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I. Noise

1. Technical Information

- a. OSHA permits noise exposures up 90 decibels, averaged over an 8-hour period. Noise levels are measured on the A scale of a standard sound level meter and are expressed as dBA.
- b. Paragraph 1910.95(c) of the 1983 Hearing Conservation Amendment to the Occupational Noise Exposure Standard requires employers to administer a continuing, effective hearing conservation program for all employees whose noise exposures equal or exceed an 8-hour TWA (time-weighted average) of 85 dBA or, equivalently, a noise dose that is equal to 50 percent of the PEL. The standard requires that all continuous, intermittent, and impulsive sound levels from 80 dB to 130 dB be included in the measurement of dose. In other words, the threshold level for noise measurement purposes is 80 dB.
- c. Dosimeters can be used to calculate both the continuous equivalent A-weighted sound level (LA) and the 8-hour TWA for the time period sampled.

2. Effects

- a. Auditory Effects
 - i. Chronic noise-induced hearing loss is a permanent sensorineural condition that cannot be treated medically. It is initially characterized by a declining sensitivity to high-frequency sounds, usually at frequencies above 2,000 Hz.
 - ii. Exposure of a person with normal hearing to workplace noise at levels equal to or exceeding the PEL may cause a shift in the worker's hearing threshold. Such a shift is called a standard (or significant) threshold shift and is defined as a change in hearing thresholds of an average 10 dB or more at 2,000, 3,000, and 4,000 Hz in either ear. Workers experiencing significant threshold shifts are required by 29 CFR 1910.95(g)(8) to be fitted with hearing protectors and to be trained in their use.

- b. Extra-auditory Effects. In addition to effects on hearing, noise:

Interferes with speech;

Causes a stress reaction;

Interferes with sleep;

Lowers morale;

Reduces efficiency;

Causes annoyance;

Interferes with concentration; and

Causes fatigue.

c. Noise/Hearing Loss

Noise-induced loss of hearing is an irreversible, sensorineural condition that progresses with exposure. Although hearing ability declines with age (presbycusis) in all populations, exposure to noise produces hearing loss greater than that resulting from the natural aging process. This noise induced loss is caused by damage to nerve cells of the inner ear (cochlea) and, unlike some conductive hearing disorders, cannot be treated medically.

3. Standards

a. Time-weighted average (TWA) noise limits as a function of exposure duration are shown as follows:

Duration of Exposure (hrs/day)	Sound Level – dB(A)		
	ACGIH	NIOSH	OSHA
16	82	82	85
8	85	85	90
4	88	88	95
2	91	91	100
1	94	94	105
1/2	97	97	110
1/4	100	100	115*
1/8	103	103	—

* No exposure to continuous or intermittent noise in excess of 115 dB(A).

** Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

*** No exposure to continuous, intermittent, or impact noise in excess of a peak C-weighted level of 140 dB.

b. The OSHA regulation has an additional action level of 85 dB(A) which stipulates that an employer shall administer a continuing, effective hearing conservation program when the TWA value exceeds the action level. The program must include monitoring, employee notification, observation, an audiometric testing program, hearing protectors, training programs, and recordkeeping requirements.

- c. The OSHA noise standard also states that when workers are exposed to noise levels in excess of the OSHA PEL of 90 dB(A), feasible engineering or administrative controls shall be implemented to reduce the workers' exposure levels. Also, a continuing, effective hearing conservation program shall be implemented.
4. Program Requirements for Occupational Noise Exposure

a. Monitoring

The hearing conservation program requires employers to monitor noise exposure levels in a manner that will accurately identify employees who are exposed to noise at or above 85 decibels (dB) averaged over 8 working hours, or an 8-hour time-weighted average (TWA.) Under this program, employees are entitled to observe monitoring procedures and they must be notified of the results of exposure monitoring. Instruments used for monitoring employee exposures must be carefully checked or calibrated to ensure that the measurements are accurate.

b. Noise – Training Information

Supervisors and exposed workers must become aware of and understand about the adverse effects of noise and how to prevent noise-induced hearing loss. People exposed to hazardous noise must take positive action, if progressive permanent hearing loss is to be prevented. Each exposed worker and supervisor should know the following.

- i. Noise exposure may result in permanent damage to the auditory system and there is no medical or surgical treatment for this type of hearing loss.
- ii. Each person should know how to recognize hazardous noise even if a noise survey has not been conducted and/or warning signs posted.
- iii. Preventing noise-induced hearing loss is accomplished by reducing both the time and intensity of exposure. Reducing exposure time is accomplished by avoiding any unnecessary exposure to loud sound. Reducing intensity is usually accomplished by wearing personal hearing protection. Each person must be able to properly wear and care for the particular type of hearing protection selected.
- iv. Each person must know how to tell if they have been overexposed to loud sound. Overexposure may occur even while wearing hearing protection. Earplugs and/or earmuffs alone may not be enough protection. Each time a temporary threshold shift (TSS) occurs, a certain degree of permanent loss results. The recognizable symptoms of overexposure are described as “dullness in hearing or ringing in the ears.”

c. General Program Management

- i. Deans, Directors, Department Chairs, Principal Investigators, Managers and Supervisors are responsible for ensuring that noise hazards which may contribute to occupational hearing loss in their areas are evaluated.
- ii. Occupational & Environmental Safety is responsible for:
 - 1) Monitoring and evaluating noise sources upon request.

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- 2) Providing training for potentially noise exposed individuals upon request.
- iii. Workers responsibilities include the following:
- 1) Learn about the potential hazards of noise exposure and follow the rules when around or operating noisy equipment.
 - 2) Wear or use prescribed protective equipment.
 - 3) Refrain from operating equipment without proper training or equipment that has safety defects.
 - 4) Attended training sessions for hazardous noise exposures.
 - 5) Be aware of the noise producing capabilities of equipment they are around or use.