CAOHC
Council for Accreditation in Occupational Hearing Conservation

update

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# Bystander Impulse Noise Exposure from Small-Caliber Weapons: How Close is Too Close?

*By: William J. Murphy[i], Gregory A. Flamme, Edward L. Zechmann, Caroline Dektas, Deanna K. Meinke, Michael Stewart, James Lankford, Donald S. Finan, and Seleen Collins*

BANG, BOOM, BOOM, BOOM! Gun users have felt the powerful impact of that noise in their own ears, but what is its impact on the ears of people nearby? And what happens when several guns are shot at the same time?

Hunters, sport shooters, soldiers, and police officers often fire their guns singly and in groups. Most shooters know that the noise from their own guns can damage their hearing, but they might not realize the hazard posed by noise from other guns. Bystanders also might not realize that their hearing is at risk if they are positioned too close to the person shooting.

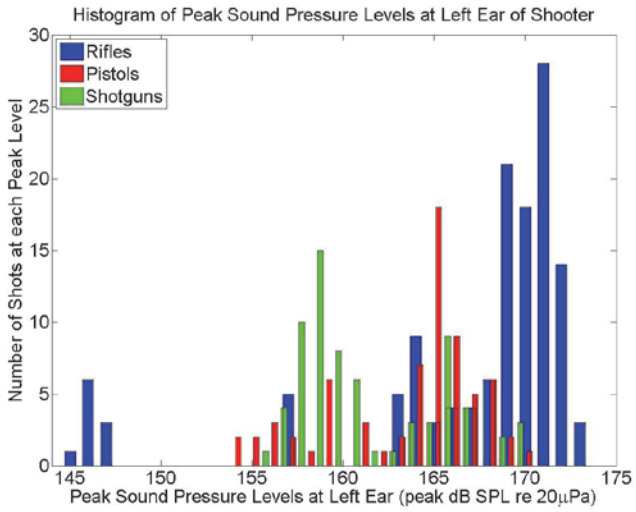
Researchers at the National Institute for Occupational Safety and Health (NIOSH) and affiliated with the National Hearing Conservation Association decided to work together on this issue. They set up an outdoor range to measure the noise impact (or *exposure*) from commonly available guns. Eighteen microphones capable of measuring high-level sounds were placed around a single shooter, at distances up to 6 meters, to measure the gunfire. The shooter fired 54 different guns (pistols, shotguns, and rifles) over a flat, grassy field.

First, researchers used the measurements to determine how far away bystanders must be to keep their hearing safe. This minimum safe distance, called the *foul line,* was determined for each gun fired. Then the researchers estimated the effects of more than one shooter along a firing line. They combined the data from the single shooter to predict the sound exposure from multiple (2 to 16) shooters, positioned one-half to 2 meters apart, firing the same weapon.

## Content



*Figure 1. The peak sound pressure levels ranged between 145 and 173 dB for a microphone close to the left ear of the shooter.*




The peak pressure levels at the shooter's left ear were between 145 and 173 decibels (see Figure 1). The majority of peak levels were above 159 decibels. The sound pressure measurements showed that when the distance between a single shooter and a bystander doubles, the sound energy falls off by about 5 to 7 decibels. However, as the number of shooters increases, the sound level does not decline as much with extra distance from the firing line. Since the location of the bystander relative to the shooters cannot be controlled, the timing of the gunshots from different shooters was ignored in the sound pressure analysis.

Because noise levels less than 85 decibels of 8-hour-equivalent A-weighted energy are not considered a significant hearing risk, the researchers looked for the distance needed to reach that safe exposure limit for each gun.[1–3] They set the foul line at the point containing 95% of those calculated safe distances. This approach allowed them to determine the minimum safe distance for each of the guns fired.

When each shooter fired 25 shots, the foul line was found to be about 15 meters (about 16 yards, or 49 feet) back from the firing line. For some guns—rifles over .270 caliber with muzzle brakes—the foul line was farther back (see Figure 2). Muzzle brakes are ports on the barrel that reduce recoil and barrel lift during shooting. The ports direct hot gases in the barrel to the sides and backward, thus sending sound toward the firer and other shooters off to the sides.

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Phone (414) 276-5338
Fax (414) 276-2146
E-mail: info@caohc.org

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# Message from the Chair
# Best Practices in Occupational Hearing Conservation

*By: Madeleine J. Kerr, RN, PhD*

The application of best practices or evidence-based practice is implied in CAOHC's mission to enhance the quality of occupational hearing conservation programs. Evidence-based practice is the integration of best research evidence with clinical expertise and patient values (IOM, 2001, p. 147). As occupational hearing conservationists, we can use resources such as scientific literature, standards, expertise of our colleagues and worker/organizational values to inform our own best practices. The focus of this news item is a stakeholder meeting held by the Occupational Safety and Health Administration (OSHA) to seek input for best practices to prevent occupational hearing loss.

To determine what were the best practices in preventing occupational hearing loss, OSHA convened a group of 30 participants representing industry, trade organizations, academia, and safety and health professionals (OSHA, 2011). A summary of the meeting is available http://www.osha.gov/dsg/noise/stakeholder-meeting.html . Three themes relate directly to CAOHC: noise monitoring and exposure assessment, audiometric testing, and hearing protector training. A summary of the stakeholder comments on these discussion points follows.

A best practice for noise monitoring and exposure assessment is to form a joint employee-management committee with noise control responsibilities. It is important to track individual workers' job tasks to better understand the noise hazards. The new CAOHC noise measurement course provides instruction on how to perform noise measurements. The use of real-time monitors is a way to trigger workers' use of protectors. NASA is already using instantaneous noise exposure levels because they are easier for employers and employees to understand than time-weighted averages.

Audiometric testing is promoted as a key element of occupational hearing conservation programs, yet audiometric testing does not save hearing by itself. Testing should be followed by counseling and training. Everyone who performs hearing testing in an occupational setting should be certified by CAOHC. The background noise level should be low enough to allow for accurate hearing threshold measurement. A baseline hearing test should be performed sooner than the one year allowed by the standard. A means of transmitting that baseline test with mobile workers is needed so that they have their baseline available on the first day of the job.

Hearing protectors and training are important elements in a hearing conservation program. Fit-testing is widely promoted as a best practice, however if workers do not wear hearing protection, it is not effective. Employers should enforce hearing protection use, provide a variety of types of protectors, and provide solutions to barriers such as communication while wearing hearing protection. Training is crucial and it should be motivational with adequate time devoted to it.

Finally, stakeholders gave examples of companies that operate effective noise control programs. Recipients of the Safe in Sound Awards all have some noise control in their programs http://www.safeinsound.us/. For example, Shaw Carpeting won a Safe in Sound Excellence in Hearing Loss Prevention in the Manufacturing Sector award in 2011 for its hearing conservation program which used engineering controls and fit-testing. The 2013 winner in this category was Vulcan Materials Company, a producer of crushed stone, sand and gravel, known for their noise measurement and control program enhanced by employees trained as industrial hygiene support staff. Explore these Safe in Sound exemplars for ideas that you can adopt. As always, CAOHC is with you in advocating best practices in hearing conservation!

For further information please refer to Page 4 (Morata and Meinke), or check out the Safe in Sound website.

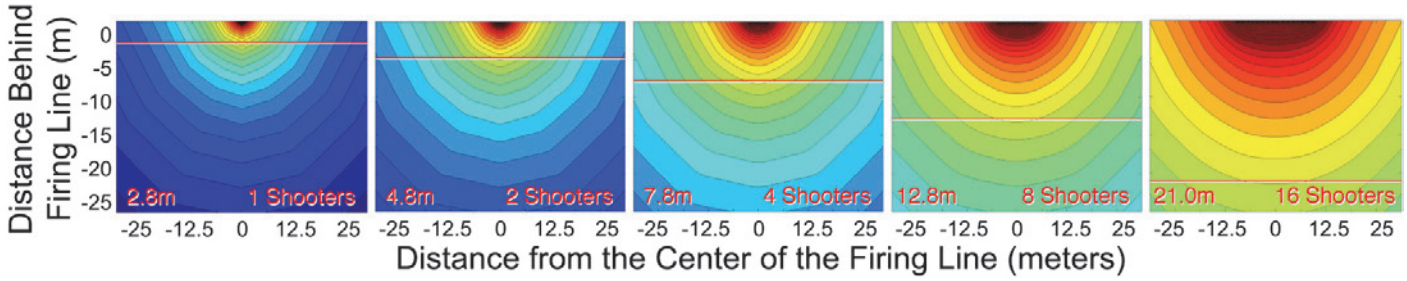
## References

Institute of Medicine (2001). Crossing the Quality Chasm: A New Health System for the 21st Century. National Academies Press.

