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UPDATE

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Options in Defining Background Noise During Audiometric Testing

By Elliott H. Berger, MS

Introduction

Background noise in audiometric testing continues to be a concern in the regulatory and audiological communities, despite the fact that an accepted and validated American National Standard (ANSI S3.1-1999) exists that clearly defines acceptable ambient noise levels and the associated errors in threshold measurement that they create. The ANSI standard is based on objective measurements and includes options to adjust its tabled values, depending upon the amount of masking that the experimenter is willing to tolerate. This article reviews the data and theory behind the standard, clarifies the proper interpretation of the standard and the options that it provides, compares its specifications to the values proposed by the National Hearing Conservation Association (NHCA) and the American Speech-Language Hearing Association (ASHA) (NHCA, 1994), and summarizes actual room noise measurements reported in the literature.

Background

The specification of permissible ambient noise during audiometric testing has been a matter of controversy since the Occupational Safety and Health Administration (OSHA) hearing conservation amendment was first proposed in 1981. The reasons are obvious. Audiologists and scientists need to define background noise levels that are low enough to allow the measurement of true audiometric thresholds while industry and equipment manufacturers need to have a specification that can realistically be achieved in practice without undue hardship. The final decision in such matters is often a compromise, hopefully well grounded in scientific "facts."

The situation becomes more controversial when the question of which thresholds must be accurately measured (that is, measured without elevation due to masking) is open to debate. Generally the most troublesome frequency to test with respect to background noise is 500 Hz. Some argue that valid thresholds at that frequency are relatively unimportant for detection of standard threshold shifts (STS), and thus are either unconcerned regarding masking at that frequency or recommend deleting 500 Hz altogether.

An ANSI standard specifying permissible ambient noise levels during audiometric testing has existed since 1960 (S3.1-1960); it was revised in 1977, 1991, and most recently 1999. The earliest of these standards specified levels based upon what was considered audiometric zero at that time. Since those standardized values for audiometric zero changed in the later 1960s (the thresholds became more sensitive) it became necessary in 1977 to reduce the ambient noise requirements as well. Changes occurred again in 1991 and 1999 due to new data for the noise-excluding characteristics of audiometric earphones, and revised procedures for predicting masking. In the most recent standard the procedure for computing masking is the one developed by Berger and Killion (1989) that has been experimentally validated in three separate experiments separated by over 10 years. The 1999 ambient-noise requirements are well grounded in experimental data using realistic background noises, and are defined so as to permit thresholds be masked by no more than 2 dB.

The contestable issues with respect to S3.1-1999 pertain to which audiometric test frequencies are important to accurately test, and whether more or less than 2 dB of masking due to background noise is tolerable. A third point, and one often overlooked is that the values in the standard for the ears-covered conditions are based upon a listener who obtains average amounts of attenuation from the audiometric earphones used to administer the test. We will return to this point in a moment.

Application and Field Data

Maximum permissible ambient noise levels (MPANLs) are the sound levels that permit the measurement of thresholds with no more than 2 dB of masking. In Tables 1, 2, and 3, ANSI S3.1-1999 specifies those values in terms of the ears-covered (for supra-aural and for insert earphones) and ears-not-covered (i.e. sound field audiometry) octave-band and one-third octave-band sound pressure levels (SPLs). Because low frequencies can cover up or mask high frequencies due to the upward spread of masking, noise levels are specified down to 125 Hz even when audiometric testing extends to only 500 Hz. This article will focus on the most common condition, namely the ears covered by supra-aural earphones mounted in the MX41/AR or Type 51 cushions, with testing extending down to 500 Hz.

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UPDATE
CAOHC

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Chair's Message

By James D. Banach, MBA

Not all that long ago, issues of quality were a separate focus for any organization. Quality was a concept on to itself, with programs, policies and approvals. For the quality committed organization, this is no longer the case. Rather than being a separate concept, it is now an integral principle tested and applied in every decision.

A long time ago, before I was certified as an OHC, and OSHA had just promulgated its first noise regulation, and portable computers were the size of a fine piece of luggage, I used to make a living calibrating audiometers and certifying the background levels in audiometric test booths. Those were the days when adjustments to the output level of an audiometer were made by changing resistor values by soldering in different resistors. The equipment needed to accomplish simple calibration filled two full-size suitcases and a hand truck was your best friend. As with so much in our lives, microprocessors have changed all this, making calibration easier, faster and more reliable and the needed equipment has shrunk in size. Alas, poor hand truck, you are forgotten.

Quality, reliability, repeatability, dependability are all watch words that surround us daily. Many commercials promise the product offered will do the job, first time, every time for the best value. Increasingly manufacturers of products are subjecting themselves to programs meant to improve the product they offer. ISO 9000 type accreditations are necessary to play in the big leagues of manufacturing, and are spreading into other non-manufacturing forms of business.

A focus on quality is no stranger for those who work as service providers too. In our own world of hearing conservation, regulations and standards exist for every aspect of the process. Audiometric testing, noise measurement, hearing protection, and overall program performance have ANSI, IEC, OSHA, MSHA, DOD, NIOSH and in some cases even state-promulgated expectations. Keeping up and balancing all these expectations is a challenge for the hearing conservation professional.

This edition of the UPDATE will help you sort through many topics related to improving the service of hearing conservation. Elliott Berger helps us through issues regarding room background noise levels, Deana Meinke gives us some insights on purchasing calibration services, and Lee Hager looks at extended work shifts and what it means for hearing protection.

With so much to stay abreast of, it is little wonder that the CAOHC Council is exerting so much energy in trying to equip Professional Supervisors, Course Directors and Occupational Hearing Conservationists with the tools they need to be effective. At times the Council may seem like the "big brother" of movie fame, when it is really our intent to be more like the big brother of "Leave it to Beaver" fame. Change always meets with resistance, and should not be made just for the sake of change, but it must happen —then we can improve because 'good enough' **isn't** good enough. If you'd like to get a new perspective, read the book *From Good to Great* by Jim Collins. Just as it was a great thing to move away from resistors and hand trucks to calibrate audiometers, it is important that our certification courses and all aspects of occupational hearing loss programs continue to strive for greatness.

And so we keep working. The development of the skills and quality of Professional Supervisors is an energy driver for the Council. We keep working toward improved course content and materials that support the missions of all our wonderful Professional Supervisors, Course Directors, and Occupational Hearing Conservationists. And we continue to work at balancing a desire for unquestioned quality, with ingenuity, consideration of various viewpoints, and the realities of our resources and market needs.

