Hearing Conservation



INCIDENT

In 2008, Jeff Ammon, 55, began noticing a feeling of pressure in his ears every day after work.

Over the next months, when his symptoms progressed into a slight loss of hearing and sensitivity to noise, he became worried. Ammon, a construction worker for 32 years, eventually started wearing ear protection hoping this would address these complaints – but it was too late.

From that point on, sounds ranging from the hum of a lawnmower to normal tones of conversation caused a piercing, jabbing pain in his inner ear. He stopped working in 2011, when the pain became unbearable. He also hears ringing in his ears and experiences dizziness, both side effects of the auditory damage.

“It’s debilitating … completely,” he said.

Ammon spent almost all of his working life surrounded by the loud noises of jackhammers, saws and air compressors.

Ammon worked for several small construction companies building houses. He said he was never told to wear ear protection. His colleagues didn’t wear it either. No one talked about it and, even when he worked with loud equipment, he wasn’t aware of the need for ear protection.

He applied for Social Security disability benefits but was rejected because his condition was not on the Social Security Administration’s list of medical diseases considered disabling. When he first experienced his symptoms, he visited dozens of audiologists who only told him he had slight hearing loss. Research linking hyperacusis – unusual tolerance toward ordinary sounds – and pain was only at its infancy. Specific treatments still are not available for people with this type of hearing damage.

These days, he experiments with new medications or therapies, hoping for more awareness about the illness – and about protecting hearing at the workplace. He is waiting for the third appeal for Social Security disability benefits.

“I’m hearing a little more about it, but not nearly enough,” he said. “And it needs to start at the workplace.”

Now he avoids going outdoors, choosing instead to stay in his soundproof basement in

Lebanon, Pa., and communicate with his doctor mostly through an online patient portal.

“The medication to address pain has not been very successful at all. … I’m also on some medication for stress, anxiety and depression,” he said. “It has isolated me from society.”

NEED TO KNOW

Noise, or unwanted sound, is one of the most pervasive occupational health problems. It is a by-product of many industrial processes. Sound consists of pressure changes in a medium (usually air), caused by vibration or turbulence. These pressure changes produce waves emanating away from the turbulent or vibrating source. Exposure to high levels of noise causes hearing loss and may cause other harmful health effects as well. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure.

Noise-induced hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after period of rest. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage.
OSHA’s Hearing Conservation Program is designed to protect workers with significant occupational noise exposures from hearing impairment even if they are subject to such noise exposures over their entire working lifetimes.

What monitoring is required?

The **Hearing Conservation Program** requires employers to monitor noise exposure levels in a way that accurately identifies employees exposed to noise at or above 85 decibels (dB) averaged over 8 working hours, or an 8-hour time-weighted average (TWA). Employers must monitor all employees whose noise exposure is equivalent to or greater than a noise exposure received in 8 hours where the noise level is constantly 85 dB. The exposure measurement must include all continuous, intermittent, and impulsive noise within an 80 dB to 130 dB range and must be taken during a typical work situation. This requirement is performance-oriented because it allows employers to choose the monitoring method that best suits each individual situation.

Employers must repeat monitoring whenever changes in production, process, or controls increase noise exposure.

Employees are entitled to observe monitoring procedures and must receive notification of the results of exposure monitoring. The method used to notify employees is left to the employer’s discretion.

Employers must carefully check or calibrate instruments used for monitoring employee exposures to ensure that the measurements are accurate. Calibration procedures are unique to specific instruments. Employers should follow the manufacturer’s instructions to determine when and how extensively to calibrate the instrument.

What is audiometric testing?

The employer must establish and maintain an audiometric testing program. The important elements of the program include baseline audiograms, annual audiograms, training, and follow-up procedures. Employers must make audiometric testing available at no cost to all employees who are exposed to an action level of 85 dB or above, measured as an 8-hour TWA.

The audiometric testing program follow-up should indicate whether the employer’s

hearing conservation program is preventing hearing loss. A licensed or certified audiologist, otolaryngologist, or another physician must be responsible for the program. Both professionals and trained technicians may conduct audiometric testing.

