

Industrial Noise and Hearing Conservation

**INCLUDES SAMPLE WRITTEN
PROGRAM AND HEARING
TESTING RESOURCES
2004**

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Occupational Noise Exposure

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 a 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 suffering material hearing impairment even if they are subject to such noise exposures over their entire working lifetimes.

The following summarizes the required components of OSHA's hearing conservation program.

Noise 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.) That is, 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 since it allows employers to choose the monitoring method that best suits each individual situation. Monitoring should be repeated when changes in production, process, or controls increase noise

exposure. Such changes may mean that additional employees need to be monitored and/or their hearing protectors may no longer provide adequate attenuation.

Under this program, employees are entitled to observe monitoring procedures and they must be notified of the results of exposure monitoring. The method used to notify employees is left to the discretion of the employers.

Instruments used for monitoring employee exposures must be carefully checked or calibrated to ensure that the measurements are accurate. Calibration procedures are unique to specific instruments. Employers have the duty to ensure that the measuring instruments are properly calibrated. They may find it useful to follow the manufacturer's instruction to determine when and how extensively to calibrate.

Audiometric Testing

Audiometric testing not only monitors the sharpness and acuity of an employee's hearing over time, but also provides an opportunity for employers to educate employees about their hearing and the need to protect it.

The employer shall establish and maintain an audiometric testing program. The important elements of an audiometric testing program include baseline audiograms, annual audiograms, training, and followup procedures. Audiometric testing must be made 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 followup should indicate whether the employer's hearing conservation program is preventing hearing loss. A licensed or certified audiologist (specialist dealing with an individual having impaired hearing), an otolaryngologist (physician specializing in the diagnosis and

treatment of disorders of the ear, nose, and throat), or a physician must be responsible for the program. Both professionals and trained technicians may conduct audiometric testing. The professional in charge of the program does not have to be present when a qualified technician conducts tests, however. The professional's responsibilities include overseeing the program and the work of the technicians, reviewing problem audiograms, and determining whether referral is necessary.

The employee needs a referral for further testing when test results are questionable or when problems of a medical nature are suspected. If additional testing is necessary or if the employer suspects a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors, the employee shall be referred for a clinical audiological evaluation or otological exam, as appropriate. There are two types of audiograms required in the hearing conservation program: baseline and annual audiograms.

A. Baseline Audiograms

The baseline audiogram is the reference audiogram against which future audiograms are compared. Baseline audiograms must be provided within 6 months of an employee's first exposure at or above an 8-hour TWA of 85 dB. An exception is the use of mobile test vans to obtain 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 for any period exceeding 6 months after their first exposure until the baseline audiogram is obtained.

Employees should not be exposed to workplace noise for 14 hours preceding the baseline test; however, appropriate hearing protectors can serve as a substitute for this requirement and can be worn during this time period.

B. Annual Audiograms

Annual audiograms must be conducted within 1 year of the baseline. It is important to test hearing on an annual basis to identify deterioration in hearing ability so that protective follow-up measures can be initiated before hearing loss progresses. Annual audiograms must be routinely compared to baseline audiograms to determine whether the audiogram is valid and to determine whether the employee has lost hearing ability--i.e., if a standard threshold shift (STS) has occurred. STS is an average shift in either ear of 10 dB or more at 2,000, 3,000, and 4,000 hertz. An averaging method of determining STS was chosen because it diminished the number of persons falsely identified as having STS and who are later shown not to have had a change in hearing ability. Additionally, the method is sensitive enough to identify meaningful shifts in hearing early on.

Audiogram Evaluation

If an STS is identified, employees must be fitted or refitted with adequate hearing protectors, shown how to use them, and required to wear them. Employees must be notified within 21 days from the time the determination is made that their audiometric test results showed an STS. Some employees with an STS may need to be referred for further testing if the professional determines that their test results are questionable or if they have an ear problem of a medical nature that is 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, employees must be informed that they should 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 discontinue wearing hearing protectors.

