

Chapter 15 – Hearing Conservation

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15.1 Introduction

The goal of this Hearing Conservation Program is to protect County employees from work related hearing loss. This Program is mandated by Cal/OSHA Sections 5095-5100 and is part of the County's Occupational Injury and Illness Prevention Program for employees whose noise are at or above the "action level", an 8-hour time-weighted average of 85 dBA. This program shall also apply to Departments who provide employees with hearing protection, regardless of the measured sound levels. Refer to section 15.9.2 Appendix B: Noise Exposure Limits for more information.

The main body of this document and Appendix A are for employees and managers who work in a noisy environment. Appendices B, C, & D are for professionals such as industrial hygienists and medical specialists who are involved in hearing conservation testing and monitoring.

15.3 Managing Noise in the Workplace

15.3.1 Types of Hearing Damage

Hearing damage that develops over months or years of hazardous noise exposure is known as noise induced hearing loss. A second kind of hearing damage, acoustic trauma, is caused by injury to the inner ear from a one-time exposure to excessively high impact noise such as a blast or explosion.

15.3.2 Ways to Identify Excessive Noise

Typically, a workplace may have excessive noise if you have to raise your voice above background noise to be heard at a distance of three feet. Managers must evaluate work areas and work practices to identify those which could damage employees' hearing.

Managers who suspect noise exceeds in their area exceed a safe level for employees should:

- Contact their Department's Safety Coordinator to request noise measurement.
- Ensure that noise conditions on the day noise measurements are taken are representative of typical operations.
- Comply with the recommendations in the written report you receive after the noise measurements are taken.

The report will tell you if noise levels exceed what Cal/OSHA calls the "action level". If the "action level" is exceeded, the manager will have to take action to reduce the risk of hearing loss.

15.3.3 Methods to Reduce Employee Exposure To Excessive Noise

One way to reduce employee exposure to noise is to modify the workplace to reduce the noise level. The best modification is to reduce the noise at the source; an alternative is to absorb or redirect the noise. These kinds of steps are called "engineering controls" because they use engineering to reduce exposure. Some examples are:

- Preventative maintenance and repair of equipment.
- Substituting quieter machines.

- Substituting quieter processes or operations.
- Reducing vibration.
- Reducing sound produced by gas flow.
- Reducing sound transmission through solids.
- Moving equipment.
- Using acoustical room or equipment treatments.

A second approach is to reduce the amount of time the employee is exposed to the noise or move employees away from the noise source. This approach is called an "administrative control" because it controls exposure through administrative means.

If noise cannot be reduced below the "action level", by using the above methods, then employees must use earplugs and/or muffs. This is a less desirable alternative, but it may be the only practical one.

Cal/OSHA requires that the use of earplugs and muffs be accompanied by a program of testing, recordkeeping, and enforcement. If ear plugs and/or muffs are used, the County must:

1. Make ear plugs and muffs available, at no cost, to each employee whose noise exposure exceeds the action level. Employees will be given the opportunity to select ear plug and/or muffs from at least two different types.
2. Make the use of ear plugs and/or muffs mandatory.
3. Post signs reading: "Hearing Protection Required"
4. Establish a mandatory Audiometric, hearing, testing program for all employees whose noise exposures equal or exceed the action level. The program will be at no cost to employees. The County must maintain employee hearing test records for an employee's term of employment plus 30 years.
5. Provide Hearing Conservation Program training to employees annually, which:
 - Identifies areas and tasks that involve high noise levels.
 - The purpose of hearing protectors, including the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
 - Tells employees where to get earplugs and muffs.
 - Provides the most current Hearing Conservation Program related information.
 - Encourages employee input to reduce noise levels.
 - The purpose of baseline and annual audiometric testing, as well as an explanation of the test procedures.
 - Maintains training records at the worksite for three years. (See chart 15 -1).