We all have a lot to be proud of. We are not facing a quality issue that is broken and lost. It is in very good shape. Those ears we care for deserve more, they deserve greatness. So all of us that make up the CAOHC family must keep improving, keep stretching toward greatness. There is one thing we want to make clear, with CAOHC, you can expect the best of class, the highest quality. With CAOHC there is no equal!

OHC Corner

FAQ: Noise Measurements in the Workplace

By Lee Hager

Noise measurement and exposure assessment are sometimes overlooked in hearing conservation programs (HCPs) especially in the crush of getting hearing testing completed. This is unfortunate since exposure information is necessary to operate a truly effective program. Let's examine the key questions regarding appropriate noise measurements for the purpose of hearing conservation.

Why do I need noise measurements?

First, noise measurements determine if people exposed to enough noise need to be enrolled in the HCP. OSHA bases that decision on an 8-hour average noise exposure level of 85 decibels (dBA) so it's important to have enough information to know with reasonable certainty that each person in the facility is exposed above or below that amount of noise. OSHA calls the 85 dB[1] time-weighted average (TWA) the "action level."

Second, exposure information is important to determine work-relatedness of the hearing losses detected on industrial audiograms. It's hard for the program's professional supervisor to make a call about whether a hearing loss is related to the job unless they know how much noise is associated with the job. These measurements are also called into play when issues of worker compensation arise and when determining whether or not a hearing loss qualifies as OSHA-recordable. OSHA also requires that the "most recent noise exposure" be recorded on or with each audiogram.

Third, noise-exposure information is important when selecting hearing protection devices (HPDs). OSHA requires that HPDs protect all HCP participants to an effective level of 90 dB TWA, and those who show an standard threshold shift (STS), to 85 dB TWA. Matching HPD performance to workers' noise exposure can assure that they are getting enough protection to prevent hearing loss and help in the selection and fitting of the right HPD for the worker and for the job.

Do I need to measure everybody?

OSHA allows the use of representative personal monitoring. Representative monitoring permits the grouping of people who do similar work and who would be expected to have similar noise exposures into similar exposure groups. Noise exposure is determined for a couple of people in the SEG (similar exposure group) and those results are considered representative of the whole. Many times, this can be accomplished by using existing organizational structures, like departments and job classifications. *The Noise Manual* from AIHA (Berger et al., 2000) is a good source of information about how to select and organize groups for all kinds of workplace monitoring, and how to apply some statistics to make sure that enough people are sampled to provide reliable information.

What kind of equipment is needed to make noise measurements?

A **dosimeter** is a personal noise measurement device. It is typically attached to the worker with the microphone on the workers' shoulder and the worker wears it while doing his or her normal job. Most dosimeters give their results as TWA and/or dose during the time measured and will extrapolate short measurements to full-shift 8-hour equivalents. Many also provide the option of more detailed results, showing sound levels that were measured for increments as small as a minute.

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[1] Often the "A" weighting indicator is dropped from the "dBA" when decibels are used in conjunction with the term "time-weighted average," since in OSHA parlance, TWA implies A-weighting.

OHC Spotlight

A. Sanders, P. Castleberry

Passion is the Key – a Successful Hearing Conservation Program

When asked to explain the key to the success of the hearing conservation program at a Georgia food processing plant, Pam Castleberry, Safety Manager and a CAOHC Certified Occupational Hearing Conservationist (COHC) answered, "You have to make a program fun, or employees will tune you out." Angie Sanders, Manager and also a COHC, believes that role playing and game playing during employee hearing conservation orientation provides an interactive and interesting approach to learning – one that employees will remember and utilize.

The factory, which manufactures condiment packages, has machinery that produces between 90 to 100 dB TWA of noise exposure. These exposures require a solid hearing conservation program. Both of these managers believe that breaking down hearing conservation concepts will help their employees understand why this program is so important to their hearing health.

The "divas" know how to have fun with their program, too, coming to the employee education session wearing T-shirts with "Hearing Conservation Diva" logos and rhinestone tiaras on their head.

Angie and Pam strive for excellence at work and also educate their workforce on non-occupational noise exposures such as auto racing, hunting, lawn mowing and listening to music.

For further information about this program, contact Diane S. DeGaetano, RN BSN COHN-S COHC, the CAOHC representative for the American Association of Occupational Health Nurses (AAOHN), at ***diane.degaetano@merial.com***.

Purchasing Calibration Services

by Deanna Meinke, MA FAAA

Audiometers are designed to produce accurate and consistent test signals, regardless of the setting where the industrial hearing test is conducted (manufacturing plant, medical office or mobile van service provider, etc.). The equipment must be maintained and calibrated regularly in order to ensure accuracy and consistency over time. Both audiometer calibration and ambient noise level measurement are critical components of an effective hearing conservation program and each are required for regulatory compliance. An occupational hearing conservationist (OHC) is typically the person responsible for purchasing and scheduling these services. So, when should the calibrations be done? What equipment is needed for audiometer calibration? Where should calibration services be performed? Who should an OHC trust to perform these essential duties?

When should calibrations be performed?

Hearing conservation regulations stipulate that audiometers must be calibrated annually[1] or whenever there is a deviation of 10 dB or more on the daily functional equipment check. In addition, ambient noise levels in the test environment must be compliant within allowable levels *at the time of testing*, but there are no absolute timelines specified for documenting these sound level measurements. In general practice, ambient noise measurements are typically performed once a year when the audiometer is calibrated, providing the audiometer is used in a stationary location. In the case of mobile van service providers, ambient noise levels are typically re-measured at each physical location where testing is conducted. It is critical that these measurements be done within a timeframe that is representative of the acoustic environment during actual hearing testing. In other words, do not measure ambient noise levels after everyone has gone home for the day, the air-conditioner is off and the phones are not ringing. If a site cannot achieve sufficiently quiet background noise levels during routine daily activity, then changes need to be made in the test environment. Some test facilities may monitor ambient noise levels on a day-to-day basis using a bioacoustic simulator with the capacity to detect room noise levels that exceed the permissible values. More recently, advances in technology allow for ambient noise measurements to be collected automatically at the time of each hearing test by integrating a sound-level measuring device into computerized audiometers and test rooms. These newer systems continuously monitor background noise levels and can temporarily pause a test when permissible background noise levels are exceeded.

What basic equipment is needed for audiometer calibration?

The couplers used for audiometer calibration are specified in American National Standards Institute (ANSI) *Method for coupler calibration of earphones* (ANSI S3.7-1995 [R2003]). This equipment is often sold and marketed as part of an audiometer calibration "kit".