What is a baseline audiogram?

The baseline audiogram is the reference audiogram against which future audiograms are compared. Employers must provide baseline audiograms within 6 months of an employee's first exposure at or above an 8-hour TWA of 85 dB. An exception is allowed when the employer uses a mobile test van for audiograms. In these instances, baseline audiograms must be completed within 1 year after an employee's first exposure to workplace noise at or above a TWA of 85 dB. Employees, however, must be fitted with, issued, and required to wear hearing protectors whenever they are exposed to noise levels above a TWA of 85 dB for any period exceeding 6 months after their first exposure until the baseline audiogram is conducted.

What are annual audiograms?

Employers must provide annual audiograms within 1 year of the baseline. It is important to test workers' hearing annually to identify deterioration in their hearing ability as early as possible. This enables employers to initiate protective follow-up measures before hearing loss progresses. Employers must compare annual audiograms to baseline audiograms to determine whether the audiogram is valid and whether the employee has lost hearing ability or experienced a standard threshold shift (STS). An STS is an average shift in either ear of 10 dB or more at 2,000, 3,000, and 4,000 hertz.

What is an employer required to do following an audiogram evaluation?

The employer must fit or refit any employee showing an STS with adequate hearing protectors, show the employee how to use them, and require the employee to wear them. Employers must notify employees within 21 days after the determination that their audiometric test results show an STS. Some employees with an STS may need further testing if the professional determines that their test results are questionable or if they have an ear problem thought to be caused or aggravated by wearing hearing protectors. If the suspected medical problem is not thought to be related to wearing hearing protection, the employer must advise the employee to see a physician. If subsequent audiometric tests show that the STS identified on a previous audiogram is not persistent, employees whose exposure to noise is less than a TWA of 90 dB may stop wearing hearing protectors.

The employer may substitute an annual audiogram for the original baseline audiogram if the professional supervising the audiometric program determines that the employee's STS is persistent. The employer must retain the original baseline audiogram, however, for the length of the employee's employment. This substitution will ensure that the same shift is not repeatedly identified. The professional also may decide to revise the baseline audiogram if the employee's hearing improves. This will ensure that the baseline reflects actual hearing thresholds to the extent possible. Employers must conduct audiometric tests in a room meeting specific background levels and with calibrated audiometers that meet American National Standard Institute (ANSI) specifications of SC-1969.

When is an employer required to provide hearing protectors?

Employers must provide hearing protectors to all workers exposed to 8-hour TWA noise levels of 85 dB or above. This requirement ensures that employees have access to protectors before they experience any hearing loss.

Employees must wear hearing protectors:

- For any period exceeding 6 months from the time they are first exposed to 8-hour TWA noise levels of 85 dB or above, until they receive their baseline audiograms if these tests are delayed due to mobile test van scheduling;
- If they have incurred standard threshold shifts that demonstrate they are susceptible to noise; and
- If they are exposed to noise over the permissible exposure limit of 90 dB over an 8-hour TWA.

Employers must provide employees with a selection of at least one variety of hearing plug and one variety of hearing muff. Employees should decide, with the help of a person trained to fit hearing protectors, which size and type protector is most suitable for the working environment. The protector selected should be comfortable to wear and offer sufficient protection to prevent hearing loss.

Hearing protectors must adequately reduce the noise level for each employee's work environment. Most employers use the Noise Reduction Rating (NRR) that represents the protector's ability to reduce noise under ideal laboratory conditions. The employer then adjusts the NRR to reflect noise reduction in the actual working environment.

The employer must reevaluate the suitability of the employee's hearing protector whenever a change in working conditions may make it inadequate. If workplace noise levels increase, employees must give employees more effective protectors. The protector must reduce employee exposures to at least 90 dB and to 85 dB when an STS already has occurred in the worker's hearing. Employers must show employees how to use and care for their protectors and supervise them on the job to ensure that they continue to wear them correctly.

Training

Employee training is very important. Workers who understand the reasons for the hearing conservation programs and the need to protect their hearing will be more motivated to wear their protectors and take audiometric tests. Employers must train employees exposed to TWAs of 85 dB and above at least annually in the effects of noise; the purpose, advantages, and disadvantages of various types of hearing protectors; the selection, fit, and care of protectors; and the purpose and procedures of audiometric testing.