Hearing Conservation Flowchart

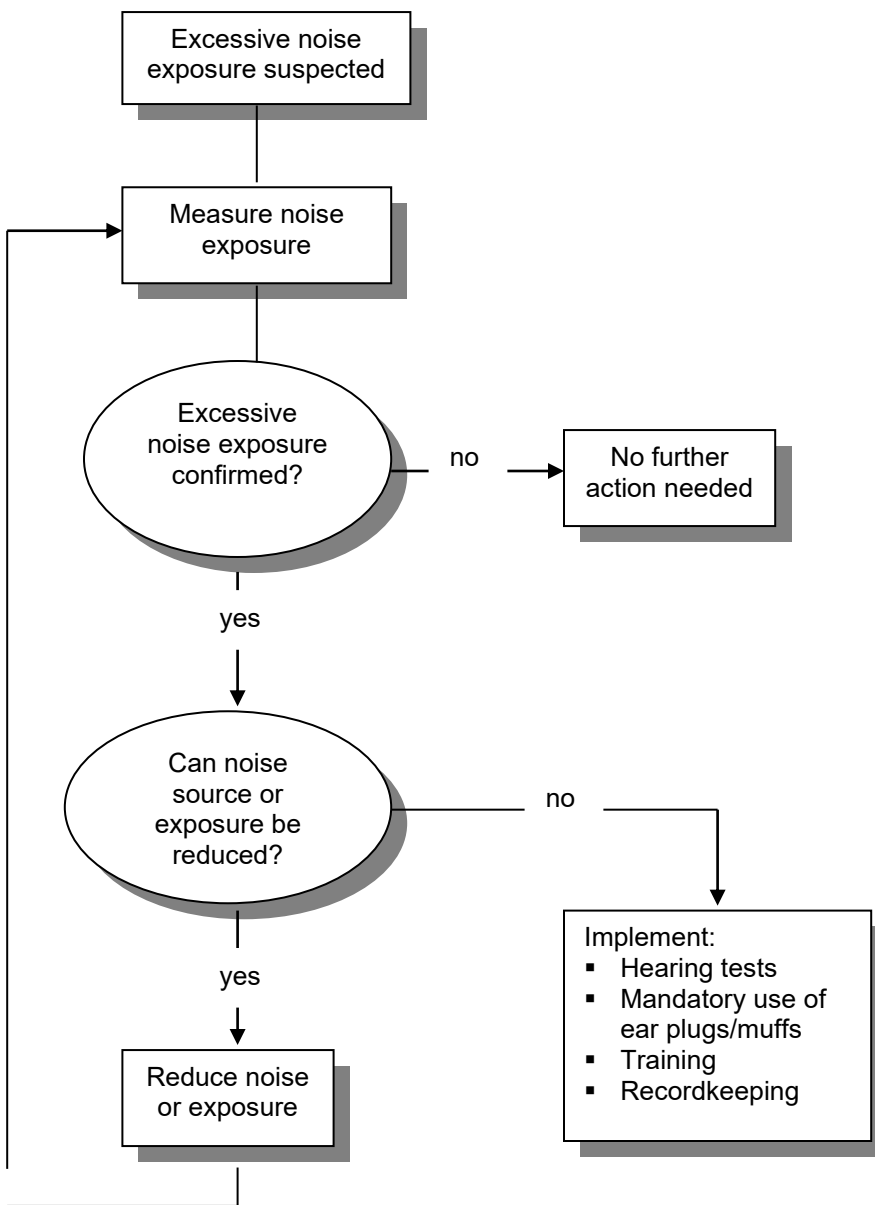


Chart 15-1

15.4 Roles and Responsibilities

Everyone has a role to play in hearing conservation. This section outlines the roles and responsibilities of all County employees.

15.4.1 Occupational Safety and Environmental Compliance (OSEC)

- Establishes the Hearing Conservation Program and assist in the development of Departmental programs.