- A sound level meter (SLM) and octave band filter set with calibration traceability are necessary. Traceability is assured by using calibrated devices to measure the output of earphones whose calibration can be traced back to the National Institute of Standards and Technology (NIST). Without a traceable calibration chain, the measurements made with the audiometer cannot be considered valid. The SLM should be a Type 1 and utilize a microphone compatible with the acoustic coupler and applicable ANSI specifications for the audiometer being calibrated. A Type 1 SLM will provide for greater accuracy in the calibration measurements obtained.
- An acoustic coupler and an "artificial ear" are also used to calibrate earphones. These devices conform to laboratory standards themselves. Different couplers are necessary for supra-aural and insert-type earphones. An earphone cannot be calibrated by simply holding an SLM microphone next to the earphone diaphragm.
- Computer software is available for contemporary audiometer calibration systems. This software will interface with the SLM and record the measurements directly into a database for report generation. This minimizes the chances of data entry or recording errors. On rare occasions, audiometric equipment output levels drift from their intended intensities and minor correction factors may be used to assure valid threshold measurement. The software may automatically calculate these correction factors, create calibration certificates and generate scheduling reports for future calibration services.

Where should calibration services be conducted?

Ideally calibration services should be performed at the same physical location that audiometric testing is done. This affords an opportunity to conduct both audiometer calibration and ambient noise level measurements at the same time. This approach minimizes the time involved and the chances for calibration errors. If equipment is shipped to a different geographical region for calibration, the audiometer may not calibrate exactly the same at the distant locale and the OHC's test facility. This situation may arise if there are significant differences in altitude or the earphones/audiometer are damaged in return transit. Obviously, the ship-to-calibrate approach will not include measurement of ambient noise levels, so this would have to be arranged through a separate local service provider.

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[1]Occupational Safety and Health Administration (OSHA) 1910.95 specifies an annual acoustic audiometer calibration and a biennial exhaustive audiometer calibration. In current practice, there are minimal distinctions and negligible time differences between these two types of calibration services. As a best practice, the majority of calibration service providers perform exhaustive calibrations whenever audiometers are calibrated.

Purchasing Calibration Services – *continued from page 4*

Who provides calibration services?
Hearing conservation regulations *do not* stipulate who should perform these critical measurements or how to select reputable service providers. Audiometric equipment manufacturers, mobile testing companies, scientific or biotech measurement laboratories, special instrument distributors, mobile van companies and unaffiliated professionals or individuals, may provide calibration services. It is an unfortunate reality that not all calibration services are equal. In fact, some may use equipment that does not conform to ANSI requirements or provide adequate medical-legal documentation. Following are descriptions of various resources for calibration services:

- Equipment Manufacturers:
  An OHC may opt to ship their audiometer back to the original manufacturer for annual calibrations. This is a viable option and audiometer manufacturers typically have stringent quality assurance processes in place. They are also able to repair the equipment immediately if any problems are detected. Typically, audiometers are calibrated for the geographical elevation of the service provider. When shipping audiometers, beware of altitude shifts of more than 4000 feet as this can distort the results. Because there are fewer air molecules at higher altitudes the overall output of the audiometer has to be greater when used at high altitudes. This is most evident at frequencies above 3000 Hz.
- Mobile Testing Service Providers:
  Occasionally, larger mobile van companies employ their own special equipment technicians/staff to handle calibrations for their fleet. In some cases, these companies may offer calibration services to others in their home office area for a fee or by servicing audiometers shipped to their facility. In most cases, these individuals are well trained and familiar with calibration processes and documentation. These technicians are more likely to be familiar with only one or two audiometer manufacturers since most mobile vans utilize the same audiometric equipment throughout their fleet.
- Scientific or Biotech Measurement Laboratories:
  In some instances a measurement laboratory may offer acoustic calibration services, including audiometer calibrations. In some parts of the world there may be national regulations for acoustic calibrations and certification of equipment is mandated from a certified laboratory or traceable back to a certified lab. Measurement laboratories are less commonly used for audiometer calibrations in the U.S.
- Special Instrument Distributors (SID):
  These are commercial sales and service providers. A special instrument distributor will be familiar with a variety of audiometers and is usually factory trained in repair and calibration specific to each audiometer make and model. In many cases, this may be the manufacturer-authorized distributor from which you originally purchased your audiometer, sound-booth and/or audiometric software. These SID providers travel to your test facility and usually perform both the audiometer calibration and ambient noise measurements at the same time. By using manufacturer-authorized service providers, the OHC is also assuring that proper state and federal licensing are maintained for persons selling and servicing medical devices and that audiometer warranties are not voided in the process of calibration.

  In 1998, a group of SIDs formed the National Association of Special Equipment Distributors (NASED) in order to promote reputable calibration services. Member businesses adhere to the following voluntary standards:

  - Employ technicians who are trained and monitored to ensure their knowledge as well as skills.
  - Verify the accuracy and traceability of the calibration measuring devices in use.
  - Supply complete and accurate documentation to maintain records and support valid medical-legal decisions.

  The skill of the service technicians is assessed with a written and practicum certification exam. For NASED companies, the initial application and annual renewal of membership requires documenting compliance with these voluntary standards. NASED member companies may be located by accessing directory information at **www.nased.com**
- Unaffiliated professionals or individuals:
  This may be a local electronics technician, college professor, audiologist, industrial hygienist, occupational nurse, OHC or an individual entrepreneur. These service providers typically work independently or they may "moonlight" by providing this service separately from their regular employment responsibilities. The quality of calibration services varies greatly among these individuals. Reputable providers use calibrated SLMs, possess traceable calibration records, have been expertly trained and provide high-quality services and documentation. At the other extreme are providers that may use inadequate instrumentation (e.g., the wrong type of SLM or a SLM out of calibration), perform the calibration incorrectly, reference an incorrect calibration standard or provide incomplete documentation.

Unfortunately, a consumer has no means of objectively evaluating the expertise and quality of calibration service providers, with the exception of NASED. So, how might you recognize if your calibration services and documentation are adequate? The following questions are designed to help you critique your service provider and the documentation you receive from them:

- Does your service provider contact you prior to the date of calibration expiration to arrange re-calibration services?

