimated to be women. Given these numbers, one must assume respirators may be worn by a significant number of pregnant women. Therefore, it becomes important to know if respirator fit changes during pregnancy.

The impact of weight gain during a normal pregnancy on respirator fit was recently evaluated and published by Roberge, Kim, Palmiero & Powell). They recognized from previous studies that weight gain other than from pregnancy causes an increase in facial dimensions around the cheeks due to expansion of facial fat cells. In other words, eating too much, in combination with too little exercise can make your cheeks (and other body parts) larger. There are of course other factors that can increase facial size. They also recognized other studies that showed significant increases in body weight are normal during pregnancy, but this should not be attributed solely to fat deposition in the facial areas. If this is true, significant change in facial dimensions would be less likely during pregnancy. It is known that the majority of weight gain during a normal pregnancy is attributable to the combined weight of the fetus, placenta, amniotic fluid, increased maternal blood/plasma volume, enlarged uterus, and increased breast mass. None of this is directly associated with increased facial fat cell size. During the first two trimesters of a normal pregnancy, progesterone (a hormone), induces body fat to accumulate in the upper leg and abdominal areas, but not around the cheeks.

To study the effect of respirator fit, the investigators fit tested 15 pregnant and 15 non-pregnant women to one of two different N95 FFRs , matched by similar facial measurements. They found no differences in respirator fit. They concluded that women who adhere to recommended weight gain during pregnancy, would not require additional fit testing simply because they were pregnant. However, women who exceed recommended weight gain guidelines and those with disorders that result in facial edema, such as preeclampsia (development of hypertension), may impact respirator fit.

For additional info go to Roberge, Kim Palmiero & Powell, *J Occup Environ Hyg*, 12: 761, 2015.

SCBA Facepiece Lens Failure
On January 28, 2016, The Washington State Department of Labor & Industries Division of Occupational Safety & Health (DOSH) released an electronic bulletin (#1HeB2016) warning SCBA users to check their facepiece for signs of thermal stress that could lead to catastrophic failure. Thermal (heat) stress at live fires, including live-fire training exercises, can rapidly degrade the facepiece lens on firefighter's self-contained breathing apparatus (SCBA) and cause it to fail. They reported 7 fatalities between 2002 and 2011, where the polycarbonate lens underwent catastrophic thermal degradation while firefighters were still "on air".

Thermal stress is known to cause crazing (a network of very fine cracks), warping, bubbles, holes, gaps, discoloring, and other damage to SCBA facepiece lenses. Obviously damaged facepiece lenses must be repaired or removed from service. See figure below for suggested approaches to find small cracks not readily visible under normal conditions.

It is unclear if this 2016 report is the result of recent SCBA lens failures in Washington or reporting from NIOSH, NFPA, &/or NIST reports released in 2011 and 2012. Regardless, it is a good reminder to check SCBA facepiece lenses for signs of thermal damage and damage in general.

Source of Photo: Wash L&I DOSH eBulletin #1HeB2016

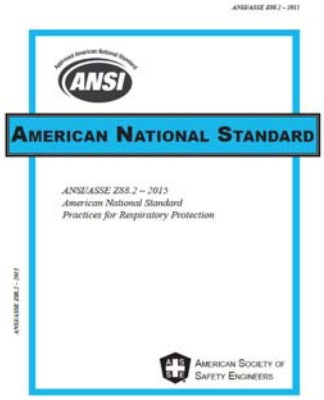
Catastrophic facepiece lens failure is a concern because modern building components and furnishings burn hotter than traditional building materials. Complicating this problem is the fact that other personal protective equipment (PPE) used by fire personnel has evolved to the point that thermal protection has improved. Consequently, firefighters are less likely to feel intense heat and stay in an area where damage to the facepiece lens could occur. In this respect, the SCBA facepiece lens is often considered to be the weakest link in high heat conditions. If catastrophic lens failure were to occur during firefighting, the resulting loss in respiratory protection can cause thermal injury to the wearers respiratory system and inhalation of toxic combustion products. Death can also occur. See photo below for an example of catastrophic lens failure. Fortunately, improvements in NFPA and NIOSH certification requirements are making newer facepieces more resistant to thermal stress, although older facepieces are still in use. Persons who conduct respirator fit testing should be knowledgeable about the facepieces they test. Respirators wearers should inspect their equipment routinely and before entry into IDLH environments.