- Oversees Hearing Conservation Program implementation, evaluation and modification per Cal/OSHA updates.
- Performs work site noise measurements when a concern has been identified. Provides written recommendations to supervisors and/or agency/department heads when action level is exceeded.
- Inform managers and employees of the results of noise measurements. Inform employees of the results of individual noise dosimetry.
- Reviews Workers' Compensation reports on hearing loss rates and recommends corrective actions.
- Instructs FAF Building Operations to post noise-warning Signs.

15.4.2 Agency/Department Heads

- Responsible for the implementation of the Hearing Conservation Program in their Agency/Department.
- Allocate sufficient resources to line managers and first line supervisors to fully implement the Hearing Conservation Program.

15.4.3 First Line Supervisors

- Inform Agency/Department Safety Coordinator of any suspected noise hazard.
- Coordinate sound level testing, as needed, to confirm excessive noise exposures.
- Implement efforts, where possible, to reduce noise exposures.
- Identify employees who are exposed to excessive noise and qualify for placement in the Hearing Conservation Program.
- Provide new and existing employees in the HCP with ear plugs and muffs.
- Ensure the correct use, maintenance, and care of ear plugs and muffs.
- Provide Hearing Conservation Program training.
- Notify each employee exposed at or above the action level of the results of the monitoring. (See Appendix A).
- Call Concentra Occupational Health or VMC Occupational Medicine/Employee Health Services (for VMC employees) and schedule affected employee(s) for a baseline hearing test.
- At least annually after the baseline hearing test, notify employees that a new hearing test is required.
- Inform Agency/Department Safety Coordinator of any change in the workplace that may increase noise above the action level.

15.4.4 Employees

- Receive training on the Hearing Conservation Program, ear plugs and muffs, and hearing test.

- Use ear plugs and muffs to minimize exposure to workplace noise.
- Tell your supervisor of concerns about high noise levels and any adverse effects when wearing ear plugs or muffs.

15.4.5 Agency/Department Safety Coordinator

- Ensures that the County's Hearing Conservation Program is followed within their agency/department.
- Assist supervisors in implementing the Hearing Conservation Program.
- Coordinate basic Hearing Conservation Program training with OSEC.
- Arranges for sound level and dosimetry monitoring with Occupational Safety and Environmental Compliance if there are suspected noise hazards.

Assumes responsibility for posting of a copy of Article 105 (5095 through 5100) in CCR Title 8, in their respective workplaces.

15.4.6 Purchasing

- Works with Occupational Safety and Environmental Compliance to determine which types of ear plug or muffs and warning signs the County will purchase.

15.4.7 Building Operations

- Post caution and/or warning labels and signs when requested by OSEC or Agencies/Departments.

15.4.8 Workers' Compensation

- Maintain records of occupational noise exposure injuries, illnesses and expenses.

15.4.9 VMC / Occupational Medicine and Employee Health Services

- Administer and evaluate employee hearing tests.
- Provide basic hearing conservation training.
- Provide the employee medical treatment and/or referral when necessary.
- Maintain records of hearing tests for duration of employment plus 30 years.
- Maintain records of noise measurements for a minimum of 30 years.
- Train all employees annually who are exposed to noise at or above the action level and ensure employee participation in such programs. The training will include at a minimum:
 - The effects of noise on the ear.
 - The purpose of ear plugs and muffs
 - Advantages and disadvantages of earplugs and muffs.
 - Attenuation of various ear plugs and muffs
 - Instructions on selection, fitting, use and care of earplugs/muffs.
 - The purpose of the hearing test.

- An explanation of the hearing test.
- Maintain training records for three years and provide them to employees upon request.
- Maintain an accurate record of employee exposure monitoring measurements and audiometric tests.

The audiometric test record shall include:

- Name and job classification of the employee
- Date of the audiogram
- The examiner's name
- Date of the last acoustic or exhaustive calibration of the audiometer
- Employee's most recent noise exposure assessment.

The records shall be made accessible to all employees.