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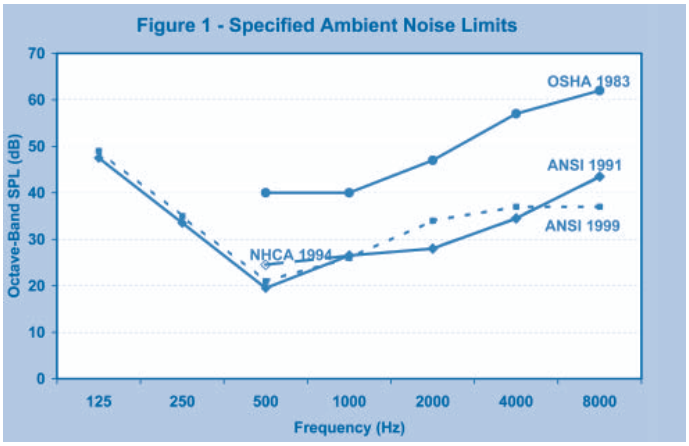
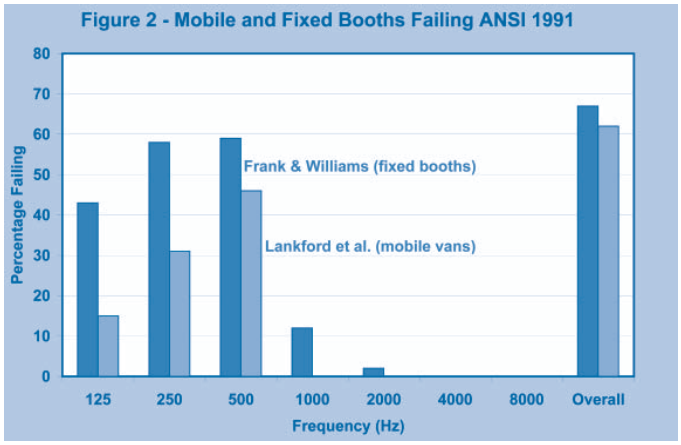
The MPANLs are shown in Figure 1 where they are compared to the 1991 ANSI standard as well as to NHCA (1994) and the OSHA (1983) regulation. Note the two ANSI standards agree within a decibel or so except at 2 and 8 kHz. The NHCA values are identical to the 1991 ANSI standard except for a 5-dB allowance at 500 Hz, to recognize the problems of meeting that requirement and the relatively lower importance of accurate threshold determinations at that frequency. The OSHA values, based on socio-political compromise, are 13 to 25 dB above the ANSI 1999 values, in particular 19-dB higher at the key masking frequency of 500 Hz. The inappropriateness of the OSHA values was verified experimentally by Berger and Killion (1989) who demonstrated that levels as high as those permitted by OSHA did indeed mask thresholds at all of the OSHA-required audiometric test frequencies by at least 12 dB.



The crux of the real-world issue is shown in Figure 2 which presents the percentage of industrial test booths in mobile vans (Lankford et al., 1999; 13 booths) and in fixed facilities (Frank and Williams, 1994; 490 booths) that fail to comply with allowable limits. Note that at the worst-case test frequency of 500 Hz, 46 – 59% of the rooms fail to meet the requirement. According to Lankford et al., all of the rooms would pass the NHCA requirement at that frequency due to the 5-dB allowance. Frank and Williams did not evaluate the NHCA criteria (which appeared subsequent to their paper), but a 5-dB adjustment at 500 Hz would still leave some of the rooms evaluated by Frank and Williams in non-compliance.



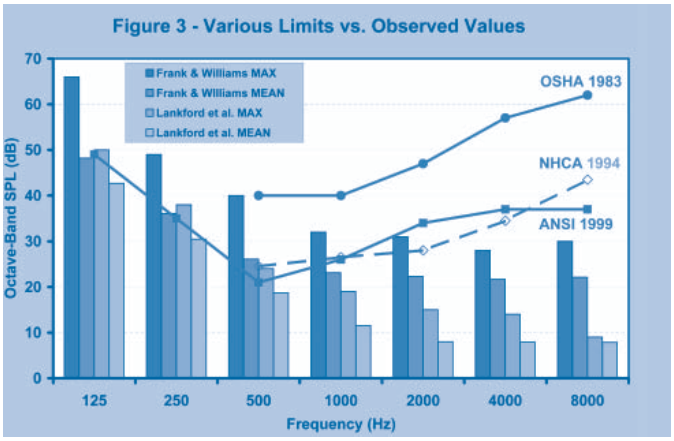


Figure 3 presents the field data vs. the NHCA, current ANSI, and OSHA values. Clearly some booths have problems, especially if the ANSI data were applied as intended, and levels at 125 and 250 Hz are also considered.

One reaction to these results might be to say the ANSI values are unreasonable. However, that suggestion is unsupported by the data. The ANSI values represent reality, and actually the facts are even worse than the data presented thus far indicate. A key component of the ANSI predictions is the level of attenuation of ambient noise that is presumed for the supra-aural test earphones. Although the estimates are based upon reliable real-ear attenuation data averaged across several studies, the values used are mean attenuation data. Normally when evaluating devices that block sound, such as hearing protectors, the mean attenuation values less one or two standard deviations are those that are applied. This indicates what either 84% or 98%, respectively, of the population will achieve under those test conditions. In keeping with such thinking the attenuation values used for the derivation of the MPANLs should be reduced by approximately 5 dB (for the 1-standard deviation case) or 10 dB (for the 2-standard deviation case). That would directly reduce the MPANLs by the same amount (Clause 5 of S3.1-1999). As is, without that adjustment, many persons who are tested actually obtain less earphone attenuation than suggested and hence experience greater masking than predicted.

Implications

Reality cannot be ignored. The maximum permissible ambient noise levels in the standard must be met if thresholds masked by no more than 2 dB are to be measured. Arbitrarily raising the MPANLs to assure that more booths comply simply ignores the facts. If we cannot meet the required levels, the options are as follows:

1) Acknowledge that at lower test frequencies such as 500 Hz, we incur 5- or 10-dB of masking, or in other words that we can only test to hearing threshold levels of 5 or 10 dB at those frequencies, instead of 0 dB. In this case, Clause 5 of the ANSI 1999 standard tells us that the amount by which we are willing to raise the minimum thresholds that we can accurately measure is the exact amount that we can relax the MPANLs to which we must adhere. If we agree that measurement of

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thresholds to a maximum sensitivity of 5 dB is sufficient (with up to 2 dB of masking), then we can add 5 dB to the MPANLs. If we can accept thresholds that are no more sensitive than 10 dB, then we can add 10 dB to the MPANLs.

2) Eliminate, as has been proposed (Stephenson, 2004), testing of 500 Hz in occupational hearing conservation programs, both to save time, and because 500 Hz tells us little about the progression of noise-induced hearing loss.
3) Use audiometric earphones, such as insert earphones, that provide higher levels of ambient noise reduction. In that case, MPANLs can be increased from 13 – 29 dB, with the 29-dB gain occurring at the frequency at which typically the greatest masking occurs due to ambient noise, namely 500 Hz.

References:

ANSI (1960). "Criteria for Background Noise in Audiometer Rooms," American National Standards Institute, S3.1 1960, New York, NY.