Source of Photo: NIST Technical Note 1724. November 2011

Respiratory Protection a Top 4 Violation
OSHA Violations in Fiscal 2015. OSHA has announced the top 10 categories of most cited alleged violations of the OSH Act in fiscal 2015. Respiratory Protection is once again within the top five, coming in at number four (4). If curious, the top ten are – Fall Protection, Hazard Communication, Scaffolding, Respiratory Protection, Lockout/Tagout, Powered Industrial Trucks, Ladders, Electrical-Wiring Methods, Machine Guarding, and Electrical-General Requirements.

Highlighting Changes in Z88.2-2015

With the long awaited release of ANSI/ASSE Z88.2-2015, I've been asked what changes have been made. Considering that the current version replaces the 1992 version, the number of changes are considerable. While too many to list in this newsletter, below are a few changes that may be of interest:



Z88.2-2015 has a requirement for annual respirator program audits. This differs somewhat from OSHA which is performance based. In addition, Z88.2 recommends periodic program audits by a knowledgeable person not directly associated with program. For example, respirator program administrators may believe their fit testing program is effective. However, the program administrator may not fully understand why poorly fitting respirators can pass a fit test and potentially expose a respirator wearer to airborne contaminants. To prevent this, the program administrator may need to invite a person knowledgeable about fit testing to observe and evaluate the entire fit testing process.

Speaking of fit testing, Z88.2 clarifies that when an overall fit factor of greater than 100 is required, a quantitative fit test method (i.e., ambient aerosol or controlled negative pressure) should be used and refers to ANSI/ASSE S88.10-2010 (Respirator Fit Test Methods).

The annex addresses non-wear time issues which can significantly reduce worker protection. Therefore, the annex now includes information that describes the reduction in worker protection when the respirator is not worn or used correctly even for short periods of time. An example of this common problem is described later in this newsletter for spray painters that lift the visor on their facepiece for just a few seconds to inspect the finished product.

Z88.2-2015 also adds clarity to respirator terminology. For example, using the word "disposable" is no longer used when referring to filtering facepiece respirators. This small change will make Z88.2 terminology consistent with the published literature, which is considerably important to the health care community.

Guidance on user seal checks changed from a non-mandatory recommendation to a mandatory requirement. This also represents another terminology change. With respect to seal checks, Z88.2 replaced "user" with "wearer". The sub-committee wanted to distinguish between other respirator users such as employers, respirator program managers, etc., from those who actually wear the respirator (i.e., wearers). While I agree there is need to recognize other "users" of respiratory protective equipment, from my perspective, once a respirator is donned, the only user is the respirator wearer. Since OSHA, NIOSH, and respirator manufacturers call this process a "user seal check"; to avoid confusion, I suspect this change in terminology will not be readily incorporated into many worker training programs.

Another change that may go unnoticed is the definition of Assigned Protection Factor (APF). The change is significant for two reasons. First, the disagreement in APF values was a major obstacle that prevented Z88.2 from being published many years earlier. Second, the revised definition puts greater emphasis on the fact that the APF will only be achieved when a comprehensive respiratory protection program is put into effect. Failure to implement all necessary program requirements will result in lower protection levels. With that in mind, here's the Z88.2 -2015 definition for Assigned Protection Factor (APF):

> "The minimum expected workplace level of respiratory protection that would be provided by a properly functioning and used respirator or a class of respirators to properly fitted and trained wearers when all elements of an effective respirator program are established and are being implemented."

Lastly, a comprehensive section discusses respirator selection issues for atmospheres with reductions in oxygen content in combination with altitude above sea level. Z88.2-2015 has a table that includes partial pressure of oxygen, rather than percentage of oxygen. While essentially equivalent to OSHA, partial pressure of oxygen is biologically more appropriate.

These were just some of the changes made to Z88.2-2015. To purchase your personal copy visit www.asse.org/standards or contact customer service at 1-847-699-2929. The standard list price is $77, although substantial discounts are available to members of ASSE ($57) and AIHA/AHMP ($67).