15.5 Potential Noise Areas and Equipment

Examples of County jobs that may have noise hazards:

Parks and Recreation

Park Maintenance Worker
 Ranger
 Senior Ranger
 Park Manager
 Park Equipment Operator
 Operator/Mechanic
 Field Sport Manager
 Range Master
 Assistant Range Master
 Pullers (skeet)

Fleet and Facilities Department

Carpenter
 Plumber
 HVAC Maintenance Worker
 Print/Graphics Worker
 Auto Mechanic
 Auto Mechanic Helper
 Auto Mechanic Attendant
 Auto Parts Supervisor
 Auto Paint and Body Repair

Roads & Airports

Road Maintenance Worker

Valley Medical Center

Laundry Worker

Animal Control

Animal Shelter Worker
 Kennel Attendant

Department of Correction
Industries Worker
Laundry Worker
Public Service Program Worker

Examples of equipment that may pose a noise hazard:

Lawn Mowers
Leaf Blowers
Chain Saws
Paper "Joggers"
Paper Folders
Tractors
Chippers
Weed Wackers
Jack Hammers
Planers
Routers
Most Pneumatic Tools
Office Core Drillers

15.6 Glossary

The technical terms used in the Hearing Conservation Program are defined below.

Action Level Whenever an employee is exposed at or above an 85 dBA Time Weighted Average (TWA) measured in the A-scale, slow response or equivalently.

Administrative Controls Any method that limits daily exposure to noise through scheduling of work.

Area Sampling A noise measurement made in the immediate area of the noise source, which is representative of the employee's noise exposure.

Attenuation The ability to reduce the amount of noise exposure.

Hearing Test A chart, graph, or table resulting from a hearing test showing an employee's hearing threshold level as a function of frequency.

Hearing Test Equipment An electronic instrument that conforms to the requirements and specification of American National Standards Institute ANSI S3.6-1969. It is used for measuring threshold levels.

Audiologist A professional, specializing in the study and rehabilitation of hearing, who is certified by the American Speech, Hearing and Language Association or licensed by a state board of examiners.

Baseline Hearing Test The initial hearing test against which future hearing tests are compared.

Cal/OSHA California Occupational Safety and Health Administration.

Criterion Sound Level A level of 90 decibels.

Continuous Noise Exposure Employee noise exposure that remains at about the same level during a given time period.

Decibel (dBA) A unit of measurement of sound level corrected to the A-weighted scale, as defined in ANSI S1.4-1977.

Engineering Control A physical way of preventing exposure to sound that either eliminates or isolates the sound source. The emphasis is on preventing sound from occurring at the source or when this is not feasible, absorbing or directing the sound away from occupied areas.

Ear Plugs or Muffs Personal protective devices that are worn over the ears (ear muffs) or in the ear (ear plugs) to limit employee noise exposure.

Hertz (Hz) Unit of measurement of frequency, numerically equal to cycles per second.

Impact Noise Sound levels during which the intervals between peak levels are more than one second.

Noise Area An area where sound levels may exceed the Action Level.

Personal Sampling A noise measurement that is obtained within one foot of the employee's ears.

Representative Exposure Measurements of an employee's noise dose or 8-hour Time Weighted Average (TWA) sound level that the County deems to be representative of exposures of other employees in the workplace.

Sound Level Meter An instrument for the measurement of sound level.

Standard Threshold Shift (STS) A change in hearing threshold relative to the baseline hearing test of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear (after any adjustments for hearing changes due to the aging process when required or allowed by law).

Time Weighted Average (TWA) Noise dose which has been weighted for a certain time duration, usually eight hours.

15.7 Applicable Regulations

CAL/OSHA, Title 8, GISO Section 5095-5100

15.8 References

ACGIH, Threshold Limit Values, current edition

ANSI S3.6 - 1969, Audiometers, Specifications for

ANSI S12.6- 1984, Method for the Measurement of Real-Ear Protection of Hearing Protectors and Physical Attenuation of Earmuffs

ANSI S1.25 - 1978, Personal Noise Dosimeter, Specifications for

ANSI S1.4 - 1983. Sound Level Meters, Specification for NIOSH, List of Personal Hearing Protectors and Attenuation Data

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15.9 Appendices

15.9 Appendix A: Sample Notification Letter

Supervisors should use this letter:

- 1) To inform employees of the results of noise exposure tests. Supervisors should explain what the measurements mean.
- 2) To tell employees what they should do (for those exposed to noise levels at or above the action level).