ANSI (1977). "Criteria for Permissible Ambient Noise During Audiometric Testing," American National Standards Institute, S3.1 1977, New York, NY.

ANSI (1991). "Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms," American National Standards Institute, S3.1 1991, New York, NY.

ANSI (1999). "Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms," American National Standards Institute, S3.1 1999, New York, NY.

Berger, E. H. and Killion, M. C. (1989). "Comparison of the Noise Attenuation of Three Audiometric Earphones, with Additional Data on Masking Near Threshold," J. *Acoustical Society of America, 86*(4), 1392 1403.

Frank, T. and Williams, D. L. (1994). "Ambient Noise Levels in Industrial Audiometric Test Rooms," *Am. Ind. Hyg. Assoc.* J. *55*(5), 433 437.

Lankford, J. E., Perrone, D. C., and Thunder, T. (1999). "Ambient Noise Levels in Mobile Audiometric Testing Facilities," *Am. Assoc. Occup. Health Nurs.* J. *47*(4), 163 167.

NHCA (1994). "Comments and Recommendations on Noise and Hearing Conservation Regulations," submitted November, 1994 by the NHCA and the American Speech-Language Hearing Association (ASHA).

OSHA (1983). "Occupational Noise Exposure; Hearing Conservation Amendment; Final Rule." U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR 1910.95 *Federal Register 48(46), 9738-9785.*

Stephenson (2004). "Is Testing 500 Hz Necessary When Monitoring for Occupational Hearing Loss?," *Spectrum (1)*, Suppl.1, 25-26.

Elliott Berger is the Senior Scientist, Auditory Research for E-A-R /Aearo Technologies, Indianapolis, IN. He has authored over 60 journal and magazine articles, hearing-protection chapters in eight text books, the on-going EARLog Series, and was the principal editor for the 4th and 5th editions of the American Industrial Hygiene Association's Noise Manual, and is the editor of the 4th edition of the CAOHC Hearing Conservation Manual. He may be contacted via e-mail at: eberger@compuserve.com.

CAOHC Course Director Celebrates Anniversary

George R. Cook, AuD CCC-A

The first course I remember participating in was in 1969 for the Maryland Industrial Nurses Association. At that time, we gave instructions such as, "Turn the audiometer on at least 20 minutes before testing to give the tubes time to warm up." When the decision was made to create a certification process and standard curriculum in the early 1970's – and I was there – the Council for Accreditation in Occupational Hearing Conservation (CAOHC) was formed. The Council has been adding certified techicians and tweaking content ever since.

A lot has changed in 35 years. The review of hearing tests began with 'truckloads' of paper. Today the workload for recordkeeping has been reduced to a few hours a week by utilizing technology. In 1969, we lugged 20-pound octave-band analyzers, performing three sets of readings for each work position in order to calculate noise exposure. Now, hand-held meters and wireless noise dosimeter devices are state-of-the-art for measuring noise exposures. Plant populations have changed, too, and the work environment is cleaner and safer since many companies have successful hearing conservation programs.

Over the years I have continuously taught CAOHC courses for OHCs. I estimate that I have participated in or directed training for an average of 180 students each year, making a total of newly trained or 'refreshed' up to 6,000 students! Often I have thought that I would rather have quality as my claim to fame, not just longevity and volume. However, at this stage, any attention is appreciated.

Dr. Cook is an audiologist with Workplace Group in Greensboro, North Carolina. He has been a CAOHC Course Director since 1973 and can be reached at: ***gcook@workplacegroup.net***

Professional Supervisor Courses scheduled for Spring 2006

Audiologists and physicians who take on supervision of audiometric testing in hearing conservation programs should be competent in "best practices" of hearing conservation. The CAOHC Council will present a course titled: "The Professional Supervisor of the Audiometric Monitoring Component of Hearing Conservation Programs" prior to the American Academy of Audiology (AAA) convention on Wednesday, April 5, 2006 in Minneapolis, Minnesota. This course is directed to audiologists. Attendees will receive continuing education credits, a copy of the *Hearing Conservation Manual 4th Edition*, and unique training materials. Registration will be available online at: **www.caohc.org/**or contact Barbara Lechner at **info@caohc.org.**

A similar course for physicians will be conducted by CAOHC and sponsored through the American College of Occupational & Environmental Medicine (ACOEM) at the American Occupational Health Conference (AOHC) on Tuesday, May 9, 2006 in Los Angeles, California. You'll find registration information at ACOEM's site. **www.acoem.org.**

OHC Corner–Noise Measurements in the Workplace – ***continued from page 3***

Sound level meters are designed for hand-held noise measurement applications. Some measure instantaneous sound levels only; others integrate sounds over time like a dosimeter. Many instruments are designed to be used as either a dosimeter or a sound level meter. Make sure that the instruments, meet the most current revision of the pertinent ANSI standards, ANSI S1.4 for sound level meters and ANSI S1.25 for dosimeters. Instruments should always be checked for proper function before they are used each day, with field calibration performed according to the manufacturer's guidelines. Instruments are to be factory calibrated according to manufacturer's recommendations.

What kind of measurements do I need and for how long should I measure the noise?

OSHA requires representative personal monitoring for compliance. That means that the noise measured must be related to the worker, not to an area or location. Long-term, personal exposure data can be obtained by using a dosimeter or a sound level meters and combinations of time-on-task measurements, or task-based exposure assessment models.

For a full shift, starting at clock-in and stopping at clock-out, many use dosimeter sampling. For jobs that are repetitive in nature, shorter sampling periods may be appropriate – using half-shift samples, for example, to represent the exposure for jobs that are the same in the morning and afternoon. This method could allow the collection of twice as many samples. As a caution, make sure that there are no early or late special tasks (clean-up, for example) that might be noisier than the rest of the job.

To determine a time-on-task exposure assessment: first, find out what a worker does during their workday and how long they do it. Second, measure the noise related to each of the tasks then use a simple formula, demonstrated in examples 1 & 2 above, to extrapolate the 8-hour TWA.

Example 1:
8 hours exposure at 88 dBA = 76% dose = 88 dBA TWA - **NO HEARING PROTECTION REQUIRED BY OSHA** (unless worker has STS)

12 hours exposure at 88 dBA = 114% dose = 90.9 dBA TWA - **HEARING PROTECTION PROGRAM REQUIRED BY OSHA**

Even though sound levels never exceeded 90 dBA, the longer duration of exposure resulted in greater than 100% dose, and equated to higher dBA TWA requiring hearing protection.