OSHA (2011). Stakeholder meeting on preventing occupational hearing loss. Washington, D.C. Available http://www.osha.gov/dsg/noise/stakeholder-meeting.html

Noise Exposure Profiles for Small-caliber Firearms from 1.5 to 6 meters... – continued from page 1

*Figure 2. The 85-dBA foul line for a .270 caliber A-Bolt Medallion Rifle with muzzle brake moves from less than 3 meters to 21 meters as the number of shooters increases from 1 to 16. The spacing between shooters is 1 meter and the number of shots fired is 25.*




The bottom line is that bystanders without hearing protection should not be within 13 meters of the firing line at an uncovered, outdoor firing range. They should wear hearing protection if

- they need to be positioned nearer to the shooters than the foul line
- the shooters are firing more than 25 shots each
- the shooters are firing large-caliber rifles with muzzle brakes
- the gunshots exceed 140 decibels in peak sound pressure level.[4,5]

These measurement methods can be applied to other environments such as indoor firing ranges and covered outdoor ranges. For fewer shots and fewer shooters, the foul line will be less than 13 meters. At outdoor ranges, the overhead cover and the table or bench where the shooter fires are reflective surfaces that can increase the overall energy reaching the bystander's ear and therefore require a greater distance for the foul line. This reflected sound energy is even greater at indoor firing ranges that lack sound-absorptive coverings on the walls, ceilings, and partitions. All persons at an indoor range should wear hearing protection. In fact, NIOSH recommended in 2009 that shooters and instructors wear *double* hearing protection.[5] That's sound advice.

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[i] Hearing Loss Prevention Team, National Institute for Occupational Safety and Health, 4676 Columbia Parkway, Mailstop C-27, Cincinnati OH 45226-1998, Address correspondence to first author wjm4@cdc.gov

*William Murphy is co-leader of the Hearing Loss Prevention Team (HLPT) at NIOSH. He has worked to develop strategic planning for hearing loss research at NIOSH. Mr. Murphy supervises a diverse group of engineers, scientists and audiologists and has developed acoustical standards for testing and rating hearing protection devices (HPDs) and worked with the U.S. Environmental Protection Agency to draft a revised regulation for labeling HPDs. Mr. Murphy is also a co-inventor of a HPD Well-Fit, a system designed to quickly and efficiently fit test earplugs.*

# CAOHC Group Page on LinkedIn Offers Discussion Forum and Information for Hearing Conservation Professionals

CAOHC has created a group page on LinkedIn, the professional networking website (www.linkedin.com). People who join the CAOHC group can start and contribute to moderated discussions on hearing conservation-related issues. In addition, group members will get updates on CAOHC events and projects.

To join the group, please go to www.linkedin.com. If you are not a member of LinkedIn, you can create a profile by clicking on the "Join Today" button at the top of the page. Once you are a LinkedIn member, sign in and select "Groups" from the drop-down menu next to the search box and type CAOHC into the search bar. When "CAOHC group" appears on your screen, click the "Join" icon. Your request will be reviewed and approved by the group's moderator.

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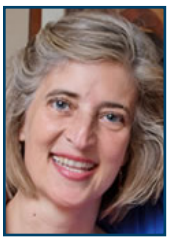


# Safe-in-Sound Awards™: Recognizing and promoting effective hearing loss prevention

*By: Thais Morata, Ph.D., and; Deanna K. Meinke, Ph.D*

The Safe-in-Sound Excellence in Hearing Loss Prevention Award™ was created in a partnership between the National Institute for Occupational Safety and Health (NIOSH) and the National Hearing Conservation Association (NHCA) in late 2006 (www.safeinsound.us). The objective of this initiative was to obtain information about real world successful hearing loss prevention programs and public health practices currently in use in industry and disseminate it widely. The rationale behind this initiative was that by disseminating evidence-based strategies, Safe-in-Sound™ could enable other groups to effectively advance hearing loss prevention practice.

In 2007, NIOSH facilitated the organization and meeting of an expert committee comprised of members[1] with diverse backgrounds and areas of expertise relevant to hearing loss prevention in construction, agriculture, regulatory practices and general industry. The expert committee has been responsible for the logo creation, award development, application review, candidate site visits, annual award winner selections and recognition ceremony. Three "Safe-in-Sound Excellence in Hearing Loss Prevention Awards™" were established; one for each of the three North American Industrial Classification System (NAICS) sectors providing start up funding for project; Construction (23), Manufacturing (31-33) and Services (51-56, 61, 71-72, 81 & 92). In addition, a fourth award for "Innovation in Hearing Loss" was established to recognize individuals and/or business entities, regardless of sector/NAICs code affiliation.

Several premises have provided guidance for the Safe-in-Sound Excellence in Hearing Loss Prevention Award™ since its inception. First, the award criteria must be adaptable to different work conditions and administrative structures inherent within some work sectors. Second, it is desirable to see this award encompass all industry sectors, therefore expansion of the criteria for other sectors were also given consideration. Third, the ultimate goal of preventing noise-induced hearing loss was the focus of our efforts and *not* regulatory compliance. This will assure that the awards progress beyond an outdated US regulatory compliance audit. Fourth, the award applicants were given the freedom to demonstrate their evidence of hearing loss prevention in a manner that best exemplifies this goal and is more germane to their efforts. Fifth, innovation and quality are highly valued and recognized. Sixth, there currently is no "gold standard" for measuring the objective success of hearing loss prevention programs; therefore, we must rely on indicators that are felt to be associated with success in their hearing loss prevention effort. Lastly, the award criteria must be dynamic and adaptable to the ongoing process.

The Safe-in-Sound Award™ implements a rigorous systematic review process to capture and evaluate the successes and lessons learned from examples of excellence in hearing loss prevention. Award applications are submitted online (http://www.safeinsound.us/application.html) and undergo a series of reviews including: pre-screen for completeness; preliminary scores; first-round decisions; supplemental information requests; second-round decisions; selective site visits and final award decisions. The crystal awards (Figure 1) are presented annually at the NHCA annual conference by the NIOSH

SAFE·IN·SOUND
EXCELLENCE IN HEARING LOSS PREVENTION AWARD

## Excellence Award: Construction Sector

2012: **Bechtel National Inc.**, BSII, Waste Treatment and Immobilization Plant Project – Richland, WA

## Excellence Award: Manufacturing Sector

2009: **Pratt & Whitney** – East Hartford Facility, CT

2009: **Domtar Paper Company** – Kingsport Mill, TN

2011: **Shaw Industries Group**, Fibers Division, Plant WM, GA

2012: **Colgate-Palmolive** – Worldwide Corporation

2012: **3M**, Hutchinson Plant– Hutchinson, MN

2013: **Vulcan Materials Company** (VMC), Companywide.

## Excellence Award: Services Sector

2009: **The Montgomery County Water Services** – OH

## Innovation Award: Construction Sector

2010: **The New York City Department of Environmental Protection (NYC DEP), NY and Parson Brinckerhoff, Inc.** – MA

## Innovation Award: Manufacturing Sector

2010: **Etymotic Research, Inc.** – Elk Grove Village, IL

2013: **Johns Manville (JM),** a Berkshire Hathaway company.

## Innovation Award: Services Sector

2009: **Sensaphonics Hearing Conservation, Inc.,** – Chicago, IL

2010: **Dr. Kris Chesky and the College of Music, University of North Texas** – Denton, TX

2011: **CPT Leanne Cleveland and the Fort Carson (FC) Army Hearing Program** in Colorado Springs, CO.

2013: **Dangerous Decibels®**- Oregon Health & Science University, Portland State University, University of Northern Colorado and the Oregon Museum of Science and Industry

director or his or her representative. The first awards were presented in 2009. Current and past award winner presentations can be reviewed at http://www.safeinsound.us/winners.html. Safe-in-Sound Award™ winner values and characteristics are summarized in a recent journal manuscript by Meinke and Morata (2012) in the International Journal of Audiology (http://informahealthcare.com/doi/abs/10.3109/14992027.2011.633569).