(Date) _____

Cal/OSHA requires the County to test noise levels as part of a County Hearing Conservation Program. The results of a measurement taken at (location) on (survey date) show that:

___ Noise levels were below the Cal/OSHA "action level". This means that unless the noise level at the work site changes, no further action needs to be taken to protect you from work-related hearing loss.

___ Noise levels exceeded the Cal/OSHA "action level". This means that *(Employee Name)* _____ must take the following actions to be protected from work-related hearing loss:

- 1) To protect your hearing, you must wear ear plugs and/or muffs at all times when performing (identify task/area) _____. These plugs and/or muffs will be provided to you by the County free of charge.
- 2) On *(date & time)* _____ you are scheduled for a hearing test at Valley Medical Center/Occupational Medicine and Employee Health Services. To ensure a valid result, use ear plugs and/or muffs in all high noise level areas during the 14-hour period prior to the hearing test. This includes both on-the-job and off-the-job exposures to high noise levels. If you cannot attend the scheduled hearing test, please call *(name and phone number of contact)* _____.

The County is committed to protecting you from work related hearing loss. If you would like additional information or have any questions, ask your supervisor or call *(name and phone number of contact)* _____.

15.9.2 Appendix B: Noise Exposure Limits

Protection against the effects of noise exposure shall be provided when sound levels exceed those in the tables below. Noise exposure limits are generally applied as an eight-hour exposure limit of 90 dBA. For exposures of shorter or longer durations, the exposure limit may be adjusted as indicated in the table. Hearing Conservation Program elements are required to be implemented whenever employee noise exposures equal or exceed an eight-hour time-weighted average of 85 dBA. Hearing Conservation Program elements include exposure monitoring, audiometric testing, medical monitoring, and training.

Continuous Noise Permissible Exposure Limits

- Measured on the A-scale of a standard sound-level meter set at slow response.

Duration (Hours)	Sound Level (dBA)*
16	85
8	90
4	95
2	100
1	105
0.5	110
0.25	115
0.125 or less	120

Impulse Noise Permissible Exposure Limits

* Peak sound-pressure level.

Sound Level (dBP)*	Permitted Impulses/Day
140	100
130	1,000
120	10,000

15.9.3 Appendix C: Hearing Protection Methods

Engineering Controls

Where feasible, facilities and equipment will be procured, designed, operated, and/or modified in such a manner as to prevent employee exposure to continuous noise levels above 85 dBA over an eight-hour TWA or impulsive noise above 140 dBP. Any reduction in employee noise exposure, even if not reduced below 85 dBA, is beneficial. If engineering controls fail to reduce sound levels to within the limits of Enclosure B, hearing-protective equipment and/or administrative methods of noise-exposure protection must be used.

Personal Hearing Protection

1. Personal protective equipment is to be used only temporarily or if engineering controls are not feasible or practical.
2. Supervisors shall enforce the use of earmuffs and/or plugs by employees assigned to work in areas where they will be exposed to continuous noise (without regard to duration of exposure) in excess of 90 dBA or to impulse noise in excess of 140 dB. Disposable earplugs and/or earmuffs will be made available for employee use (if desired) if noise exposures under 90 dBA create a nuisance. Earplugs will be provided for the exclusive use of each employee and will not be traded or shared.
3. Hearing protectors must attenuate employee noise exposure to a level of 90 dBA or below. Both earmuffs and plugs are required where noise levels equal or exceed 110 dBA. For employees with STS, protectors must attenuate exposure to an eight-hour TWA of 85 dBA. Estimation of the adequacy of hearing-protector attenuation should be performed according to OSHA-specified methods (see Appendix A of 29 CFR 1910.95).
4. If reusable preformed earplugs are used, they will be permanently issued to the employee and fitted to the employee under medical supervision. During fitting, the employee will be instructed in the proper method of insertion, storage, and cleaning of the earplugs. Earplugs will be checked during annual medical examinations.
5. Earmuffs will be provided for employees when analysis of noise environments shows that the attenuation provided by earplugs is not sufficient to reduce noise exposures below 90 dBA. The user shall inspect earmuffs on a regular basis.
6. Special hearing-protective equipment, such as sound-suppression communication headsets, may be used in noise hazard areas. These devices should be inspected regularly. Sound-suppression headsets may not be used if they have been damaged, altered, or modified in any way that affects the attenuation characteristics. If replacement parts (such as ear cup seals) are available, the headsets may be repaired and reused. If sound-suppression headsets are not permanently issued to employees, such equipment must be cleaned and sanitized before re-issuance.