Example 2:
Based on 8-hour shift, half the shift at 80 dBA and half at 85 dBA
4 hours at 80 dBA = 12.5% dose + 4 hours at 85 dBA = 25% dose
Total 8 hour dose = 37.5% = 82.9 dBA TWA - **NO HEARING CONSERVATION PROGRAM REQUIRED**

Same job on 12 hour shift
6 hours at 80 dBA = 19% dose + 6 hours at 85 dBA = 38% dose
Total 12 hour dose = 56% = 85.8 dB TWA - **HEARING CONSERVATION PROGRAM REQUIRED**
Change in time of exposure was enough to require HCP inclusion solely based on longer shift.

What's a noise dose?

Dose is a way to express the amount of noise exposure. Keep in mind that noise exposure is a function of noise level and time. OSHA considers 8 hours at 90 dBA to be 100% of the allowable noise dose (without HPDs), and they assume that the risk associated with noise exposure doubles with each 5-dB increase in sound level.

Considering levels less than 90 dBA makes:

a. 8 hours at 85 dB a 50% dose
b. 16 hours at 85 dB a 100% dose
c. 8 hours at 95 dB a 200% dose; and so on

Dose can be a useful metric to help communicate relationship between time and noise level, and is especially useful when working with other than 8-hour shifts.

What happens when work shifts change?

Exposure may be expressed as an 8-hour equivalent, but the full work shift must be taken into consideration as well as reflect the full typical workday, even if it is longer than 8 hours. The noise sample needs to be long enough to capture everything the worker does on the job in appropriate proportion and capture the true average sound level of the event being measured. This typically means three to five iterations of a short task with sound levels that vary slightly, or longer measurements if more variability is found in sound level. Generally speaking, each hour over 8 adds about 1 dB to TWA. This effect works in the opposite direction as well.

How long must I keep noise exposure records?

The specific OSHA requirement for keeping noise surveys is two years. However, OSHA also requires that the "most recent noise exposure" be recorded with or on the audiogram, and the requirements for hearing test record retention are far more stringent. Exposure records could have important uses down the road for helping with audiometric interpretation and worker compensation cases. Most professionals suggest that record retention policies for noise exposure data be the same as for the audiometric data – up to the duration of employment plus 30 years.

How can I use noise measurements to help my hearing conservation program?

In addition to the applications above, many people use some basic analysis of their noise surveys to measure some aspects of how well the HCP is working. Keeping track of the number of people exposed at various levels, and looking at how those numbers trend over time, can be a useful tool to determine how well the noise control aspects of the program are working. Tracking the number of noise exposed workers is useful as well for assisting with resource allotment, budgeting, and similar administrative program functions.

Noise measurement is a key part of any effective hearing conservation program. With a little attention to detail and the right approach, this information can serve as the basis for managing the program overall.

Reference:

Berger, E. H., Royster, L. H., Royster, J. D., Driscoll, D. P., & Layne, M. (2000). *The Noise Manual, 5th edition*, American Industrial Hygiene Association, Fairfax, VA.

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Purchasing Calibration Services – *continued from page 5*

- Do you receive other sound-level documentation besides a generic "certificate" of calibration?
- Are the results recorded on a standardized calibration form?
- Is the audiometer accurately identified in terms of Make/Model/Serial Number?
- Are actual test values recorded rather than just a series of checked boxes?
- Are the ANSI references used for the calibration specified?
- Are the earphone serial numbers noted?
- Is the sound measuring instrumentation used for the calibration services specified? (The make/model/serial number and date of last calibration should be evident).
- Can you read the date of calibration and the name of the individual performing the calibration?
- Does your service provider maintain file copies of all calibrations performed?
- Were any calibration adjustments or equipment repairs noted on the calibration forms? Specifically, if adjustments were made the vendor should provide "as received" and "as adjusted" values.
- Does the calibration record indicate actual ambient noise levels in the test room or booth and indicate if they satisfy the minimum standards?
- Did the service provider inspect the sound booth lights, fans and door seals?

"Yes" responses to the above questions are positive quality indicators. A sample calibration form is provided for your reference in Figure 1. If you suspect the quality of your calibrations is questionable, then discuss your concerns with a NASED-compliant vendor or the audiometer/sound booth manufacturer. In most cases, they will be familiar with reputable service providers in your local area and can help guide you to higher quality services. Copies of the calibration documentation should also be provided to the person responsible for supervising the hearing conservation program (HCP) and the Professional Supervisor of the Audiometric Portion of the HCP, who must be a physician or audiologist, providing audiogram review [these may be the same person]. These professionals are another resource to consult regarding the adequacy of the calibration services and to objectively evaluate the documentation purchased by your facility.

Careful attention to the background noise levels in the test environment and the performance of audiometer calibration services will positively impact the quality and effectiveness of the hearing conservation program. Ultimately, it will help establish the credibility of the audiometric testing program and generate respect for the OHC from plant employees and management.

Appreciation is extended to Rod Warembourg of MSR West, Inc., Chick Clemen of Gordon N. Stowe and Associates, Inc. and Nate Hancock of Medical Technologies, Inc. in the preparation of this article.

References:

ANSI (1995). "Method for coupler calibration of earphones," Am. Natl.Stds. Inst., S3.7-1995[R2003]. Acoustical Society of America, New York, NY.

OSHA (1983). "Occupational Noise Exposure: Hearing Conservation Amendment; Final Rule." U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR 1910.95, 48 *Federal Register* 9776-9785.

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Figure 1 – Sample calibration form

FREQUENCY IN HERTZ			DISTORTION -30 dB re 3% THD	PHONES				NBM (SPL) ATT. POSIT 70 dB	PHONES		BONE DEVIATION		SOUND FIELD WARBLE at ___° incidence		ATTENUATOR LINEARITY			Sound Room Calibration
NOMINAL	Channel 1 of Right	Channel 2 of Left		CHANNEL 1		CHANNEL 2												SOUND ROOM AMBIENT NOISE
				Left	Right	Left	Right				Ch. 1	Ch. 2	Left	Right	Dial	Ch. 1	Ch. 2	FREQ. / INSIDE
125															120			
250															110			
500															100			125
750															90			250
1000															80			500
1500															REF 70			1000
2000															60			2000
3000															50			4000
4000															40			8000
6000															30			
8000															20			
10000															10			
12000															0			

WHITE NOISE (ATT. 70 dB) . . . . . dB
MASKING (ATT. 70 dB) . . . . . dB
SPEECH NOISE (ATT. 70 dB) . . . . . dB
SISI IdB . . . . . 2 dB . . . . . 5 dB . . . . . .