An annual audiogram may be substituted for the original baseline audiogram if the professional supervising the program determines that the employee's STS is persistent. The original baseline audiogram, however, must be retained 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 an improvement in hearing occurs. This will ensure that the baseline reflects actual hearing thresholds to the extent possible. Audiometric tests must be conducted in a room meeting specific background levels and with calibrated audiometers that meet American National Standard Institute (ANSI) specifications of SC-1969.

Hearing Protectors

Hearing protectors must be available to all workers exposed to 8-hour TWA noise levels of 85 dB or above. This requirement will ensure that employees have access to protectors before they experience a loss in hearing.

Hearing protectors must be worn by

1. employees 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 in situations where baseline audiograms are delayed because it is inconvenient for mobile test vans to visit the workplace more than once a year;
2. employees who have incurred standard threshold shifts since these workers have demonstrated that they are susceptible to noise; and
3. employees exposed over the permissible exposure limit of 90 dB over an 8-hour TWA.

Employees should decide, with the help of a person who is trained in fitting hearing protectors, which size and type protector is

most suitable for their working environment. The protector selected should be comfortable to wear and offer sufficient attenuation to prevent hearing loss.

Hearing protectors must adequately reduce the severity of the noise level for each employee's work environment. The employer must reevaluate the suitability of the employee's present protector whenever there is a change in working conditions that may cause the hearing protector being used to be inadequate. If workplace noise levels increase, employees must be given 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. Employees must be shown how to use and care for their protectors and must be supervised on the job to ensure that they continue to wear them correctly.

Training

Employee training is very important. When workers understand the reasons for the hearing conservation programs' requirements and the need to protect their hearing, they will be better motivated to participate actively in the program and to cooperate by wearing their protectors and taking audiometric tests. Employees exposed to TWAs of 85 dB and above must be trained 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. The training program may be structured in any format, with different portions conducted by different individuals and at different times, as long as the required topics are covered.

Recordkeeping

Noise exposure measurement records must be kept for 2 years. Records of audiometric test results must be maintained for the duration of

employment of the affected employee. Audiometric test records must include the name and job classification of the employee, the date, the examiner's name, the date of the last acoustic or exhaustive calibration, measurements of the background sound pressure levels in audiometric test rooms, and the employee's most recent noise exposure measurement.

As of January 2004, employee hearing loss should be recorded on the OSHA 300 Log. A special checkbox has been added to the 300 Log for this purpose. Hearing loss is considered an occupational illness and should be recorded on the 300 Log when the following conditions are identified during an employee's annual audiogram:

- employee has a standard threshold shift (STS), and
- the STS is work-related, and
- the employee has aggregate hearing loss exceeding 25 dB from audiometric zero.

Hearing Testing Resources (Colorado)

The following companies should be able to provide employee hearing tests (audiograms) for employees. Please see the Yellow Pages of phone book under Audiologists for additional hearing conservation sources.

Arapahoe Hearing Associates
7600 E. Arapahoe Rd., Suite 105
Englewood, CO 80112
(303) 770-4327

Audiological Consultants, Inc.
3575 S. Sherman, Suite 3
Englewood, CO 80110
(303) 761-7600

Center for Hearing, Speech, and Language
4280 Hale Parkway
Denver, CO 80220
(303) 322-1871

Colorado West Otolaryngologists
425 Patterson, #503
Grand Junction, CO 81506
(970) 245-2602

D.L. Teter and Associates
206 W. County Line Rd., #230
Highlands Ranch, CO 80126
(303) 791-4216

Denver Ear Associates
799 E. Hampden Ave., Suite 510
Englewood, CO 80110
(303) 861-5881

Harvard Park Hearing Center
950 E. Harvard Ave., Suite 500
Denver, CO 80210
(303) 777-4327

Sample Written Program

Although OSHA does not require a written hearing conservation program, the attached program, if properly completed, will not only help you work through the pertinent issues, but will also constitute an adequate hearing conservation program in accordance with 1910.95(c)(1). This program should not be used without consideration of the unique conditions and requirements at each site and it may be necessary to modify the program for your specific needs.