Another Airborne Virus

As our science of infectious diseases becomes better, we're beginning to learn that the airborne route plays a much larger role than infectious diseases "experts" thought. We now have a better understanding how Novovirus can spread through the air. The *ATS Morning Minute* (8/20/2015) reported that bacteriophages, like norovirus, can be aerosolized. This means that patients who are sick with norovirus can potentially spread infectious particles when vomiting. Keep in mind that while billions of infectious particles can be generated, the CDC reports that only 18 are enough to make another person ill. According to one of the researchers who co-authored a study investigating aerosol generation during vomiting (Lee-Ann Jaykus, of North Carolina State University), airborne particles can then contaminate nearby surfaces such as tables and door handles, leaving anyone who touches those surfaces at risk of infection. Worse yet, norovirus is known to linger for weeks. All raises the question regarding protection of heath care workers. I wonder if there are devices that can reduce the risk of inhalation exposure. Let me know if you can think of anything.

PAPR Training

The fundamental difference between a PAPR and a negative pressure air-purifying respirator is that PAPRs use a motorized blower to push air into the facepiece rather than relying upon the wearer's respiratory system to pull air through air purifying elements. To accomplish this, the PAPR has a battery, charging unit, and often various low flow alarms, and other mechanical equipment. Given this additional complexity and potential use in areas that may require a higher APF, why is it that PAPR training programs are often of shorter duration? After all, both air-purifying respirators, yet PAPRs are more complex. Is the difference in training time based on the assumption that the blower handles nearly everything and less training is required? In my experience, the length of time needed to train employees on PAPRs is at least equal to, and/or longer than traditional negative pressure respirators.

Vaccinate or Force a Surgical Mask

Back in September, 2015 the Ontario Nurses' Association (ONA) won an important and potentially precedent-setting arbitration award against a local area hospital, striking down the controversial "Vaccinate or Must Wear a Surgical Mask" policy introduced at many Ontario, Canada hospitals. This policy essentially forces health-care workers to wear an **un**fitted surgical mask for the entire flu season if they choose not to get the influenza vaccine. (Note: a surgical mask is not the same as a fit tested N95 filtering facepiece respirator).

After considering from Canadian and U.S. experts, Arbitrator Jim Hayes found the policy of forcing employees to wear a surgical mask for 6 months to be unreasonable and "coercive." He also found that the mask was not an effective measure for patient safety. As a result, the Arbitrator concluded that the requirement to vaccinate or mask was a "coercive tool" to force health-care workers to receive immunization.

"Vaccinate or Mask" policies have been highly criticized as symbolic rather than a scientifically based tool in the fight against influenza.

ONA's experts testified that forcing healthy registered nurses to wear masks for up to six months during the influenza season did little or nothing to prevent transmission of the virus in hospitals. They testified that nurses who have no symptoms are unlikely to be a real source of transmission and that it was "illogical" to force healthy nurses to mask. Arbitrator Hayes sided with the nursing association and concluded that there was "scant" evidence that forcing nurses to routinely wear surgical masks reduced transmission of influenza to patients.

Worker Exposure During Paint Spraying

An investigation of worker exposure due to improper use of a continuous flow air supplying respirator with an "air-fed visor" was reported by researchers at the Health and Safety Laboratory in the United Kingdom (Mike Clayton & Nick Baxter: HSE Research Report RR1064, 2015) and published in the *Annals of Occupational Hygiene*. In their report, they demonstrated significant loss in respiratory protection when employees momentarily lift the visor for very short periods of time (just seconds). The report describes workers using air-fed visors (AFV) [a type of atmosphere supplying respirator] during isocyanate paint spraying. This type of respirator is commonly worn within the automotive painting and repair trade and commonly incorporates a flip-up the visor. During spray painting, wearers may flip-up the visor to inspect the quality of the paint finish. While lifting the visor may be for just a few seconds, it is often repeated numerous times during a work shift. In addition, even when the visor is returned to the proper position, it takes time to clear the contaminate from the breathing zone within the

Example of an "air-fed visor" from HSE RR1064

facepiece. The authors called this "clearance time". They found that the degree of residual protection provided by the visor when in the lifted position is in the approximate range of 1 to 3.7 (mean 1.7). When the protection factor was measured over the entire exposure period (from start of the lift to recovery of protection after refitting) it had a range of approximately 1.4 to 9.0 (mean 2.7). For comparison, when this respirator was correctly worn, measured protection factors were between 5,000 and 10,000. Reasons given by the majority of painters who offered explanations for lifting the visor included: poor visual clarity, over spray, scratched lens, moving to a different (low) position where the lighting was not as bright, and light reflections. Regardless of the reasons, the practice of briefing lifting the visor of an air fed respirator provides unacceptable protection to the worker. To view the entire report including recommendations for improved designs, go to the HSE web page (www.hse.gov.uk) and search for Research Report "RR1064". Or read a published article in *Ann. Occup. Hyg*. 59(9):1179-1189, 2015.