Owner: _____
Address: _____
Make of Audiometer: _____
Model Number: _____
Serial Number: _____
Earphone Type: _____ LT # _____ RT # _____
Insert Type _____ LT # _____ RT # _____
Bone Vibrator: Type _____ S/N _____

RISE TIME	ms
OVERSHOOT	dB
FALL TIME	ms
PULSE WIDTH	ms
CROSS TALK	dB

COMMENTS

	Pass	Fail
Other Unwanted Sound	____	____
Shock Hazard	____	____
Stability	____	____
Purity of Tones	____	____
Acoustical Fidelity	____	____

SPEECH CALIBRATION
1. KHz INPUT. ATTN SET TO 70 dB HTL

	CHAN 1	CHAN 2
LEFT		
RIGHT		
SPKR.		
TAPE/CD		
BONE		
INSERT		

TEST EQUIPMENT

UPCOMING OHC CERTIFICATION AND RECERTIFICATION COURSES* 2006

*The listed dates indicate day one of the scheduled classes; certification courses are 20 hours in length; recertification classes are 8 hours.

Current as of February 2006 (for a complete list of courses visit our website at www.caohc.org); for the most current list of courses contact the CAOHC office at 414/276-5338.

Begin Date	State	City	Course Director	Phone
2/28/2006	KS	Lenexa	Diane L. Bachman	913-748-2063
2/28/2006	OH	Cincinnati	John H. Elmore	800-357-5759
2/28/2006	WA	Bellevue	Mary M. McDaniel	206-706-7352
3/1/2006	KS	Lenexa	Diane L. Bachman	913-748-2063
3/1/2006	OH	Toledo	James J. Jerome	317-841-9829
3/1/2006	WA	Bellevue	Mary M. McDaniel	206-706-7352
3/1/2006	TN	Memphis	Robert C. Rhodes	281-492-8250
3/1/2006	MD	Baltimore	Margaret Sasscer	410-646-2121
3/1/2006	ID	Boise	Brek D. Stoker	208-376-3591
3/1/2006	CO	Greeley	Laurie Wells	970-593-6339
3/2/2006	OH	Toledo	James J. Jerome	317-841-9829
3/2/2006	TN	Memphis	Robert C. Rhodes	281-492-8250
3/2/2006	MD	Baltimore	Margaret Sasscer	410-646-2121
3/2/2006	ID	Bosie	Brek D. Stoker	208-376-3591
3/3/2006	IL	Bloomington	Deanna M. Ginder	309-888-8885
3/7/2006	MA	Marlboro	Pamela J. Gordon	860-526-8686
3/7/2006	CA	Sacramento	Kirsten R. McCall	425-254-3833
3/8/2006	IL	Chicago/OakPark	Robert C. Beiter	708-445-7171
3/8/2006	NC	Morrisville	Thomas H. Cameron	919-657-7500
3/8/2006	TX	San Antonio	John H. Elmore	800-357-5759
3/8/2006	MA	Marlboro	Pamela J. Gordon	860-526-8686
3/8/2006	IA	Iowa City	Laura Kauth	563-355-7712
3/8/2006	CA	Sacramento	Kirsten R. McCall	425-254-3833
3/8/2006	PA	Philadelphia	Timothy A. Swisher	412-367-8690
3/9/2006	IL	Chicago/Oak Park	Robert C. Beiter	708-445-7171
3/9/2006	TX	San Antonio	John H. Elmore	800-357-5759
3/9/2006	IA	Iowa City	Laura Kauth	563-355-7712
3/9/2006	PA	Philadelphia	Timothy A. Swisher	412-367-8690
3/13/2006	FL	Tampa	Harvey B. Abrams	727-398-9395
3/13/2006	GA	Atlanta	Herbert J. Greenberg	678-352-0312
3/13/2006	MO	North Kansas City	Linda Kay Ratliff-Hober	816-221-1401
3/14/2006	FL	Tampa	Harvey B. Abrams	727-398-9395
3/14/2006	GA	Atlanta	Herbert J. Greenberg	678-352-0312
3/14/2006	MO	North Kansas City	Linda Kay Ratliff-Hober	816-221-1401
3/14/2006	OH	Cleveland	William K. Wolfe	770-475-2055
3/15/2006	TX	Houston	John H. Elmore	800-357-5759
3/15/2006	NC	Greensboro	Cheryl S. Nadeau	336-834-8775
3/15/2006	AR	Little Rock	Jane Prince	870-972-1166
3/15/2006	TX	Houston	Johnny L. Sanders	281-492-8250
3/15/2006	Puerto Rico	San Juan	Richard Stepkin	856-435-7200
3/15/2006	OH	Cleveland	William K. Wolfe	770-475-2055
3/16/2006	TX	Houston	John H. Elmore	800-357-5759
3/16/2006	AR	Little Rock	Jane Prince	870-972-1166
3/16/2006	TX	Houston	Johnny L. Sanders	281-492-8250
3/16/2006	Puerto Rico	San Juan	Richard Stepkin	856-435-7200
3/20/2006	CA	Anaheim	Charles E. Fankhauser	707-746-6334
3/21/2006	CA	Anaheim	Charles E. Fankhauser	707-746-6334
3/21/2006	MA	Auburn	Steven R. Fournier	508-832-8484
3/21/2006	MI	Farmington	Thomas H. Simpson	313-333-2492
3/22/2006	WI	Brookfield	Edward W. Korabic	262-547-2227
3/22/2006	MI	Farmington	Thomas H. Simpson	313-333-2492
3/22/2006	OH	Cincinnati	Timothy A. Swisher	412-367-8690
3/23/2006	PA	Pittsburgh	Roger M. Angelelli	412-831-0430
3/23/2006	WI	Brookfield	Edward W. Korabic	262-547-2227
3/23/2006	OH	Cincinnati	Timothy A. Swisher	412-367-8690
3/24/2006	PA	Pittsburgh	Roger M. Angelelli	412-831-0430
3/24/2006	SC	Charleston	Stuart L. Cohen	843-797-0275
3/25/2006	SC	Charleston	Stuart L. Cohen	843-797-0275
3/28/2006	CA	Los Angeles	Kathryn M. Deppensmith	281-498-8250
3/29/2006	OR	Portland	Rodney M. Atack	503-614-8465
3/29/2006	IL	Chicago	John H. Elmore	800-357-5759
3/29/2006	TN	Chattanooga	Melette L. Meloy	678-363-9897
3/30/2006	OR	Portland	Rodney M. Atack	503-614-8465
3/30/2006	IL	Chicago	John H. Elmore	800-357-5759
3/30/2006	TN	Chattanooga	Melette L. Meloy	678-363-9897
4/3/2006	OR	Portland	Michael Fairchild	503-259-2686
4/3/2006	OR	Portland	Michael Fairchild	503-259-2686
4/4/2006	PA	Erie	James W. Nutter	814-453-4716
4/5/2006	TN	Memphis	John H. Elmore	800-357--5759
4/5/2006	AL	Birmingham	Georgia W. Holmes	205-934-7178
4/5/2006	KY	Louisville	James J. Jerome	317-841-9829
4/5/2006	PA	Erie	James W. Nutter	814-453-4716
4/5/2006	TX	Dallas	Johnny L. Sanders	281-492-8250
4/5/2006	PA	Pittsburg	Timothy A. Swisher	412-367-8690
4/6/2006	NC	Greensboro	George R. Cook	336-834-8775
4/6/2006	TN	Memphis	John H. Elmore	800-357-5759
4/6/2006	MA	Marlboro	Pamela J. Gordon	860-526-8686
4/6/2006	AL	Birmingham	Georgia W. Holmes	205-934-7178
4/6/2006	KY	Louisville	James J. Jerome	317-841-9829
4/6/2006	TX	Dallas	Johnny L. Sanders	281-492-8250
4/6/2006	PA	Pittsburgh	Timothy A. Swisher	412-367-8690
4/10/2006	ME	Waterville	Anne Louise P. Giroux	207-872-0320
4/10/2006	CT	Shelton	Phyllis L. Sochrin	203-776-4327
4/11/2006	MO	St Louis	Mary E. Aubuchon	314-747-5800
4/11/2006	CT	Shelton	Phyllis L. Sochrin	203-776-4327
4/12/2006	FL	St. Petersburg	Harvey B. Abrams	727-398-9395
4/12/2006	MO	St Louis	Mary E. Aubuchon	314-747-5800
4/12/2006	MA	Auburn	Steven R. Fournier	508-832-8484
4/17/2006	FL	West Palm Beach	Herbert J. Greenberg	678-352-0312
4/18/2006	FL	West Palm Beach	Herbert J. Greenberg	678-352-0312
4/18/2006	LA	Scott	Jim J. Guillory	337-233-3955
4/18/2006	CA	Ontario	Kirsten R. McCall	425-254-3833