Three winners were recognized in 2013; one for Excellence in Hearing Loss Prevention in the Manufacturing Sector and two for Innovation in Hearing Loss Prevention. They are:

- **Vulcan Materials Company** (VMC), a major producer of construction aggregates; primarily crushed stone, sand and gravel. VMC operates 323 aggregates plants and other production and distribution facilities which serve 19 states, the District of Columbia, the Bahamas and Mexico. In 2011, VMC shipped approximately 143 million tons of construction aggregates, and also provided asphalt mix, ready-mixed concrete and paving construction services. VMC was recognized for their commitment and implementation of a quality data-driven hearing loss prevention program that extends beyond simple regulatory compliance. VMC's effort is especially noteworthy when one considers the diverse and ever-changing and challenging work environments that are characteristic of this industry. VMC has embraced innovative and cost-effective noise measurement and control strategies. Noise risks are prioritized and addressed systematically with careful attention to detail to assure prompt reporting, high quality data, detailed analysis, progress tracking and outcome assessments. VMC provides extensive noise measurement and control training and re-training for select employees to function as industrial hygiene support staff. This allows VMC to increase their noise hazard surveillance and intervention opportunities without sacrificing quality. VMC's is also leading the advancements in noise monitoring strategies for mobile workers by integrating sophisticated technologies such as GPS, and video into their noise measurement protocols. These novel approaches will benefit other industries in the future and contribute to the goal of eliminating occupational noise-induced hearing loss.
- **Johns Manville (JM)**, a Berkshire Hathaway company, is a leading manufacturer and marketer of premium-quality building insulation, commercial roofing, roof insulation, and specialty products for commercial, industrial and residential applications. JM employs 6500 employees in the U.S., Europe and Asia. JM was recognized for their development and application of innovative hearing loss prevention program metrics. Their "Hearing Conservation Pyramid" approach incorporates both leading and lagging indicators of hearing conservation program effectiveness. Rather than an injury-based focus which relied solely on the traditional significant threshold shift (STS) metric and Occupational Safety and Health Administration (OSHA) recordable hearing loss cases, JM has integrated three other metrics. These additional metrics include an early audiometric notch index, hearing protector personal attenuation ratings and a noise level index designed to track noise exposure levels weighted by FTEs. The implementation of the JM "Hearing Conservation Pyramid" approach initiated noise control engineering training which ultimately resulted in the completion of successful noise control projects and stimulated resource sharing between plants. The JM revised metric approach has been enthusiastically embraced by both plant managers and employees due to their ability to directly impact the noise exposure of workers. This innovative JM data driven approach has demonstrated practical implementation in the short-term and will provide for long-term program monitoring and advocacy. The JM "Hearing Conservation Pyramid" is readily adaptable to other noise-exposed industries who wish to become proactive rather than reactive to the risk of noise-induced hearing loss among their workforce.
- **Dangerous Decibels®**, a multi-faceted, evidence-based intervention program dedicated to the prevention of noise-induced hearing loss and tinnitus. The Dangerous Decibels program has been built upon collaborative partnerships between the Oregon Health & Science University, the Portland State University, the University of Northern Colorado and the Oregon Museum of Science and Industry with widespread funding and dissemination support by numerous organizations. Dangerous Decibels was recognized for their development, widespread dissemination and cultural adaptation of innovative training strategies shown to positively change knowledge, attitudes and behaviors in youth and adults. The program is unique in terms of the solid scientific and theoretical basis which incorporates health communication theory into all program aspects including science museum exhibits, virtual exhibits, K-12 classroom programs, educator training workshops, "Jolene – How Loud is Your Music" public outreach tools and research. Dangerous Decibels emphasizes the need to protect hearing for a "lifetime" and bridges the occupational and non-occupational noise risks. Dangerous Decibels is changing the culture of hearing loss prevention across all ages and investing in the hearing health of current and future workers.

Prevention of noise-induced hearing loss is frequently an over-looked area of health and safety and the award serves to highlight their accomplishments and remind a larger audience of the importance of these efforts. Many organizations/employers reported that the award provided leverage and opportunities to expand the reach of the current approaches; pilot programs have been adopted by other entities or in other geographical regions (see http://www.safeinsound.us/impact.html).

Advanced hearing loss prevention strategies are spreading corporate-wide and professional/government organizations are discussing new policies, guidelines and/or procedures. The Safe-in-Sound Award™ establishes credibility, especially for those award winners who stretch traditional boundaries with novel or unique approaches. Rather than the awards serving to only recognize those that have reached a pinnacle of achievement, it actually motivates the award winners to pursue additional program improvements and to reach higher goals. Personal commitments are renewed, re-dedicated and re-energized. In addition, the award has facilitated the extension of successful hearing loss prevention activities and strategies toward workers that are not traditionally considered in typical workplace hearing loss prevention programs (e.g. musicians, military personnel) and beyond the confines of the traditional workplace into the home and recreational/community settings.

Public input to the website and to the award program can be sent to info@safeinsound.us or to our Twitter account at @SafeinSoundUS. If your organization has implemented excellence in hearing loss prevention or has innovative approaches unique to your workforce, the Safe-in-Sound Award™ expert committee encourages you to apply for our next round of awards in 2014. Application instructions and online submission are available at http://www.safeinsound.us/application.html. CAOHC course instructors and occupational hearing conservationists are in a unique position to identify potential candidates for future awards, please visit the website and consider applying or encouraging others to apply.

## REFERENCES

Meinke, D.K., Morata, T.C. (2012). Awarding and promoting excellence in hearing loss prevention. I*nternational Journal of Audiol. 51*: S63-70.

## DISCLAIMER

Mention of any company or product does not constitute endorsement by the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH).

## FOOTNOTE:

[1] John R. Franks, Lee Hager, James Lankford, Deanna Meinke, Thais Morata, Rick Neitzel, Scott Schneider and Noah Seixas.

*Thais C. Morata, Ph.D. (Safe-in-Sound Project Director) is an audiologist who has been working in the area of hearing loss prevention since 1982. A native of Brazil, she earned degrees in Speech Pathology and Audiology, and Communication Disorders from the Pontifical Catholic University of São Paulo (B.S.; M.S.) and the University of Cincinnati (Ph.D.).*

*Deanna K. Meinke, Ph.D. (Safe-in-Sound Expert Committee Coordinator), has focused her career on the prevention of noise induced hearing loss as a clinician, educator, researcher and advocate. She is currently an Associate Professor of Audiology and Speech-Language Sciences at the University of Northern Colorado.*

# CAOHC unveils new logo and website

It's a year of exciting changes for CAOHC.

CAOHC's new visual identity is the biggest change. The Council has introduced a fresh logo featuring a dark blue ear with green sound waves entering into it. The ear and sound wave imagery reflect CAOHC'S mission of promoting hearing loss prevention by enhancing the quality of occupational hearing loss prevention practices. Unlike the old logo, which used earmuff imagery and emphasized hearing protection devices, the new logo represents CAOHC's overall, holistic mission of best practices in hearing loss prevention. The color blue radiates authority and trustworthiness and symbolizes CAOHC's important role of developing best practices in hearing loss prevention. The color green, which infers serenity and health, symbolizes how a good hearing conservation program can make a workplace a healthier, more peaceful place.

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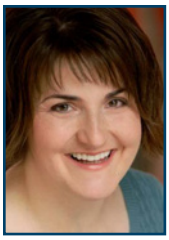
In addition to a new logo, CAOHC is launching a new website. The redesigned website, which will go live in June, will have a contemporary look, feature the new logo and color scheme and will be easier to navigate. More importantly, it will include much useful new information for Occupational Hearing Conservationists, Course Directors, Professional Supervisors, employers, and employees.

In a move that will save money and reduce paper waste, *Update* has been converted into a digital-only publication. Three times a year, *Update's* readers—Occupational Hearing Conservationists, Course Directors and Professional Supervisors— will receive an email letting them know that the latest issue has been posted on the website. Please make sure the CAOHC office has your current email address. You can send your current contact information to info@CAOHC.org.

Please check our website often for information on our new look.