Lifted Visor to Inspect Product from HSE RR1064

Spirometry Refresher - Reminder

If you took your initial NIOSH-approved spirometry training in 2011, you're due for a refresher in 2016.

Hospital Respiratory Protection Practices

Peterson and coworkers published results regarding respiratory protection practices that included 98 acute care hospitals located within six (6) U.S. states. The study included more than 1,500 hospital managers, unit managers, and health care workers. Most acute care hospitals met the initial requirements for medical clearance evaluations, initial fit testing, and training. However, adherence rates based on observations of health care workers were only 15.5% for completing the user seal check procedure; 54.6% for placing the straps correctly; and 43.3% for proper removal of the respirator. They also reported that only 28.6% of hospitals provided employees with written notification of the model and size of the respirator for which they had been fit tested. In other words, hospitals were good and checking off boxes for items they've completed. Not so good regarding program evaluation to ensure respirators are properly used and worn. For additional information, go to the source. K. Peterson, et. al., *American Journal of Infection Control*, 43;63-71, 2015

Test Your Fit Testing Knowledge:

Question:

When conducting qualitative fit testing using the saccharin (sweetener) method, the employee reports detecting the sweet taste on the 4th squeeze of the hand-held nebulizer during sensitivity threshold screening. When the 2nd stage of testing with the stronger concentration of fit test solution is used, the correct number of squeezes to administer is:

a. 4 squeezes initially, followed by 4 squeezes every 30 seconds
b. 4 squeezes initially, followed by 2 squeezes every minute
c. 10 squeezes initially, followed by 4 squeezes every minute
d. 10 squeezes initially, followed by 5 squeezes every 30 seconds

Answer appears in "Training Opportunities" toward the end of this newsletter.

Reader Question

I'm confused. Does a NIOSH certified N95 filter mean that no more than 5% of particles pass through?

Response:

Usually, but not always. It simply means that under the conditions of NIOSH filter certification test (flow rate, particle size, type of detector, using a sodium chloride particle, etc.), less than 5% passed through. However, while the NIOSH challenge test is rigorous, in some workplace settings, the percentage of particles passing through the filter could be more than 5% depending upon the specific particle size. This could potentially occur when exposed to a specific and narrow range of very small particles (i.e., nano particles). However, given the conditions in most workplaces, filter efficiency is frequently better than 95% (i.e., less than 5% penetration). Your respirator program administrator should know how to handle this situation, for the specific conditions in your workplace.

> Note: Due to time restrictions, Dr. McKay may not respond to all reader questions. However, selected questions and answers will be published in future newsletters.

Penetration of Combustion Particles through N95 Filters

A 2015 article by Shuang Gao and colleagues at the University of Cincinnati reported on the penetration of combustion aerosols through N95 filtering facepiece respirators (FFRs). In this study, combustion aerosols were produced by burning wood, paper, and plastic products. This study was conducted because first responders, first receivers and other groups may be exposed to small particles generated from combustion of these and other products. It was also known that under certain conditions, other aerosols may have higher penetration values than sodium chloride (NaCl) used for filter certification testing. In this study, penetration values of combustion particles were significantly higher than those of NaCl particles. Other factors that affected penetration included inhalation flow rate and particle size. Penetration of combustion particles through R95 and P95 FFR filters were not significantly higher than that obtained with NaCl particles. The findings were attributed to several effects, including the degradation of an N95 filter due to hydrophobic organic components generated into the air by combustion. The authors suggest that the interaction of combustion aerosols with the respirator media may be similar to oil aerosols. The findings of this study suggest that the efficiency of N95 respirator filters obtained with the NaCl aerosol may not accurately predict filter efficiency against combustion particles. This doesn't mean that the current certification test isn't acceptable. Rather, the results imply that factors other than particle size also come into play. To read more about this study, go to the *Journal of Occupational and Environmental Hygiene*, 12: 678–685, 2015.