R. Danielson, J. Banach

New CAOHC Executive Committee Announced

At the conclusion of the fall 2005 Council meeting in Rosemont, Illinois, Executive Committee members for the 2006/2007 term were announced and James Banach, MBA, was awarded a Chair's gavel in honor of his new duties. Mary McDaniel, MS CCC-A, will continue as Vice Chair; Paul Brownson, MD FACOEM FAAFP, will perform the duties of the Secretary/Treasurer; and Richard Danielson, PhD, will advise the committee in his role as Immediate Past Chair.

Noise Awareness Day – April 26, 2006

International Noise Awareness Day will be held again this year. Information and materials are available on the League for the Hard of Hearing website at: **http://www.lhh.org/noise/index.htm**

New representatives join CAOHC Council

J. Adin Mann III, PhD, is the new representative for the Institute of Noise Control Engineering (INCE) on the CAOHC Council. He is an Associate Professor and the Director of Graduate Education for Mechanical Engineering, Iowa State University. Dr. Mann's technical specialties are noise and vibration control. Much of Dr. Mann's work focuses on developing predictive models of noise. Current activities include cooling fan noise, control valve and piping noise. The goal of the models is to use them to develop noise control solutions in the design stage of products. Dr. Mann specializes in performing experiments to assist in the development of the understanding that serves as the basis for the models. Dr Mann also has experience in assessing the noise environment in industry and laboratory facilities and then developing noise control strategies that meet the required function for the facility and noise control requirements.

He received his doctorate in acoustics from Pennsylvania State University. He is a published author of several scientific articles.

Robert T. Sataloff, MD, DMA, FACS is the new representative for the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS) on the CAOHC Council. Dr. Sataloff is Professor of Otolaryngology at Jefferson Medical College, Thomas Jefferson University in Philadelphia; Chairman of the Department of Otolaryngology Head and Neck Surgery at Graduate Hospital; Adjunct Professor of Otorhinolaryngology Head and Neck Surgery, The University of Pennsylvania; on the faculty of the Academy of Vocal Arts; and Conductor of the Thomas Jefferson University Choir and Orchestra; and Director of the Voice Foundation's Annual Symposium on Care of the Professional Voice.

Dr. Sataloff is also a professional singer and singing teacher. He holds an undergraduate degree from Haverford College in Music Theory and Composition, graduated from Jefferson Medical College, Thomas Jefferson University and received a Doctor of Musical Arts in Voice Performance from Combs College of Music. In addition, he has authored several articles and books, including Occupational Hearing Loss, 3rd Edition, Taylor and Francis, Inc., New York, New York, 2006; in press and served as editor of various publications. Dr. Sataloff's medical practice is limited to care of the professional voice and to otology/neurotology/skull base surgery.

David D. Lee, MIS, CIH, CSP is the new representative for the American Society of Safety Engineers (ASSE). He began his career in safety and industrial hygiene in 1978, and has obtained his Certified Industrial Hygienist (CIH) and Certified Safety Professional (CSP) credentials. Mr. Lee holds a Masters in Industrial Safety (MIS) from the University of Minnesota, Duluth. His professional safety experience includes performing staff safety and industrial hygiene functions for employers in the taconite iron and gold mining industries, industrial hygiene consulting duties with the Nevada State Industrial Insurance System, and at the University of Nevada, Reno where he is currently employed.

David has had two articles on the impact of disabling injuries published in *Professional Safety* - based upon his first-hand living, traveling and working experiences while confined to wheelchair following a sports related injury.

He is a Professional Member of the American Society of Safety Engineers (ASSE) and is a past Vice President of Region II and a former member of their Board of Directors and is also a member of both the American Conference of Governmental Industrial Hygienists (ACGIH) and the American Industrial Hygiene Association (AIHA).

Certification of Professional Supervisors Announced

At their fall 2005 meeting the CAOHC Council announced that a new certification is available for the Professional Supervisor of the Audiometric Portion of the Hearing Conservation Program.

Candidates for this certification must meet the following requirements in order to be certified:

- Hold a current U.S. license as an audiologist or physician
- Complete an application and pay a fee
- Attend a 1-day Professional Supervisor course conducted by CAOHC instructors
- Pass an on-line exam
- Submit a test case

See page 7 for course availability.
Questions may be directed to Barbara Lechner at info@caohc.org

OHC Certification Number

Your certification number and expiration date have been provided to you by the CAOHC office on an official certificate and on a wallet size ID card. For an immediate reminder of your number and expiration date, check your name and address information on the outside back cover of each UPDATE newsletter. Don't forget to notify us when your address has changed.

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79-0106-004

Winter/Spring 2006

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