# Applying GINA in the Occupational Hearing Conservation Program

*By: Theresa H. Small, AuD, CPS/A, Associates In Acoustics, Inc.*

The Genetic Information Nondiscrimination Act (GINA) was signed into law in May 2008. The need for federal legislation to protect individuals' genetic information grew out of a concern that, through medical advancements, employers could use genetic information and discriminate against employees by denying or terminating employment, revoking pay raises, promotions or job positions, or dismissing workers' compensation benefits (National Human Genome Research Institute). Although much of GINA is specific to insurance, there is a substantial component that pertains to employment discrimination. The focus of this article is Title II of GINA. Title II took effect on November 21, 2009. The Genetic Information Nondiscrimination Act prohibits genetic discrimination in the workplace, restricts acquiring genetic information, requires maintenance of genetic information in a confidential medical record and limits disclosure of genetic information (EEOC, 2010). The final regulation took effect on January 10, 2011 and is enforced by the Equal Employment Opportunity Commission (EEOC). Title II applies to private employers, local and state governments with fifteen or more employees and also includes labor unions, employment agencies, labor management programs, Congress and federal executive agencies. Currently, GINA does not apply to members of the military, veterans obtaining care through the Veterans Administration, or individuals receiving care through Indian Health Services (Steck & Eggert, 2011).

Genetic information includes genetic tests of an individual or family member, and diseases or disorders in a family member (which can be obtained through questions related to family medical history). Family medical history is included because this information can be used in determining the increased potential risk of an individual developing a disease, disorder, or condition in the future. Employers might take advantage of this information by selectively hiring or retaining individuals who are not predisposed to genetic disease. If permitted, omission of genetically-predisposed personnel might allow employers to build a healthier and more productive workforce (Steck & Eggert, 2011), but it could deny some individuals opportunities for career-advancement.

For hearing conservation programs (HCP), GINA applies to the collection of hearing health history information. In the past, it may have been routine to ask an employee about their family history of hearing loss on a medical questionnaire. Today, because of implications regarding GINA, employers must first answer the question – how will genetic information be handled and protected? There are serious ramifications for an employer who uses a family history of hearing loss against an employee – doing so may be considered discrimination. Although new, GINA does not alter civil rights laws – employers are still expected to adhere to these regulations. Genetic information that is collected in the workplace for toxic monitoring programs, employer-sponsored wellness programs, administration of federal and state family and medical leave laws, and certain cases of unintended acquisition of genetic information is *not* prohibited (Steck & Eggert, 2011). Today, the employer may not use or disclose that information for any other purpose than what was initially intended. All genetic information should be treated the same as other health information under the Health Information Portability and Accountability Act (HIPAA) and kept confidential and separate as provided by the American with Disabilities Act. If an employer collects or obtains genetic information in a role as a health care provider then the genetic information is subject to HIPAA's privacy rule rather than GINA. The context of how the information was obtained determines whether it falls under HIPAA or GINA (Magargle, Shea, & Smith, 2010).

Employers generally cannot request information about employees' family histories; however, there are a few exceptions. The use of "safe harbor" language (see specific language below) should be used in cases of lawful requests for disclosure of genetic information. For example, a physician or audiologist may need to acquire family history information when determining work relatedness of the hearing loss. This information can be useful in deciding if the employee's work environment caused or contributed to the hearing loss or if the employee was most-likely predisposed to hearing loss. Today, according to GINA, the employer's healthcare professional may be restricted from obtaining any of the information needed in forming a worker's compensation, recordability, or reportability determinations. If the acquisition of family medical history is not required by regulation and, instead, is at the healthcare professional's discretion, then it could be considered a violation (Magargle et al., 2010). If a hearing loss family history is collected by a healthcare professional, it needs to be handled appropriately when communicated to the employer.

## Safe Harbor Language adapted from the EEOC

"The Genetic Information Non-Discrimination Act (GINA) of 2008 prohibits employers and other entities covered by GINA Title II from requesting or requiring genetic information of an individual or family member of the individual, except as specifically allowed by this law. To comply with this law, we are asking that you not provide any genetic information when responding to this request for medical information. "Genetic information" as defined by GINA, includes an individual's family medical history, the results of an individual's or family member's genetic tests, the fact that an individual or an individual's family member sought or received genetic services, and genetic information of a fetus carried by an individual or an individual's family member or an embryo lawfully held by an individual or family member receiving assistive reproductive services."

If your HCP currently collects medical case history that can be specifically associated with family-history conditions, **it is critical to investigate how that information is shared, stored and ultimately used.** Worker health history that includes genetic information must be properly protected because it may become the source for discrimination in the workplace. Hearing conservationists should investigate whether this information is needed, how it will be used, and whether an opinion or outcome will be changed due to the acquisition of the information. A general rule of thumb is: **if the information is not critical, then don't ask for or obtain it.** Employers are learning that this information is not crucial to how an employee is managed in the HCP. They have removed questions related to family history of hearing loss from their

hearing health history forms. Of equal importance, employees should alert medical personnel not to request this type of information as part of their annual hearing test (Magargle et al., 2010). Clearly, family history of hearing loss should no longer be part of routine questioning in hearing conservation programs.

## For further information on specifics of GINA:

- Coalition for Genetic Fairness
  http://www.geneticfairness.org/GINAPublication111008.pdf
  http://www.geneticalliance.org/ginaresource
- Department of Health and Human Services
  http://www.genome.gov/Pages/PolicyEthics/GeneticDiscrimination/GINAInfoDoc.pdf
- National Human Genome Research Institute (NHGRI)
  http://www.genome.gov/24519851
  www.genome.gov/10002077
- US Equal Employment Opportunity Commission:
  http://www.eeoc.gov/laws/statutes/gina.cfm,
  http://www.eeoc.gov/laws/types/genetic.cfm
  http://www.eeoc.gov/laws/regulations/gina_qanda_smallbus.cfm

## References:

Magargle, B., Shea, R., and Smith, D. (2010). GINA: It's More Than Just a Pretty Name (Client Bulletin #428). Retrieved from http://www.constangy.com/assets/attachments/CB4281.pdf

National Human Genome Research Institute (NHGRI), National Institutes of Health. Genetic

Information Nondiscrimination Act (GINA) of 2008. Retrieved from http://www.genome.gov/24519851 and www.genome.gov/10002077

Steck, M.B. and Eggert, J. (2011). The Need to Be Aware and Beware of the Genetic Information Nondiscrimination Act. *Clinical Journal of Oncology Nursing, 15(3).* E34-E41.

US Equal Employment Opportunity Commission (2010). Retrieved from Genetic Information Discrimination http://www.eeoc.gov/laws/statutes/gina.cfm, http://www.eeoc.gov/laws/types/genetic.cfm and http://www.eeoc.gov/laws/regulations/gina_qanda_smallbus.cfm

*Theresa H. Small, Au.D., is an occupational audiologist consultant for Associates In Acoustics, Inc. , a professional consulting firm specializing in industrial noise measurement, noise control engineering, occupational audiology, and hearing loss prevention. Her primary responsibilities are professional review of hearing loss prevention programs to ensure effective protection from noise hazards to employees and regulatory compliance for employers.*

# UPCOMING WORKSHOPS

## Professional Supervisor of the Audiometric Monitoring Program

**Friday, August 23, 2013**
Denver, CO

**Thursday, November 7, 2013**
Hyatt Regency Coconut Point • Bonita Springs, FL
*(This is a preconference workshop to the Academy of Doctors of Audiology (ADA) conference)*

***Registration details can be found on CAOHC's website***

CAOHC®
Council for Accreditation in Occupational Hearing Conservation

# A Screening Method for Earplug Fitting

*By: Antony Joseph, AuD, PhD, CPS/A*

CAOHC-certified personnel who provide hearing protection devices (HPDs) to the workforce should consider whether the products they dispense adequately reduce noise exposure risk for end users. For earplugs, you can determine attenuation using sophisticated commercial instrumentation or simplified screening methods. Dissimilarities in size and shape of the ear canal, as well as differences in ability to properly use HPDs, make it difficult to predict how much attenuation workers will obtain using, for example, a "one size fits most" earplug. To promptly verify if a worker can adequately use an earplug, a manual single-frequency screening protocol that requires minimal instrumentation will be introduced in this article.