Wanted: Damaged Fit Test Adapters

Rather than throwing away damaged fit test adapters, consider donating them to our fit testing workshops. We strive to make our fit testing workshops as realistic as possible. Incorporating damaged along with mostly good fit testing adapters can provide a valuable training experience. If you wish to make a donation, please email us at info@DrMcKay.com

Announcements from NIOSH NPPTL

1. On January 15, NIOSH and MSHA approved the first large-capacity closed-circuit escape respirator under new standards published in 42 CFR Part 84, Subpart O. Additional information, including the status of CCERs approved under Subpart H is available on the NIOSH NPPTL Website.

2. A Federal Register Notice was posted on January 21, 2016 inviting comment on proposed information collection project "Monitoring and Coordinating Personal Protective Equipment in Healthcare to Enhance Domestic Preparedness for Ebola Response." Written comments must be received on or before March 21, 2016.

Mark the Date for ISRP 2018
Beginning Sunday, September 16, 2018 the International Society of Respiratory Protection (ISRP) 2018 International Conference will be held in Denver, Colorado. This is the premier conference dedicated to respiratory protection. Mark the date now to avoid future conflicts.

Free Student Membership to ISRP
For students interested in respiratory protection, the International Society for Respiratory Protection (ISRP) Americas Section offers a complimentary student membership to students residing in the United States and studying in fields related to respiratory protection. Membership includes access to the "Members Only" section of the ISRP website. However, student membership does not include a subscription to the *ISRP Journal*. If you are a student in a field of study related to respiratory protection, and reside in the United States, you are invited to take advantage of this offer. Applications can be obtained from Judi Coyne at: jcoyne@cdc.gov. Please use ISRP Student Membership in the subject header.

Spirometry Refresher:
June 1, 2016 in Cincinnati
September 13, 2016 in Cincinnati
Interpretation of Spirometry: Beyond the Numbers
September 14, 2016 in Cincinnati
Go to www.DrMcKay.com for details.

Viable Influenza "A" Virus from Human Coughs
A 2015 study by Lindsley and colleagues studied the viability of Influenza A virus during human coughing. This information is important since it was known that patients with influenza release aerosol particles containing the virus into their environment. However, not as well understood was the importance of airborne transmission and viability of the virus. This part was lesser known, because there was a lack of information about the infectivity of the airborne virus. The purpose of Lindsley's study was to determine the amount of viable influenza A virus expelled by patients while coughing.
In this study, viable influenza A virus was detected in the aerosolized particles from 7 of 17 test subjects (41%) who coughed. The key word here is "viable". Furthermore the viable influenza virus was found in the particle size fraction between 0.3 to 8 um, which are in the respirable range. These results suggest that a significant proportion of patients with influenza A release small airborne particles containing viable virus into the environment. The study supports the concept that airborne infectious particles could play an important role in the spread of influenza.
For additional information, go to: *Journal of Occupational and Environmental Hygiene*, 12: 107–113, 2015.

Medical Complications from Respirator Use

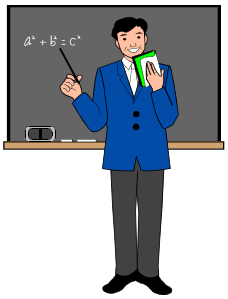
OSHA requires respirator medical clearance for persons required to wear respiratory protection. Researchers at the University of Cincinnati are collecting information on persons who:
1) developed a medical complication while wearing a respirator, and
2) identify pre-existing medical conditions causally related to the complication that developed.

If you have information (published or un-published) that established a link between a specific medical condition and a complication that developed as a result from wearing a respirator, please share this information with us. We are particularly interested in cases where a medical complication was induced by respirator use. Information such as the specific type of respirator worn, work environment, duration of use, level of physical exertion, underlying medical conditions that contributed to the complication, etc., is needed. You can send this information to Roy@DrMcKay.com

Share Your Respirator Experience
Here's an opportunity to contribute your knowledge and experience to others. If you have an interesting respirator selection or other challenging respirator problem (and solution), please submit it to info@DrMcKay.com. I may use your real-life problem to help train students in our graduate and continuing education programs in respiratory protection. This transfer of information will benefit others, maybe even your children or grandchildren.

