Dr. Mark Stephenson has served as a Research Audiologist at NIOSH since 1993. He currently directs a NIOSH project that is developing hearing loss prevention programs for the construction industry. Dr. Stephenson joined NIOSH after having completed a 20-year career in the United States Air Force. Dr. Stephenson spent most of his Air Force career at the Aerospace Medical Research Laboratory where he investigated the hazards of noise exposure, hearing protector performance and voice communication during noise. Dr. Stephenson is active in numerous professional organizations. He has served as a President of the Air Force Audiology Association, and Vice President of the National Hearing Conservation Association. He also currently serves as the Chair of the American Academy of Audiology Task Force on Hearing Conservation. Dr. Stephenson is an adjunct professor at the Ohio State University and Miami University where he teaches industrial audiology.

Dr. Stephenson’s presentation highlighted critical elements of the NIOSH Criteria Document on Preventing Occupational Hearing Loss. Dr. Stephenson began by discussing the hierarchy of control methods to prevent hearing loss. The first step is to remove the hazard, in this case noise. Removing the worker from the hazard is the next best choice if the noise cannot be satisfactorily reduced. Finally, protecting the worker by issuing hearing protection devices such as plugs or muffs would be the last choice a company could choose in a hearing loss prevention strategy. These control methods apply to factories as well as construction sites.

Sometimes an argument that people use about hearing loss is that individuals are destined to lose their hearing as they age. However, while hearing ability can decrease over time, it will not decrease as dramatically as it will in individuals who are exposed to high levels of noise. High levels of noise primarily affect hearing in the high frequencies. Dr. Stephenson presented two graphs (figures 1 and 2); one of normal hearing decrements over time, and the second illustrating hearing function decreases in noise-exposed individuals.

Another issue that Dr. Stephenson pointed out relates to the costs associated with hearing loss. Hearing loss prevention in the form of the controls mentioned above is much more cost effective than providing hearing aids to individuals who develop hearing loss severe enough to warrant the wearing of hearing as-
sisting devices. Beyond monetary costs, of course, are the social and psychosocial costs to the individual who has trouble hearing.

Education also plays an important role in preventing hearing loss. As Dr. Stephenson noted, “Without proper training, any hearing protector that can be worn wrong, will be worn wrong!” Some of the reasons people do not wear hearing protection include comfort, convenience, cost, and the perception that important sounds will not be heard if the devices are worn. Improperly fitting or improperly worn hearing protection devices reduce the amount of protection the device will provide as shown in figure 3.

Training workers about the importance of wearing hearing protection must be done in a way that the worker can identify and “buy into.” Without knowing what workers’ concerns and beliefs are, a hearing conservation program that truly protects workers’ hearing cannot be developed and carried out. In other words, talking to the workers is critical to understanding what type of program will work. Dr. Stephenson gave an example of a project (the same one Dr. Murray-Johnson discussed in her part of the presentation) to encourage underground coal miners to wear hearing protection. When asked, the workers cited the following reasons for not wearing hearing protection: comfort (worried about “poking out ear-drums”); communication; convenience (the ear cups are too big on the muffs); and roof talk (protection devices mask the warning sounds that the miners need to be able to hear).

Removing barriers and developing self-efficacy are two things that must be addressed to influence hearing protector use among workers. See figure 4.

The development of an effective program to conserve hearing is a repeated or iterative process which begins with conducting a focus group. The focus group consists of the individuals for whom the hearing conservation program is being developed. The goal of a focus group is to hear first hand the types of concerns and thoughts about how the workers view hearing loss. In addition, a company needs to document noise levels throughout the facility in order to determine what workers or areas are in the highest noise levels. Training programs can then be developed to conserve hearing. Next, it is important to observe if the principles of the program are being adopted by the workers affected by noise. Hearing ability should also be tested to see if anyone continues to lose their hearing. Based on this information, the program may need to be modified or refined periodically.

In essence, holding focus group sessions to identify the perceived barriers to using hearing protection, measuring sound pressure levels and hearing threshold levels, analyzing the audiometric data and observing behaviors are all key parts of developing a program to protect workers’ hearing.

If you would like to know more about what NIOSH is doing to promote hearing conservation, check out their “Noise and Hearing Loss Prevention” web page at: www.cdc.gov/niosh/noise/noisepg.html
Figure 3. Available protection vs. the amount of protection obtained by untrained workers.

- Likely protection as worn by untrained worker.
- Amount of protection hearing protective device advertises it provides.

Figure 4. How Do You Remove Barriers and Develop Workers’ Self-Efficacy?

Removing Barriers and Developing Self-Efficacy Is an Iterative Process

Conduct Focus Groups

- Administer Survey
- Analyze Data
- Develop Training

Observe Behaviors

Analyze Audio-Metric Data

Modify Training

Re-administer Survey

Analyze Data

Measure Sound Pressure Levels (SPLs) & Hearing Threshold Levels (HTLs)
Now Hear This...

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Address service requested.

In this issue:
Third in Three Part Series:
Showcase on preventing NIHL

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Michigan Law Requires the Re-
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Occupational NIHL

Reporting can be done by:
FAX (517) 432-3606
Telephone 1-800-446-7805
E-Mail ODREPORT@ht.msu.edu
Web www.chm.msu.edu/oem
Mail MDCIS Div. of Occ. Health
P.O. Box 30649
Lansing, MI 48909-8149

Suggested Criteria for Reporting
Occupational NIHL
1. A history of significant exposure to noise
   at works; AND
2. A STS of 10dB or more in either ear at an
   average of 2000, 3000 & 4000 Hz. OR
3. A fixed loss.*
*Suggested definitions: a 25 dB or greater loss
in either ear at an average of: 500, 1000 & 2000
Hz; or 1000, 2000 & 3000 Hz; or 3000, 4000 &
6000 Hz; or a 15 dB or greater loss in either ear
at an average of 3000 & 4000 Hz.