The Occupational Safety and Health Administration (OSHA) requires that individuals with standard threshold shift (STS) be retrained and refitted with HPDs; however, OSHA does not stipulate an optimal level of attenuation that may be used as a target during the process of HPD fitting and selection, nor does it specify the test frequency or manner in which attenuation measurements should be gathered. To reduce the chance of a repeat STS in earplug users, hearing conservationists should verify and document their ability to obtain a good earplug fitting. You should not assume that your workers will obtain the Noise Reduction Rating (NRR) that is posted on HPD packaging because the NRR is not a consistent reflection of the attenuation levels typical users actually obtain in the real world (Berger, 1983).

Instead of measuring a worker's personal attenuation directly, some hearing conservationists derate or correct the manufacturer's NRR using various suggested formulae. Inadequately, the derating procedures are not based on an individual worker's ability to fit the hearing protector, but on a rough population estimate. Derating generously reduces the manufacturer's posted NRR, yielding a potentially erroneous correction factor. To estimate a user's attenuation, and determine if protection is enough to adequately decrease risk, a more personalized approach for estimation of hearing protection fit and a recommendation of optimal levels of attenuation will be described briefly.

Employers generally do not appreciate removal of personnel from their work assignments for medical screenings as this contributes to productivity loss. Therefore, safety and medical staff must find prompt and effective ways to engage workers, while minimizing impact on productivity. Hence, there is a critical need for an accelerated screening procedure for verification of effective earplug attenuation. Use of single-frequency analysis of HPDs has been proposed by Padilla (1976), Passchier-Vermeer (1994), and Berger (2000).

Data from a cohort study of 100 subjects (Joseph, 2004) were analyzed to develop a more practical and efficient test method. In that study, binaural real-ear attenuation at threshold (REAT) in 100 normal-hearing, naïve listeners was measured with Fit-Check™. Figure 1 illustrates the mean NRR and 500 Hz REAT obtained by subjects, observed before and after training, half using foam and half using premolded devices. In each metric, listeners showed a 13 dB improvement. Inter-correlation data between all REATs and measured NRR revealed that 500 Hz was the most highly-correlated REAT ($R = .933$, $p < 0.001$), earning the name Sound Attenuation Fit Estimator, or SAFE-500. Although this frequency explained much of the variance in the NRR (R-squared = 0.87), single-frequency subject-fit estimation incurs a prediction error of 8 to -20 dB (personal communication, WJ Murphy), so use of SAFE-500 should be applied only to dichotomous (e.g., pass-fail) conditions.

Using an 85% confidence interval, a linear regression analysis was used to interpret of the SAFE-500 measurement. The 500 Hz REAT formed a scattergram centroid near 25 dB, or a subject-fit NRR of 15 dB. A 5-dB estimation factor was added to the subject-fit NRR, which is slightly less conservative than the 7-dB observation from Murphy (2013). From this paradigm, a SAFE-500 measurement below 25 dB signifies a lack of effective attenuation (bad fit), while 25 dB or

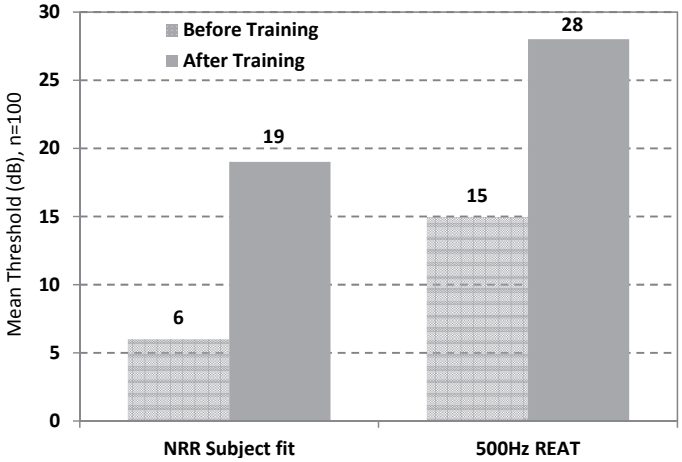



*Figure 1. Mean attenuation performance before/after training (NRR subject-fit and 500Hz REAT), from Joseph (2004)*

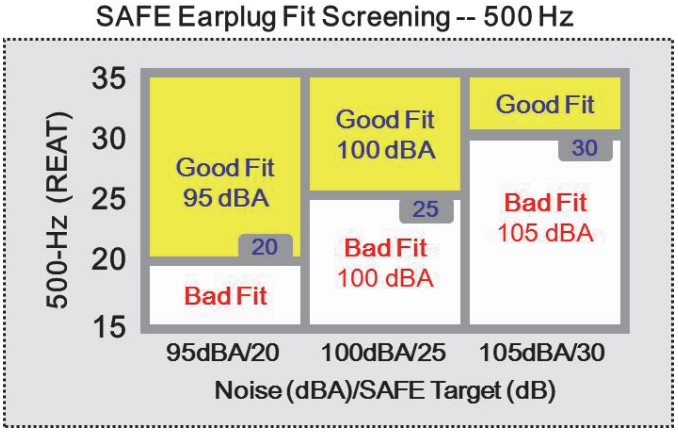



*Figure 2. SAFE-500 conversion diagram for use in hearing protection program surveillance*

above indicates good HPD insertion when exposure levels are 100 dBA. Accordingly, SAFE good-fit cut-offs are 20 dB for an exposure of 95 dBA, 25 dB for an exposure of 100 dBA, and 30 for 105 dBA. This methodology targets a protected exposure level of 80 dB, which reduces the auditory risk level to approximately one percent.

Typically, high-frequency REATs are greater than low-frequency ones (e.g., 500 Hz), but low-frequency REATs are more indicative of the depth and seal of a user's inserted HPD. Berger (2000) proposed testing the attenuation response at only 500 Hz because it is a frequency that characterizes the quality of occlusion obtained by a fitted protector. Because the SAFE-500 stimulus is a low frequency, it can provide a gauge of proper insertion of protective devices. The seal, within the ear canal, for a premolded or a custom-molded earplug is critical to attaining higher attenuations. The depth of insertion for formable plugs dramatically affects the attenuation a worker receives. It has been reported that a 500 Hz pure tone represents low-frequency narrow-band stimuli adequately, so a pure tone could be used if narrow-band stimuli were unavailable (Passchier-Vermeer et al., 1994).

To screen the effectiveness of a fitted earplug, examiners will need headphones, either Fit-Check™ or comparable deep-well circumaural headphones. Supra-aural headphones are not compatible with certain earplugs (e.g., premolded with insertion stem or custom-molded), or very poorly-fitted earplugs. A portable air-conduction audiometer with narrow band masking noise signal, or equivalent, is required. The test is easily conducted on a clinical audiometer using pulsing narrow-band noise. A 500-Hz stimulus is customarily available on standard portable audiometers and HCP test equipment. Use typical instructions required for a bracketing threshold technique. Clinicians may switch to 1 dB increments at the established 5-dB threshold. You will need as least 5-7 minutes to administer screening trials. Examiners will need to know the worker's noise exposure level. Figure 2 contains the SAFE-500 threshold targets for three specified noise levels, 95, 100, and 105 dBA. Measurements may be recorded using the steps and fields indicated in Tables 1 and 2.

The main advantages of SAFE-500 testing are ease of administration, time efficiency, and reasonable instrumentation cost. Although screening with a single-frequency is faster to administer, the measurement of multiple stimuli under circumaural headphones provides the best field assessment of earplug fit. In addition to screening workers with STS, SAFE-500 might be administered in conjunction with the pre-employment and annual audiogram, allowing workers to don their preferred earplugs for the screening. Counseling and training should be delivered after the procedure, re- screening afterwards, if needed. For every HPD wearer, it is critical to balance the importance of comfort (Byrne et al., 2011) against a desired attenuation target. Comfort is a key factor that contributes to user compliance and satisfaction with the program. Also, SAFE-500 may serve as a method of measuring the effectiveness of hearing loss prevention training. It is a screening procedure that engages hearing conservationists with workers exposed to hazardous noise, and places an emphasis on verification of acceptable protection for individuals. Refer to your Professional Supervisor for guidance on standard operating procedures and implementation of SAFE-500.