Respirator Training Courses:

The University of Cincinnati is pleased to announce the following programs on Respiratory Protection and Fit Testing that may be of interest to your staff. They are:



Fit Testing Refresher & Advanced Topics
http://www.drmckay.com/rtc-resp-refresher-advanced.shtml
June 2, 2016
Nov 3, 2016

Overview of Respiratory Protection:
http://www.drmckay.com/rtc-overview.shtml
Apr 19, 2016
Oct 25, 2016

Fit Testing Workshop (2-day):
http://www.drmckay.com/rtc-workshop.shtml
Apr 20-21, 2016
Oct 26-27, 2016

Fit Testing Workshop Quantitative (1-day):
http://www.drmckay.com/rtc-workshop1day.shtml
Dates to Be Determined

Respirator Selection & Cartridge Change Out Schedule Workshop.
http://www.drmckay.com/rtc-resp_selection.shtml
April 27 & 28, 2016

All courses are held in Cincinnati, unless noted otherwise. On-site training is available.

Respirator Selection & Change Out Schedules

This workshop provides guidance on respirator selection and the development of OSHA compliant change out schedules for respirator cartridges. A combination of lecture with practice problem sessions is used. The course is designed to teach students how to select a respirator based on workplace conditions (exposure level, type of contaminant, length of time to be worn, etc.). The selection process goes beyond the typical recommendation to "use a NIOSH approved air purifying respirator". Students will learn how to select a specific respirator as well as a specific filter/cartridge (when appropriate). More than a dozen guidelines for development of an OSHA compliant cartridge change out policy will also be taught, including common computer models and how to use them.

Partial Listing of Topics

Respirator Selection

* Review of facepiece definitions and modes of operation.
* Practical and theoretical basis for respirator selection based upon:
  Assigned Protection Factors (APF)
  - MUC's, HR's, IDLH, etc.
* OSHA guidelines for respirator selection.
  - IDLH and non-IDLH atmospheres.
* Selection steps and information gathering procedures.
* Minimum respiratory protection versus practical alternatives.
* Filter selection issues
  - How to select an N, R, or P filter.
  - Why filter selection is influenced by exposures below the exposure limit.
  - How to choose a 95 versus 100 filter.
* Practical methods for handling unknown concentrations without defaulting to an SCBA.
* Calculating MUC's for mixtures.
* Saturated Vapor Concentrations (SVC's) and selection concerns.
* When a particulate filter may be needed for organic solvents.
* Equilibrium Vapor Concentrations.
* Selection Workshop
  - Practical problems and solutions.

Development of Cartridge Change Out Schedules

* OSHA recommendations for a change out policy.
* Factors that affect cartridge service life.
* Learn how to develop an OSHA compliant change out schedule.
* Understanding the breakthrough curve.
* Common methods used to define breakthrough.
* What level of breakthrough should be used?
* Work rate tables.
* Effect of high relative humidity.
* Methods for determining service life (use, limitations, and practice problems)
  - OSHA recommendations
  - Rules of thumb
  - Using laboratory data
  - Using math models
  - Using computer (software) models
  - Cartridge testing methods (3 methods)
    Combining methods
* Learn how to develop a change schedule when computer models are not available.
* Recommendations for mixtures:
  - OSHA compliance method
  - mole fraction method
  - multi vapor model
* How to confirm your change-out schedule.
* Storage and migration concerns.
* Immediate Breakthrough Upon Reuse (IBUR) concepts

Gain confidence that your current procedure is correct!
Former students have found this information to be extremely valuable. Even experienced students find the material useful as a way to verify their current procedures.

Next dates are: **April 27-28**, 2016 in Cincinnati

Answer to Test Your Fit Testing Knowledge:
When conducting qualitative fit testing using the saccharin (sweetener) method, the employee reports detecting the sweet taste on the 4th squeeze of the hand-held nebulizer during sensitivity threshold screening. When the 2nd stage of testing with the stronger concentration of fit test solution is used, the correct number of squeezes to administer is:

d. 10 squeezes initially, followed by 5 squeezes every 30 seconds

In addition, remember this procedure is conducted for seven (7) continuous minutes (1 minute per exercise times 7 exercises).

Overview of Respiratory Protection:
This one day course provides a practical overview of respirators, standards, guidelines, use, and limitations of commonly used air purifying respirators. This class also provides an excellent overview of the OSHA Respirator Standard. Little or no prior formal training is required. The morning session includes lectures on the types and use of respirators and basic respirator selection procedures using APFs and MUCs. The advantages and disadvantages of different respirator facepieces, filters (N, R, & P), cartridges, PAPR's, and the physiologic effects of wearing a respirator will also be discussed. Respirator standards and program requirements will be reviewed to help the student comply with OSHA regulations. Discussion of qualitative and quantitative fit testing, user seal checks, worker training, and respirator medical clearance requirements will be provided. This course is essential for those individuals who oversee respirator users in their work place or new to respiratory protection.

