Reconstruction of Employee Noise Exposure History at a Large Automotive Manufacturer

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An ongoing NIOSH study to evaluate hearing loss risk for workers with long term exposure to high noise levels required reconstruction of employee noise exposure history. The following steps which were used for the process of noise exposure reconstruction will be presented.

a) Sound level measurements, documented during plant-wide surveys in 1970-71, and 1985-86, were linked to plant departments based on measurement locations.
b) Based on company documents indicating when plant process or equipment changes occurred, two time periods having different exposure conditions were identified: 1970-84, and 1985-90.
c) Average sound levels for each department were calculated for the two time periods.
d) Work histories for each job code, which included department/job task locations and task times, were developed based on employee interviews and current job code information.
e) Using work history information and calculated department sound levels a time-dependent job exposure matrix was developed for each department/job code combination.

POSTER ABSTRACTS

1. **Reconstruction of Employee Noise Exposure History at a Large Automotive Manufacturer**

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e) Using work history information and calculated department sound levels, a time-dependent job exposure matrix was developed for each department/job code combination.

2. **Hearing Protector Allowing Improved Acoustic Communication**

Joseph G. Desloge, Ph.D., and Patrick M. Zurek, Ph.D.

The aim of this project is to develop an advanced hearing protector that combines maximal attenuation of ambient sounds with signal processing that extracts the most important components of the sound field for controlled presentation to the user. By processing the signals from a microphone array mounted on the headband of the hearing protector, this device enhances desired signals from a specified "look" direction relative to signals from other directions, allowing face-to-face acoustic communication in many high-noise environments where it would be impossible otherwise. In addition, the signal processing is designed to allow the preservation of sound localization ability. Work to date has developed implementations of array-processing algorithms on a portable DSP processor and evaluated their impact on listeners' sound localization and speech reception performance. [Work supported by NIOSH].

3. **Inter-laboratory agreement of S3.19-1974 estimates of hearing protector performance**

Vern Larson, Ph.D.

Even though ANSI S12.6 superseded ANSI S3.19-1974, EPA regulations (40 CFR, Part 211) incorporate the latter into current-day regulations for testing and labeling hearing protectors. This presentation reports the results of a study that retested existing products and compares the results with manufacturer's estimates of 1/3 octave band insertion loss and noise reduction ratings. The data support the assertion that inter-laboratory variability is acceptable when the 'experimenter fit' procedure of ANSI S3.19 is employed.

4. **Reporting 24-h L_{eq}s arising from the nonoccupational noise-exposed population in the 21st century.**

Elizabeth Thompson, B.S., Elliott Berger, M.S., and Nick Hipskind Ph.D.

It has been suggested that both presbycusis and sociocusis play a role in the phenomenon of hearing loss due to age. Since sociocusis can only be studied by obtaining data on societal noise exposure, there is a continued need to evaluate individuals who are not routinely exposed to occupational noise but instead are exposed to societal and recreational noise on a daily basis. Nineteen subjects, living in Bloomington, IN, were asked to "wear" a dosimeter for seven consecutive 24-hour days. Subjects were also given a standard audiometric assessment to establish pure tone thresholds. Furthermore, individuals were asked to record noise events of interest in a small notebook so that they could be used in analysis. The average 24-hr L_{eq} across all subjects was 76 dBA with a range of 73 to 81 dBA.

5. **Hearing Aids + Earmuffs: Safe & Effective within Limits**

Babette L. Verbsky, Ph.D.

Hearing-impaired workers often suffer from reduced speech intelligibility in everyday conversation relative to their normal-hearing counterparts. Hearing aids are the aural rehabilitation tool of choice for many hearing-impaired people. However, in high noise levels, hearing aids are not worn and earmuffs (or other HPDs) further reduce speech intelligibility by further reducing the audibility of the speech signal beyond that of the hearing loss. A quantitative model for the prediction of "safe" amounts of hearing aid gain based on the acoustic environment was developed and tested on an Acoustic Test Fixture (ATF). With hearing aid gain levels set below the maximum acceptable level for the acoustic environment as determined by the model, adult subjects were tested with their own hearing aids worn in combination with each of two passive sets of earmuffs. Speech intelligibility significantly improved over the earmuff only listening condition.

6. **Auditory Risk Assessment of Portable Compact Disc Players**

Brian J. Fligor, Sc.D., CCC-A

This study investigated the output levels of CD players from five different manufacturers using different headphone styles (e.g., inserts, supra-aural). Additionally, the output levels were measured in nine new and nine used units from the same manufacturer. Results using white noise and music indicated all systems were capable of causing noise-induced hearing loss, but the hazard varied according to system and style of headphone used. A hazard-risk assessment for each system was generated based on daily-percentage noise-dose.

7. **A Wireless and Batteryless Communications Earplug**

Thomas von Wiegand, Ph.D.

In order to achieve maximal isolation from environmental sounds it is desirable to simultaneously use earplugs with over-the-ear ANC muffs. A transducer is often incorporated into the earplug to enable the user to receive audio communications while maintain-

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NHCA Mission Statement

The mission of the National Hearing Conservation Association is to prevent hearing loss due to noise and other environmental factors in all sectors of society.