**Table 1. Instructions for SAFE-500 Screening**

| | |
|---|---|
| **Step 1** | Determine level of noise exposure and which intensity it is closest to: 95, 100, or 105 dBA (round up).<br>**Circle correct value in the field labeled "A."** |
| **Step 2** | Provide test instructions, same as audiogram, but listening for noise, not tones (unless tones used during screening) |
| **Step 3** | Place headphones without earplugs inserted, conduct threshold search using 500 Hz for each ear. Remove headphones.<br>**Enter results in the field labeled "B."** |
| **Step 4** | Place headphones with earplugs inserted, conduct threshold search using 500 Hz for each ear. Remove headphones.<br>**Enter results in the field labeled "C."** |
| **Step 5** | Calculate the difference between thresholds in fields C and B (REAT).<br>**Enter calculated difference in the field labeled "D."** |
| **Step 6** | Use the chart in Figure 2 to determine if the REAT value is suitable for the exposure level circled in Step 1 (Field A), also last row of Table 2.<br>**Mark the PASS or FAIL result in the field labeled "E."** |
| **Step 7** | Retrain, re-fit, and re-screen if a **FAIL** result is obtained in either ear. When a **PASS** is eventually obtained (with comfortable fit), encourage the worker to wear the HPD using the methods trained and whenever exposed to hazardous noise. |

**Table 2. Documentation for SAFE-500 Screening**

| **Field** | | | |
|---|---|---|---|
| **A** | Estimated Noise Level | **95 dBA** **100 dBA** **105 dBA** | |
| | | Left Ear | Right Ear |
| **B** | Threshold Without Earplugs | dB | dB |
| **C** | Threshold With Earplugs | dB | dB |
| **D** | Threshold Difference (C - B) | dB | dB |
| **E** | Screening Results | **PASS** FAIL | **PASS** FAIL |
| | REAT Pass Value | **≥20 dB** **≥25 dB** **≥30 dB** | |

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Byrne, D. C., Davis, R. R., Shaw, P. B., Specht, B. M., & Holland, A. N. (2011). Relationship between comfort and attenuation measurements for two types of earplugs. Noise Health, 13(51), 86-92.

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# CAOHC Item Writer Workshop

*By: Maj. John "Andy" Merkley, MS, CCC-A, CPS/A and Kim Breitbach*

For the last four years the Occupational Hearing Conservation Exam Committee of the Council for Accreditation in Occupational Hearing Conservation (CAOHC) Council has worked with Certified Professional Supervisors of the Audiometric Monitoring Program (CPS/A), Course Directors (CD), and Certified Occupational Hearing Conservationists (COHC) to conduct an assessment of key tasks that COHCs perform and knowledge that COHCs use daily. This assessment, or Job Task Analysis (JTA), strengthens the credentials held by COHCs, improves curriculum of COHC courses, and develops a standardized assessment of learning.

In the current COHC class model, COHC Course Directors provide training as outlined by CAOHC (1), but overall content, delivery, and assessment of learning (testing) are determined by the Course Director and vary widely from class to class. In order to become more compliant with credentialing guidelines and consistent in our testing process, the CAOHC Council with the help of a task force made up of COHCs, PS', and CDs began the project of creating one standardized exam for new certificants, as well as those who recertify as COHCs.

After compiling the COHC JTA survey, the exam committee polled COHCs across the country. That survey generated more than 6,000 responses, which provided the Task Force with important data regarding the knowledge needed the skills necessary to perform their jobs as COHCs. The COHC Exam Task Force contracted with Professional Testing, Inc., to assess the feedback from the field; determine what key learning objectives needed to be assessed; weight the learning objectives; develop a validated, standardized examination to assess COHC learning in approved CAOHC Occupational Hearing Conservation workshops throughout the world; and develop a blueprint to begin to create new exam items for the standardized certification and recertification exam.

The COHC Task Force convened an item writer workshop March 6-8, 2012, with a representative from Professional Testing, Inc., and professionals from the field consisting of five COHCs, two Course Directors, two Professional Supervisors, and a CAOHC administrator. The purpose of this meeting was to learn how to write defensible exam questions, review exam questions currently in the exam bank, and, under the direction of Professional Testing, Inc., develop questions that would stand up to scrutiny. The meeting opened with exam writing instruction by Professional Testing, Inc., and was followed by two grueling days of writing, re-writing, and reviewing exam questions. Each of the questions was reviewed by the entire committee. In the end, roughly 200 questions in the exam bank were salvaged and about 50 were written. These questions were enough to develop two separate certification exams and one version of the recertification to be beta tested.

In September and October twelve CDs assisted the Task Force with the beta testing process. We were fortunate to have enough people take their current exam, as well as the beta test, in order to assess the results and set the passing score. The final step is to create new policies and procedures for deployment of our new standardized exam, which is our current project.

These are exciting times for CAOHC. The planned launch of standardized testing is January 2014. All this will lead to a stronger assessment-based certification of occupational hearing conservationists, which will result in stronger hearing conservation programs.

The Council would like to thank all of the individuals who participated in each stage of this four-year process.

COHC TASK FORCE MEMBERS

*Task Force Chairs*
Diane DeGaetano, BSN, RN, COHN-S, FAA
Vickie Tuten, COL, MS, CPS/A
Mary McDaniel, AuD CCC-A CPS/A

*Task Force Members*
Sandra J. Adams, PhD RN COHN-S/CM
Rodney M. Atack, PhD
Cheryl Y. Cameron, MS CCC-A MAA
Kara M. Cave, PhD
Nancy Craft
Michael H. Fairchild, MS JD CCC-A F-AAA
Charles E. Fankhauser, PhD
James J. Jerome, MA CCC-A
Laura Kauth, MA CCC-A
John A. Merkley, MS CCC-A
Rebecca F. Moreland, PhD MPH BSN
David Todd Nelson, AuD FAAA CCC-A CPS/A
Donna L. Pitts, CCC-A FAAA
Jane Prince, PhD
John Ribera
Timothy A. Swisher, MA CCC-A
Elizabeth O. Adegbulugbe, RN BSN CCOHC
Corrado Avarino, CCOHC
Carl J. Bishop, MS RN CCOHC
Christina T. Burns
Ronald W. Kieper, BS CCOHC
Jeanne A. Kirk, RN CCOHC
Alice M. LeBeau, RN BSN CCOHC
Scott A. Mitchell, CCOHC
Christine C. Nevinski, RN MSN MEd CCOHC
Feliz C. Ramos, MA CCOHC
Robin Tourigian, RN FNP MSN COHN-S/CM
Patricia J. Vincent, BA CCOHC
John T. Barringer, MD
Thomas W. Norris, PhD CPS/A
Vishakha Rawool, PhD CPS/A
Pam Mason, M.Ed., CCC-A

*Item Writers*
Diane DeGaetano, BSN, RN, COHN-S, FAA
Bruce Kirchner, MD MPH CPS/A
Vickie Tuten, COL, MS, CPS/A
Marion R. Juarez-Bedzyk, CCOHC
John A. Merkley, MS CCC-A
Elaine Brown, RN BS COHN-S/CM CCOHC
Leticia Perez, CCOHC
Dawn Dingeldine, RN CCOHC

*Beta Test Administrators*
Catherine Conley, AuD, CCC-A
Pam duPont, MS CCC-A
John Elmore, AuD MBA CPS/A
Charles Fankhauser, PhD
Jim Jerome, MA CCC-A
Laura Kauth, MA CCC-A
Ted Madison, MA CCC-A
Kirsten McCall, AuD CCC-A
Tom Norris, PhD
Johnny Saunders, MA CCC-A
Tim Swisher, MA CCC-A FAAA
Tom Thunder, AuD FAAA INCE Bd.Ct.