BUSINESS / REGULATION

OSHA adopted regulations requiring employers to create a **Hearing Conservation Program** in situations where workers are exposed to a time-weighted average noise level of 85 A-weighted decibels (dBA) or higher throughout an eight-hour shift.

These **Hearing Conservation Programs** require employers to measure noise levels, provide free annual hearing exams and free hearing protection, provide training, and conduct evaluations of the adequacy of the hearing protection equipment unless changes to tools, equipment and schedules are made to reduce exposure below the 85-dBA level.

OSHA's maximum permissible (as opposed to day-long average) exposure limit is 90 dBA for all workers for an eight-hour day. In addition, the OSHA standard employs a 5-dBA exchange rate. This means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half.

Federal regulations require employers to operate an effective **Hearing Conservation**

Program (HCP) for people working in hazardous noise. However, even with specific rules and recommendations to guide them, employers may struggle to be pro-active and able to prevent occurrences of noise-induced hearing loss. This webinar will address some common reasons for HCP ineffectiveness and offer tools and recommendations for improving the management of HCPs. This webinar is designed for all persons who play a role in delivering hearing loss prevention services in the workplace.

The **Labor Department** launched a challenge called "Hear and Now," in which it is soliciting pitches for innovative ideas and technology to better alert workers of hazardous noise levels.

But critics say that while these efforts might help, technology to reduce hearing injuries already exists. They contend that the maximum level of noise exposure allowed before employers are required to provide sound-protection equipment is too low, and the regulations developed by **the Occupational Safety and Health Administration** are outdated. For example, those regulations use sound level limits that don't factor in the noise exposures that occur beyond the workplace – at restaurants, concerts and sporting venues, for instance – that can add to workers' cumulative risks of harm.

According to **OSHA officials**, the agency will issue a request for information about current regulations at construction sites to figure out if more stringent protections are needed and how companies are complying.

Employers may also have to shoulder the responsibility of instilling more awareness and education among their workers. For example, workers sometimes choose not to wear hearing protection at work sites because they are not aware of their risks – especially when they are not operating loud equipment.

Mark Cullen, a professor at Stanford University who explores workplace hazards, found in a study that "at very high noise exposures, people very faithfully wear hearing protection and at low noise situations, people don't.

For general industry workers who are exposed to noise for eight hours a day at or above a time-weighted average of 85 decibels, **OSHA** requires employers to provide notification, audiometric testing and free hearing protectors. Employers also have to offer training programs for affected workers. The limit is 90 decibels for an eight-hour exposure for construction industry workers.

Cullen said employers could build noise barriers or eliminate noisy equipment, but old factories often choose to just offer hearing protection gear.

STATISTICS

Noise-induced hearing loss is a serious and preventable workplace and off-the-job hazard. Here are seven statistics relating to this problem.

1. Four million American workers who go to work each day are exposed to damaging noise levels. (NIOSH)
2. A WorkSafeBC study found that 25 percent of young people entering the workforce showed early signs of hearing loss, with a further 4.6 percent showing abnormal hearing test results.
3. In 2007, approximately 82 percent of occupational hearing loss cases were reported among workers in the manufacturing sector. (NIOSH)
4. The two most common causes of hearing loss are noise-induced hearing loss and age-related hearing loss.
5. Noise-induced hearing loss is the number one occupational disease in North

America. (Workplace Medical Corp.)
6. **A Comprehensive Hearing Conservation program** consists of these seven elements: noise measurement; education and training; engineered noise control; hearing protection devices; the posting of signs warning of noise hazards and the need for hearing PPE; annual hearing tests; and an annual program review.
7. Noise above 90 decibels (dBs) can cause hearing loss, especially when the exposure lasts for an extended period of time. (Bureau of Labor Statistics).