This sample program is not intended to be a legal interpretation of the provisions of the *Occupational Safety and Health Act of 1970*.

HEARING CONSERVATION PROGRAM FOR

<><>ENTER COMPANY NAME AND ADDRESS<><>

INTRODUCTION

Hearing conservation is an important aspect of the overall safety and health program. Workplace noise can cause hearing loss, create physical and psychological stress, and contribute to accidents by making it difficult to communicate. An estimated 14 million employees throughout the United States are exposed to hazardous noise.

Fortunately, noise exposure can be controlled. Every effort is made to use quieter processes, machinery, and equipment. When feasible engineering controls do not reduce the noise level to or below the OSHA permissible exposure limit (PEL) of 90 dB, proper hearing protectors are used. Also, all employees exposed to noise levels above 85 dB are included in a hearing conservation program. There are many reasons for providing an effective hearing conservation program, including: protecting the organization's most important resource - employees, providing a safe and healthful workplace, and complying with governmental regulations.

Management, supervisory, and employee commitment to hearing conservation and positive attitude are important aspects of the overall hearing conservation program. The key elements of the organization's hearing conservation program are:

1. Noise exposure measurements
2. High exposure areas or jobs
3. Audiometric testing and follow-up
4. Employee Education
5. Engineering and administrative noise exposure control
6. Personal hearing protection
7. Recordkeeping

<><>ENTER NAME OR JOB TITLE OF RESPONSIBLE EMPLOYEE<><> has been designated as the program administrator for Hearing Conservation.

NOISE EXPOSURE MEASUREMENT

The success of the company's hearing conservation program depends on an accurate knowledge of the existing noise environment. Accurate surveys define areas within acceptable guidelines for noise exposure and those areas where potentially harmful noise exposure exists. Effective noise exposure measurement prevents possible loss of hearing by detecting work areas where employees must wear hearing protectors and must be tested.

Detailed noise surveys have been performed for the following areas or processes:

Area/Process	Date
<><>Describe Areas or Process Where Noise Monitoring Has Been Conducted<><>	

These surveys were conducted using Type II Noise Dosimeters worn by employees working in the area. Noise Dosimeters were worn for the duration of the workshift or at least long enough to establish a conservative average noise exposure. All effected employees have been notified regarding these results.

Copies of these measurements are included in Appendix A of this program.

Additional monitoring will be conducted whenever changes in work practices or methods may change workplace noise exposures including addition of new equipment or a change in the workplace layout.

HIGH EXPOSURE AREAS OR JOBS

Based on the results of the noise exposure measurements, the following areas/jobs have been designated as "High Exposure". "High Exposure" refers to work areas or jobs where employees' noise exposure may exceed the action level of (85 dBA).

Area/Job	Hearing Protection
<><>Describe areas or jobs where noise monitoring has demonstrated exposure above the Action Level or Permissible Exposure Level. Note: These jobs/areas will require implementation of the Hearing Conservation Program including hearing protection and audiometric testing.<><>	<><>Indicate here whether hearing protection will be "Encouraged" or "Required".*

*Monitoring results above the action level (85 dBA) indicate areas where hearing protection is "encouraged" and monitoring results above the Permissible Exposure Limit (90 dBA) indicate areas where hearing protection is "required".

AUDIOMETRIC TESTING PROGRAM

The objective of this hearing conservation program is the preservation of the hearing of employees. In order to achieve this goal, an effective audiometric testing program has been implemented.

Audiograms and evaluations are conducted by:

<><><>ENTER NAME OF COMPANY THAT PERFORMS AUDIOGRAMS AND YEARLY COMPARISONS TO BASELINE AUDIOGRAMS<><><>

(Note: Audiograms and comparisons must be conducted by an audiologist or physician or someone working under a licensed audiologist or physician.)

This program includes:

- Audiograms at time of hire for all employees working in "High Exposure" areas or jobs.
- Baseline audiograms for existing work force working in "High Exposure" areas or jobs.
- Annual audiograms for all employees working in "High Exposure" areas or jobs.