*COHC Beta Test Reviewers*
Chandran Achutan, PhD
Diane DeGaetano, BSN, RN, COHN-S, FAA
Tom Hutchison, MA MHA FAAA CPS/A
Antony Joseph, AuD PhD CPS/A
Bruce Kirchner, MD MPH CPS/A
Mary M. McDaniel, AuD CCC-A CPS/A
Kim Riegel, PhD
Theresa Schulz, PhD CPS/A

## Works Cited

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*Maj. Merkley serves on the CAOHC Council representing the Military Audiology Association (MAA). He is the current Chair of the OHC Committee.*

*Kim Breitbach is the Executive Director for CAOHC.*

*From left to right: Top-Elaine Brown, Marion Juarez-Bedzyk, Andy Merkley, Bruce Kirchner*
*Bottom-Fae Mellichamp, Diane DeGaetano, Vickie Tuten, Dawn Dingeldine, Leticia Perez*

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# Upcoming Occupational Hearing Conservationist (OHC) Courses 2013

Below is a listing of all OHC certification and re-certification courses from May 13 – July 31, 2013. Please note that new courses are added daily; for the most up-to-date information please check the OHC Course Listing section of the CAOHC website, www.caohc.org.

| Start Date | End Date | State | City | FULL_NAME | Phone |
|---|---|---|---|---|---|
| 5/13/2013 | 5/15/2013 | GA | Atlanta | Herbert J. Greenberg, PhD CCC-A | 678-689-8029 |
| *5/14/2013 | 5/14/2013 | GA | Atlanta | Herbert J. Greenberg, PhD CCC-A | 678-689-8029 |
| 5/13/2013 | 5/15/2013 | ME | Waterville | Anne Louise P. Giroux, AuD CCC-A | 207-872-0320 |
| 5/13/2013 | 5/15/2013 | NM | Albuquerque | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| *5/14/2013 | 5/14/2013 | NM | Albuquerque | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| 5/13/2013 | 5/21/2013 | OH | Cleveland | Beth A. Cooper, PE INCE BD Cert | 216-570-7231 |
| 5/14/2013 | 5/16/2013 | OH | Cleveland | Beth A. Cooper, PE INCE BD Cert | 216-570-7231 |
| 5/13/2013 | 5/15/2013 | OR | Aloha | Michael H. Fairchild, MS JD CCC-A F-AAA | 503-259-2685 |
| *5/13/2013 | 5/13/2012 | OR | Aloha | Michael H. Fairchild, MS JD CCC-A F-AAA | 503-259-2685 |
| 5/14/2013 | 5/16/2013 | MA | Mansfield | Pamela G. DuPont, MS CCC-A CPS/A | 860-526-8686 |
| *5/15/2013 | 5/15/2013 | MA | Mansfield | Pamela G. DuPont, MS CCC-A CPS/A | 860-526-8686 |
| 5/14/2013 | 5/16/2013 | MI | Detroit | Thomas H. Simpson, PhD CCC-A | 313-577-6750 |
| *5/15/2013 | 5/15/2013 | MI | Detroit | Thomas H. Simpson, PhD CCC-A | 313-577-6750 |
| 5/15/2013 | 5/17/2013 | CA | Vacaville | Charles E. Fankhauser, PhD | 707-746-6334 |
| *5/16/2013 | 5/16/2013 | CA | Vacaville | Charles E. Fankhauser, PhD | 707-746-6334 |
| 5/15/2013 | 5/17/2013 | DE | Newark | Margaret Sasscer, AuD CCC-A | 410-360-6120 |
| *5/16/2013 | 5/16/2013 | DE | Newark | Margaret Sasscer, AuD CCC-A | 410-360-6120 |
| 5/15/2013 | 5/17/2013 | FL | Jacksonville | Michele Alexander, MS CCC-A | 336-834-8775 |
| *5/16/2013 | 5/16/2013 | FL | Jacksonville | Michele Alexander, MS CCC-A | 336-834-8775 |
| 5/16/2013 | 5/18/2013 | TX | Dallas/Ft Worth | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| *5/17/2013 | 5/17/2013 | TX | Dallas/Ft. Worth | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| 5/17/2013 | 5/19/2013 | CA | San Diego | Robert Dusa, AuD | 858-526-6136 |
| *5/18/2013 | 5/18/2013 | CA | San Diego | Robert Dusa, AuD | 858-526-6136 |
| 5/22/2013 | 5/24/2013 | DE | Dover | Timothy A. Swisher, MA CCC-A FAAA | 412-367-8690 |
| *5/23/2013 | 5/23/2013 | DE | Dover | Timothy A. Swisher, MA CCC-A FAAA | 412-367-8690 |
| *5/22/2013 | 5/22/2013 | NC | Morrisville | Thomas H. Cameron, PhD CCC-A CPS/A | 919-732-7378 |
| 5/22/2013 | 5/24/2013 | VA | Norfolk | Margaret Sasscer, AuD CCC-A | 301-360-6120 |
| *5/23/2013 | 5/23/2013 | VA | Norfolk | Margaret Sasscer, AuD CCC-A | 301-360-6120 |
| 5/29/2013 | 5/31/2013 | MS | Ridgeland | Beth A. Cooper, PE INCE BD Cert | 800-869-6783 |
| *5/30/2013 | 5/30/2013 | MS | Ridgeland | Beth A. Cooper, PE INCE BD Cert | 800-869-6783 |
| 6/3/2013 | 6/5/2013 | ME | Waterville | Anne Louise P. Giroux, AuD CCC-A | 207-872-0320 |
| 6/4/2013 | 6/6/2013 | WA | Seattle | Mary M. McDaniel, AuD CCC-A CPS/A | 206-706-7352 |
| *6/5/2013 | 6/5/2013 | WA | Seattle | Mary M. McDaniel, AuD CCC-A CPS/A | 206-706-7352 |
| 6/5/2013 | 6/7/2013 | AR | Little Rock | John A. Merkley, AuD CCC-A, CPS/A | 800-869-6783 |
| *6/6/2013 | 6/6/2013 | AR | Little Rock | John A. Merkley, AuD CCC-A, CPS/A | 800-869-6783 |
| 6/5/2013 | 6/7/2013 | NC | Greensboro | Cheryl S. Nadeau, MEd FAAA | 336-834-8775 |
| *6/6/2013 | 6/6/2013 | NC | Greensoboro | Cheryl S. Nadeau, MEd FAAA | 336-834-8775 |
| 6/5/2013 | 6/7/2013 | OH | Columbus | James J. Jerome, MA CCC-A | 317-841-9829 |
| *6/6/2013 | 6/6/2013 | OH | Columbus | James J. Jerome, MA CCC-A | 317-841-9829 |
| 6/5/2013 | 6/7/2013 | PA | Lyons Station | Richard Stepkin, MS CCC-A | 856-435-7200 |
| *6/6/2013 | 6/6/2013 | PA | Lyons Station | Richard Stepkin, MS CCC-A | 856-435-7200 |