Occupational Hearing Loss

- The National Institute for Occupational Safety and Health (NIOSH) recommends that workers are not exposed to noise at a level that amounts to more than 85 decibels (dBA) over 8 continuous hours.
- NIOSH estimates that 30 million U.S. workers are exposed to noise levels high enough to cause irreversible hearing loss.
- According to the U.S. Bureau of Labor Statistics, more than 20,000 workplace hearing loss cases occur annually, many resulting in permanent hearing loss.
- An estimated 24% of hearing loss in the United States has been attributed to workplace exposure, according to the Centers for Disease Control

Employment and Economic Costs

- 48% of people who have hearing loss were employed in 2014, but about the same amount (47%) are not in the labor force.
- Adults with hearing loss are more likely to have lower education, lower income, and be unemployment or underemployment, compared with their typical-hearing peers.
- Individuals with hearing loss also experience greater difficulties in employment transition and career development, compared with those with typical hearing.
- Untreated hearing loss can decrease one’s annual income by as much as $30,000. The yearly cost to society is estimated to be as high as $26 billion in unrealized federal taxes; and an estimated aggregate yearly income loss of $176 billion due to underemployment.
- For those who did collect an income, individuals with hearing loss made about 25% less; their mean wage was $23,481, compared with $31,272 for typical-hearing peers.
- Hearing aids were shown to reduce the risk of income loss by 90 to 100% for those with milder hearing loss, and from 65 to 77% for those with moderate to severe hearing loss.

Untreated hearing loss shows a higher rate of unemployment:

- Those with severe hearing loss had an unemployment rate (15.6%) double that of the typical-hearing population (7.8%), and nearly double that of their peers (8.3%) who use hearing aids. (BHI)

PREVENTION

1. **The essential parts of a Hearing Conservation Program are as follows:**

- Identify and assess areas and activities where employees may be exposed to:
  - high noise levels that may exceed 85 decibels (dBA) averaged over an eight-hour period,
  - extreme noise levels of 115 dBA at any time (greater than one second)
  - extreme impact noise levels of 140 dBC (less than one second)
  - Reduce or control noise using engineering and administrative controls, where feasible.

    - Post signs at noisy areas and require hearing protectors.
    - Identify employees who need hearing protection.
- Provide hearing protectors to employees and train them in their use.
    - Provide baseline and annual audiometric hearing exams to employees.

1. **Responsibilities of Managers, Supervisors and Investigators**

- Identify areas of excessive noise and affected employees.
- Coordinate sound level surveys and personnel monitoring for noise exposure, conducted by EH&S, to provide a quantitative assessment of noise hazards in your workplace.
- If employees are exposed to noise above 90 dBA averaged over the work shift, implement engineering or administrative controls. See the L&I Hearing Loss Prevention (Noise) webpage and Reducing Hazards from Noise (OSHA).
- Ensure individuals exposed to noise levels at or above 85 dBA averaged over an 8-hour work shift are enrolled in the Hearing Loss Prevention Program, receive training and medical surveillance.
- Ensure employees are provided with baseline and annual audiometric exams at the UW Speech and Hearing Clinic, or equivalent, through EH&S.
- Ensure staff has taken the Hearing Conservation training.
- Provide at least two types of hearing protectors to employees if controls cannot be implemented, and for all employees exposed to noise levels at or over 85 dBA averaged over an 8-hour work shift, greater than 115 dBA any time and 140 dBC impact noise any time.
- Ensure hearing protectors are worn properly.
- Post caution signs where noise may exceed 85 dBA averaged over an 8-hour work shift.
- Post danger signs where noise may exceed 115 dBA, even intermittently.
- Ensure that reports of high noise are investigated.
- Maintain records as required.

Responsibilities of Employees

- Report elevated noise levels, noisy equipment and hearing protector problems to supervisor.
- Take training on Hearing Conservation.
- Choose the most comfortable, effective hearing protection devices that fit well. Remember that the BEST protector is one you’ll wear. Earplugs are available in different sizes and shapes to fit different ear canals; earmuffs are easy to put on and take off for short-term loud noise exposure. A combination of earmuffs and earplugs may be needed.
- Wear hearing protectors in posted noise areas.
- Keep hearing protectors clean and replace when necessary.
- Take baseline and annual audiogram tests.