The success of the hearing conservation program with regard to each individual employee is evaluated by comparing annual audiograms to the baseline audiogram. This procedure, among others, helps to determine the effectiveness of the hearing protection program, and, as a result, ensures the protection of employees' hearing.

<><>ENTER NAME OF RESPONSIBLE PERSON OR JOB TITLE<><> is responsible for reviewing the recommendations of the audiologist or physician.

EMPLOYEE EDUCATION

All employees working in "High Exposure" areas or jobs are trained before initial assignment and at least annually on the following topics:

- Effects of noise on hearing
- Purpose of hearing protectors
- Advantages and disadvantages of various types of hearing protectors
- Proper use, selection, fit, and care of hearing protectors
- Purpose and procedures of audiometric testing
- Company requirements for "High Exposure" jobs or areas
- Use of specific hearing protectors provided by the company

<><>NAME OR JOB TITLE OF EMPLOYEE <><> is responsible for scheduling this training on a annual basis.

<><>NAME OR JOB TITLE OF EMPLOYEE OR CONTRACTOR<><> is responsible for conducting the training and providing documentation to the program administrator.

ENGINEERING AND ADMINISTRATIVE NOISE CONTROLS

<><>ENTER COMPANY NAME<><> recognizes the desirability of controlling the existing noise levels by engineering and/or administrative controls. Therefore, the feasibility of such controls is carefully considered including possible redesign of existing machinery, the building of partial or total enclosures, and other engineering noise control procedures for reducing the existing noise levels. Due to the complexity of some machinery used by the company and in view of economic limitations, some noise levels cannot currently be reduced to below acceptable limits.

Within the limitation of work schedules and employee skills, administrative controls have also been considered. Where feasible, over-exposed employees are rotated to other areas or jobs having noise levels below the required levels. In addition, operational procedures are modified as necessary so that during any one twenty-four hour period the allowed exposure times will not be exceeded.

Engineering and administrative controls are being considered and implemented where feasible on a continuing basis.

PERSONAL HEARING PROTECTION

Until such time as engineering and/or administrative controls reduce the amount of noise exposure to or below the allowed limits, appropriate personal hearing protective devices are made available and issued to employees working in "High Exposure" jobs or areas. It is recognized that the use of these devices is considered a temporary solution to the problem of overexposure until feasible controls are provided.

The wearing of hearing protection in the following areas or jobs is mandatory:

<><>ENTER AREAS OR JOBS WHERE HEARING PROTECTION IS MANDATORY<>

In addition, hearing protection is mandatory in ALL "High Exposure" areas for any employee who has incurred a standard threshold shift as reported by the program administrator.

All supervisors properly enforce hearing protection requirements. Continuing failure of an employee to properly wear the protection provided could result in the termination of employment with the company.

<><>NAME OR JOB TITLE OF EMPLOYEE <><> is responsible for issuing and fitting hearing protection. This individual has been trained by and is under the supervision of an audiologist or physician.

The following hearing protection devices are provided for employees:

Type of Hearing Protection	Noise Reduction Rating (NRR)
<><>Indicate type, manufacturer, and model number of hearing protection provided.<><>	<><>Indicate here the NRR listed by the manufacturer<><>

Note: Employers are required to make at least two "TYPES" of hearing protectors available to employees. Types include self-molding, pre-molded, custom molded, and ear muffs.

RECORDKEEPING

<><>NAME OR JOB TITLE OF EMPLOYEE <><> is responsible for maintaining exposure measurement records. These records will be appended to this written program as Appendix A and maintained for a minimum of two years from the measurement date.

<><>NAME OR JOB TITLE OF EMPLOYEE <><> is responsible for maintaining audiometric test results for all employees working in "High Exposure" jobs or areas. These records will be maintained for the duration of the employment of the affected employee.

All records related to this program will be provided upon request to employees, former employees, or representatives designated by the individual employee.