Administrative Controls

If hearing-protective equipment or engineering controls are not sufficient to attenuate noise to less than 90 dBA, the duration of time spent in the noise hazard area shall be limited, so as not to exceed the exposure limits specified in Appendix B.

15.9.4 Appendix D: Noise Monitoring Methodology

Noise Monitoring

1. Measurement of potentially hazardous sound levels shall be conducted when any information, observation, or calculation shows that an employee could be exposed to a noise level in excess of 85 dBA over an eight-hour TWA. This includes, but is not limited to, times when representative exposures need to be documented, when employees complain of excessive noise, or when it is difficult to understand a normal conversation if the speaker and the listener face each other at a distance of two feet. Any new equipment, operation, job, or procedure with the potential for creating hazardous noise should be evaluated with regard to noise emissions before startup. All continuous, intermittent, and impulsive sound levels from 85 to 130 dBA will be integrated into the noise measurements. Noise exposure computation is shown in Appendix A of 29 CFR 1910.95.
2. Both noise dosimetry and area monitoring will be repeated periodically, or whenever any changes to facilities, equipment, work practices, procedures, or noise-control measures alter potential noise exposures.
3. Employees and/or their representatives will be provided an opportunity to observe noise dosimetry and area monitoring activities.
4. Areas determined to have noise levels at or above 90 dBA must be posted as noise hazard areas.
5. Affected employees (employees whose exposures have been determined to exceed the Action Level) shall be notified of the results of noise monitoring.

Noise-Measurement Methods

1. Sound-level meters must meet Type II requirements of ANSI S1.4 and must be capable of measuring sound in the range of 80 to 130 dBA.
2. Noise dosimeters must meet Class 2A-90/80-5 requirements of ANSI S1.25 and be capable of integrating sound levels of 80 dB and above.
3. Employee noise doses may be ascertained by using either a noise dosimeter or sound-level meter. If a sound-level meter is used to estimate an employee's dose, the noise survey will include a time and motion study to document the variations in the employee's noise exposure during the working shift. If an employee moves about or noise intensity fluctuates over time, noise exposure is more accurately estimated by personal dosimetry. Regardless of the method chosen, a sufficient number of readings/measurements will be made to accurately reflect noise exposure.
4. Employee exposure measurements will be made in such a manner as to accurately represent the actual exposure to noise.
 - When using a noise dosimeter to determine an employee's noise exposure, the microphone will be attached to the employee in the area of the employee's shoulder.
 - When using a sound-level meter, the microphone should be positioned not less than two inches, nor more than two feet, from the employee's ear.
 - Measurements will be made with the employee at his/her regular work station(s).
5. Before and after each use, dosimeters and sound-level meters will be calibrated using acoustical calibrators to verify the accuracy of the measuring equipment.
 - If any sound-level meter or noise dosimeter is dropped, or if the microphone receives a sharp impact, a calibration check shall be performed to ensure that it is still working properly, before taking additional measurements.
 - Sound-level meters and noise dosimeters that are not working properly, or are out of calibration, shall not be used to determine an employee's noise exposure.