Fit Testing Workshop:
This two (2) day workshop provides comprehensive lecture and "hands-on" training for students who need to learn how to conduct an OSHA accepted qualitative or quantitative respirator fit test. Students will have an opportunity to fit test a variety of different style facepieces, including filtering facepieces, half, & full. A combination of lecture and "hands-on" testing in the presence of a trained and experienced instructor will be used to help participants learn how to conduct respirator fit testing to satisfy regulatory requirements. Hands-on fit testing will include qualitative and quantitative methods. The following types of fit testing equipment will be available: Saccharin (sweetener) and Bitrex (bitter) qualitative fit test kits using squeeze-bulb nebulizers as well as powered pumps using Qfit. Quantitative fit testing with the TSI PortaCount (models 8020, N95 Companion, 8030 & 8038), and the OHD Fit Tester 3000/QuantiFit. Class size will be limited to ensure a favorable faculty to student ratio. Students will learn how to set-up, operate, maintain, troubleshoot, analyze, and interpret fit test results. Where appropriate, students will learn how to calibrate testing equipment and record results. All course materials, supplies, equipment, and reference manuals will be provided.

Students will also learn how to disassemble, clean, reassemble, and inspect respirators for common problems. The workbook alone is a valuable reference for solving fit testing problems in the future.

This course uses a combination of lecture and small practicum groups to ensure students have ample time to practice and learn fit testing techniques. The second day provides students sufficient time to concentrate on the particular methods of interest to them. The "Hands-On" approach is emphasized in this course. Students will have the opportunity to fit test several different make and model respirators.

Individuals who plan to attend the fit testing workshop, but have little or no experience with respiratory protection should take the one day overview class in addition to the 2-day fit testing workshop. The fit testing workshop provides an opportunity to see and experience many different types of commonly used fit testing methods (qualitative and quantitative). A substantial discount is given when both courses are taken.

Dr. McKay is the current chair of the ANSI Z88.10 Respirator Fit Testing sub-committee.

Fit Testing Refresher & Advanced Topics:
This 1-day course is specifically designed for the person who has been conducting fit tests, but has not had formal training or needs a review. This course reviews OSHA fit testing requirements and helps the operator understand why poorly fitting respirators pass fit testing and why good fitting respirators fail. It is an excellent refresher for persons familiar with fit testing, but has limited formal training or needs a

refresher. It also provides an opportunity to discuss advanced topics not covered during a typical 2-day fit testing workshop due to time limitations. This course is also valuable for respirator program administrators who need a better understanding of fit testing procedures and assurance that their fit testing program is being run properly. The emphasis of this course is on quantitative fit testing with the TSI PortaCount, although many of the concepts are applicable to other fit test methods.

Partial Listing of Topics

Review of fit test procedures
- Facial hair: issues & solutions
- Selection process
- Comfort assessment
- Interference with PPE

Establishing pass/fail criteria
Interpretation of fit test results
Why user seal checks fail to detect leakage
Why user seal checks create leaks not present
Proper use of fit test adapters
Selecting sample probe location
Why leaking respirators pass fit testing
Why good fitting respirators fail fit testing
What does a high fit factor really mean?
Wear time & non wear time issues
- Understanding fit factor vs protection

When is quantitative fit testing required?
Opportunity to get answers to your questions

This course can also be given on-site.

Respirator Training at Your Location:

A variety of respirator training programs are available on-site. Courses available include:

* Fit Testing Refresher & Advanced Topics
* How to Develop a Cartridge Change Out Schedule (1 day)
* Respirator Selection (1 to 1.5 days)
* Fit Testing for Health Care Professionals (1 day)
* Basics of a Respiratory Protection Program (2 days)
* Overview of Respiratory Protection (1 day)
* Respirator Fit Testing: Quantitative (1 or 2 days)
* Respirator Fit Testing: Qualitative (1day)
* Fit Testing at your workplace. Not a course, but a hands-on program with your staff and equipment.

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Thank you for your continuing support. Students attending our programs help support our graduate training programs and respirator research projects. We hope to see you at a future training course.

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Dr. McKay does not receive any public or private funding for this educational service. The opinions in this newsletter are those of Dr. McKay and not the University of Cincinnati.