| Start Date | End Date | State | City | FULL_NAME | Phone |
|---|---|---|---|---|---|
| 6/5/2013 | 6/7/2013 | TX | San Antonio | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| *6/6/2013 | 6/6/2013 | TX | San Antonio | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| 6/5/2013 | 6/7/2013 | VA | Sandston | Margaret Sasscer, AuD CCC-A | 410-360-6120 |
| *6/6/2013 | 6/6/2013 | VA | Sandston | Margaret Sasscer, AuD CCC-A | 410-360-6120 |
| 6/6/2013 | 6/8/2013 | PA | Pittsburgh | Roger M. Angelelli, PhD | 412-831-0430 |
| *6/7/2013 | 6/7/2013 | PA | Pittsburgh | Roger M. Angelelli, PhD | 412-831-0430 |
| 6/11/2013 | 6/13/2013 | MA | Auburn | Steven R. Fournier, AuD CPS/A | 508-832-8484 |
| 6/11/2013 | 6/13/2013 | MO | North Kansas City | Linda Kay Ratliff-Hober, MS CCC-A | 913-961-5810 |
| *6/12/2013 | 6/12/2013 | MO | North Kansas City | Linda Kay Ratliff-Hober, MS CCC-A | 913-961-5810 |
| 6/11/2013 | 6/13/2013 | SC | Greenwood | Jacquline F. Diamond, RN BSN COHN-S CCM | 304-687-1413 |
| *6/12/2013 | 6/12/2013 | SC | Greenwood | Jacquline F. Diamond, RN BSN COHN-S CCM | 304-687-1413 |
| 6/12/2013 | 6/14/2013 | AR | Little Rock | Michele Alexander, MS CCC-A | 336-834-8775 |
| *6/13/2013 | 6/13/2013 | AR | Little Rock | Michele Alexander, MS CCC-A | 336-834-8775 |
| 6/12/2013 | 6/14/2013 | NY | Binghamton | David Todd Nelson, AuD FAAA CCC-A CPS/A | 716-213-4317 |
| *6/13/2013 | 6/13/2013 | NY | Binghamton | David Todd Nelson, AuD FAAA CCC-A CPS/A | 716-213-4317 |
| 6/12/2013 | 6/14/2013 | PA | Harrisburg | Timothy A. Swisher, MA CCC-A FAAA | 412-367-8690 |
| *6/13/2013 | 6/13/2013 | PA | Harrisburg | Timothy A. Swisher, MA CCC-A FAAA | 412-367-8690 |
| 6/12/2013 | 6/14/2013 | TX | Houston | Richard W. Danielson, PhD CPS/A | 800-869-6783 |
| *6/13/2013 | 6/13/2013 | TX | Houston | Richard W. Danielson, PhD CPS/A | 800-869-6783 |
| 6/17/2013 | 6/19/2013 | FL | W Palm Beach | Herbert J. Greenberg, PhD CCC-A | 678-689-8029 |
| *6/18/2013 | 6/18/2013 | FL | W Palm Beach | Herbert J. Greenberg, PhD CCC-A | 678-689-8029 |
| *6/17/2013 | 6/17/2013 | OR | Aloha | Michael H. Fairchild, MS JD CCC-A F-AAA | 503-259-2685 |
| 6/19/2013 | 6/21/2013 | IL | Chicago/Schaumburg | Thomas D. Thunder, AuD FAAA INCE Bd.Ct. | 847-359-1068 |
| *6/18/2013 | 6/18/2013 | IL | Chicago/Schaumburg | Thomas D. Thunder, AuD FAAA INCE Bd.Ct. | 847-359-1068 |
| 6/19/2013 | 6/21/2013 | NC | Morrisville | Thomas H. Cameron, PhD CCC-A CPS/A | 919-732-7378 |
| 6/19/2013 | 6/21/2013 | NV | Las Vegas | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| *6/20/2013 | 6/20/2013 | NV | Las Vegas | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| 6/26/2013 | 6/28/2013 | CO | Denver | John A. Merkley, AuD CCC-A, CPS/A | 800-869-6783 |
| *6/27/2013 | 6/27/2013 | CO | Denver | John A. Merkley, AuD CCC-A, CPS/A | 800-869-6783 |
| 6/26/2013 | 6/28/2013 | IA | Des Moines | Laura S.T. Kauth, MA CCC-A | 563-499-6627 |
| *6/27/2013 | 6/27/2013 | IA | Des Moines | Laura S.T. Kauth, MA CCC-A | 563-499-6627 |
| 6/26/2013 | 6/28/2013 | TN | Chattanooga | Melette L. Meloy, MS CCC-A | 678-363-9897 |
| *6/27/2013 | 6/27/2013 | TN | Chattanooga | Melette L. Meloy, MS CCC-A | 678-363-9897 |
| 7/1/2013 | 7/3/2013 | IL | Rockford | Anneliese M. Hartman, AuD CCC-A | 815-599-7770 |
| *7/2/2013 | 7/2/2013 | IL | Rockford | Anneliese M. Hartman, AuD CCC-A | 815-599-7770 |
| 7/10/2013 | 7/12/2013 | GA | Columbus | Michele Alexander, MS CCC-A | 336-834-8775 |
| *7/11/2013 | 7/11/2013 | GA | Columbus | Michele Alexander, MS CCC-A | 336-834-8775 |
| 7/10/2013 | 7/12/2013 | WI | Madison | James J. Jerome, MA CCC-A | 317-841-9829 |
| *7/11/2013 | 7/11/2013 | WI | Madison | James J. Jerome, MA CCC-A | 317-841-9829 |
| 7/15/2013 | 7/17/2013 | IA | Davenport | James J. Jerome, MA CCC-A | 317-841-9829 |
| *7/16/2013 | 7/16/2013 | IA | Davenport | James J. Jerome, MA CCC-A | 317-841-9829 |
| 7/15/2013 | 7/17/2013 | GA | Atlanta | Herbert J. Greenberg, PhD CCC-A | 678-689-8029 |
| *7/16/2013 | 7/16/2013 | GA | Atlanta | Herbert J. Greenberg, PhD CCC-A | 678-689-8029 |
| *7/15/2013 | 7/15/2013 | Jamaica | Kingston | Lynn E. Cook, AuD FAAA | 800-869-6783 |
| 7/17/2013 | 7/19/2013 | FL | Miami | Lynn E. Cook, AuD FAAA | 800-869-6783 |
| *7/18/2013 | 7/18/2013 | FL | Miami | Lynn E. Cook, AuD FAAA | 800-869-6783 |
| 7/15/2013 | 7/17/2013 | ME | Waterville | Anne Louise P. Giroux, AuD CCC-A | 207-872-0320 |
| 7/15/2013 | 7/17/2013 | OR | Aloha | Michael H. Fairchild, MS JD CCC-A F-AAA | 503-259-2685 |
| *7/15/2013 | 7/15/2013 | OR | Aloha | Michael H. Fairchild, MS JD CCC-A F-AAA | 503-259-2685 |
| 7/15/2013 | 7/17/2013 | WA | Spokane | Mary M. McDaniel, AuD CCC-A CPS/A | 206-706-7352 |
| *7/16/2013 | 7/16/2013 | WA | Spokane | Mary M. McDaniel, AuD CCC-A CPS/A | 206-706-7352 |
| 7/17/2013 | 7/19/2013 | MI | Detroit | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |
| *7/18/2013 | 7/18/2013 | MI | Detroit | John H. Elmore, AuD MBA CCC-A | 800-357-5759 |

| Start Date | End Date | State | City | FULL_NAME | Phone |
|---|---|---|---|---|---|
| 7/17/2013 | 7/19/2013 | NC | Greensboro | Cheryl S. Nadeau, MEd FAAA | 336-834-8775 |
| *7/18/2013 | 7/18/2013 | NC | Greensboro | Cheryl S. Nadeau, MEd FAAA | 336-834-8775 |
| *7/17/2013 | 7/17/2013 | NC | Morrisville | Thomas H. Cameron, PhD CCC-A CPS/A | 919-732-7378 |
| 7/18/2013 | 7/20/2013 | PA | Kittanning | Douglas N. Callen, PhD | 724-543-7068 |
| *7/19/2013 | 7/19/2013 | PA | Kittanning | Douglas N. Callen, PhD | 724-543-7068 |
| 7/23/2013 | 7/25/2013 | MO | North Kansas City | Linda Kay Ratliff-Hober, MS CCC-A | 913-961-5810 |
| *7/24/2013 | 7/24/2013 | MO | North Kanas City | Linda Kay Ratliff-Hober, MS CCC-A | 913-961-5810 |
| 7/24/2013 | 7/26/2013 | GA | Atlanta | Melette L. Meloy, MS CCC-A | 678-363-9897 |
| *7/25/2013 | 7/25/2013 | GA | Atlanta | Melette L. Meloy, MS CCC-A | 678-363-9897 |
| 7/24/2013 | 7/26/2013 | NV | Las Vegas | Kathryn M. Deppensmith, MS CCC-A | 800-869-6783 |
| *7/25/2013 | 7/25/2013 | NV | Las Vegas | Kathryn M. Deppensmith, MS CCC-A | 800-869-6783 |
| 7/24/2013 | 7/26/2013 | NY | Albany | Timothy A. Swisher, MA CCC-A FAAA | 412-367-8690 |
| *7/25/2013 | 7/25/2013 | NY | Albany | Timothy A. Swisher, MA CCC-A FAAA | 412-367-8690 |
| 7/24/2013 | 7/26/2013 | OH | Dayton | Chris M. Pavlakos, PhD | 937-436-1161 |
| *7/26/2013 | 7/26/2013 | OH | Dayton | Chris M. Pavlakos, PhD | 937-436-1161 |
| 7/24/2013 | 7/26/2013 | VA | Chantilly | Margaret Sasscer, AuD CCC-A | 410-360-6120 |
| *7/25/2013 | 7/25/2013 | VA | Chantilly | Margaret Sasscer, AuD CCC-A | 410-360-6120 |
| 7/29/2013 | 7/31/2013 | VA | Norfolk | George R. Cook, Jr., AuD CCC-A | 336-430-3369 |
| *7/30/2013 | 7/30/2013 | VA | Norfolk | George R. Cook, Jr., AuD CCC-A | 336-430-3369 |
| 7/31/2013 | 8/2/2013 | FL | Tampa | Jason M. Jones, MS CCC-A | 800-869-6783 |