

Hearing Conservation Program



California State University, Chico

Department of Environmental Health and Safety

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Table of Contents

| <u>Section</u> | <u>Page</u> |
|---------------------------------------------------------------|-------------|
| 1.0 Introduction | 1-1 |
| 2.0 Exposure Limites for Noise..... | 2-1 |
| 2.1 Protection | 2-1 |
| 2.2 Levels of Noise Exposure..... | 2-1 |
| 2.3 Measurements of Noise Levels | 2-1 |
| 3.0 Noise Exposure Computation..... | 3-1 |
| 3.1 Computation of Employee Noise Exposure..... | 3-1 |
| 3.2 Conversion Between “Dose” and 8-Hour TWA Sound Level..... | 3-2 |
| 4.0 Audiometric Testing and Evaluation | 4-1 |
| 4.1 Audiometric Testing Program | 4-1 |
| 5.0 Training Program..... | 5-1 |
| 6.0 Recordkeeping | 6-1 |
| 7.0 Glossary | 7-1 |

List of Tables

| | <u>Page</u> |
|---------------------------------------------------------------------------------------------------------------------|-------------|
| 1.0 Permissible Noise Exposure | 1-1 |
| 2.0 Workshift Noise Exposure | 3-1 |
| 3.0 Conversion from "Percent Noise Exposure" or "Dose" to "8-Hour Time Weighted Average Sound Level" (TWA) | 3-2 |
| 4.0 Glossary | 7-1 |

The purpose of this manual is to establish the acceptable limits of Noise Exposure at California State University, Chico (CSU, Chico). Title 8, Group 15, Article 105, Sections 5095-5099 of the California Code of Regulations (CCR) has established acceptable limits for the amount and duration of noise employees can be exposed to during a work shift. CSU, Chico, employees exposed to the upper limits of noise exposure during an 8-hour shift are required by law to use ear protection, unless the noise can be controlled by administrative or engineering controls. (Section 2.0 also details noise exposure limits.)

Protection against the effects of noise exposure will be provided to employees when the sound levels and duration exceed those shown in Table 1. Sound level will be measured on the A-scale of a standard sound level meter at slow response.

TABLE 1 - Permissible Noise Exposure

| Permissible Duration per Workday (Not to be exceeded) | | |
|----------------------------------------------------------|----------------------|--------------|
| <i>Sound Level (dBA)</i> | <i>Hours-Minutes</i> | <i>Hours</i> |
| 90 | 8-0 | 8.00 |
| 92 | 6-4 | 6.06 |
| 94 | 4-36 | 4.60 |
| 96 | 3-29 | 3.48 |
| 98 | 2-38 | 2.63 |
| 100 | 2-0 | 2.00 |
| 102 | 1-31 | 1.52 |
| 104 | 1-9 | 1.15 |
| 106 | 0-52 | 0.86 |
| 108 | 0-40 | 0.66 |
| 110 | 0-30 | 0.50 |
| 112 | 0-23 | 0.38 |
| 114 | 0-17 | 0.28 |

The University encourages all employees to wear hearing protection in all situations where excessive noise is generated even though the noise level is below the Permissible Noise Exposure level.

2.0

Exposure Limits for Noise

2.1 Protection

Protection against the effects of noise exposure will be provided when the sound levels and duration exceed those shown in Table 1 when measured on the A-scale of a standard sound level meter at slow response. When employees are subjected to sound levels exceeding those listed in Table 1, feasible administrative or engineering controls will be utilized. If controls fail to reduce sound levels within the levels of the Table, personal protective equipment will be provided by the University to reduce sound levels to within the levels of the Table.

The department will provide their employees who are exposed to an 8-hour time-weighted average of 85 decibels or greater with hearing protection. This will be provided at no cost to the employee. Employees will be given the choice of more than one type of ear protection, and the employees will be trained by the Department of Environmental Health and Safety (EHS) in the fitting and care of the equipment.

Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels as required by CCR Section 5096 (b). For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposures to an 8-hour time-weighted average of 85 decibels or below.

The adequacy of hearing protector attenuation will be reevaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation.

2.2 Levels of Noise Exposure

When daily noise exposure is composed of two or more periods of noise exposure at different levels, their combined effects should be considered rather than the individual effect of each. If the sum of the following fractions: $C_1 / T_1 + C_2 / T_2 \dots C_n / T_n$ exceeds unity, then the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level. T_n indicates the total time of exposure permitted at that level. If the variation in noise level involves maxima at intervals of 1 second or less, the noise is to be considered continuous. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level. Section 3.0 details noise exposure computation.

2.3 Measurement of Noise Levels

The Department of Environmental Health and Safety has the equipment necessary for measuring noise levels using a Sound Level Meter (SLM). If there is any suspicion of excess levels of noise, EHS will conduct tests to determine if the noise levels are permissible within the California Code of Regulations (CCR). Instruments used to measure employee noise exposure will be calibrated annually to ensure measurement accuracy. Noise level monitoring will be repeated whenever a change in production, process, equipment, or controls increases noise exposure.

3.1 Computation of Employee Noise Exposure

****NOTE**** Employees are not expected to perform these computations. They are presented here for reference and information.

Noise dose is computed using Table 2 as follows: When the sound level, L , is constant over the entire work shift, the noise dose, D , in percent, is given by: $D = 100 C/T$ where C is the total length of the workday, in hours, and T is the reference duration corresponding to the measured sound level, L , as given in Table 2 or by the formula shown as a footnote to that Table.

When the work shift noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by: $D=100 (C_1 / T_1 + C_2 / T_2 + \dots + C_n / T_n)$ where C_n indicates the total time of exposure at a specific noise level and T_n indicates the reference duration for that level as given by Table 2.

The 8-hour time-weighted average sound level (TWA), in decibels, may be computed from the dose, in percent, by means of the formula: $TWA= 16.61 \log_{10} (D/100) + 90$. For an 8-hour work shift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

TABLE 2 - Work shift Noise Exposure

| <u>A-weighted Sound level, L (decibel)</u> | <u>Reference Duration T (hours)</u> |
|--------------------------------------------|-------------------------------------|
| 80 | 32 |
| 85 | 16 |
| 90 | 8 |
| 95 | 4 |
| 100 | 2 |
| 105 | 1 |
| 110 | 0.5 |
| 115 | 0.25 |
| 120 | 0.125 |
| 125 | 0.063 |
| 130 | 0.031 |

In the Table, the reference duration, T , is computed by $T= 8 / 2^{(L-90) / 5}$

where L is the measured A-weighted sound level.

3.2 Conversion Between “Dose” and 8-Hour TWA Sound Level

Noise exposure is usually measured with an audiometer which gives a readout in terms of “dose.” Dosimeter readings can be converted to an 8-hour time-weighted average sound level (TWA). In order to convert the reading of a dosimeter into TWA, use Table 3. This Table applies to dosimeters that are set to calculate dose or percent exposure according to the relationship in Table 2.

TABLE 3 - Conversion from “Percent Noise Exposure” or “Dose” to “8-Hour Time Weighted Average Sound Level” (TWA)

| <u>Dose or Percent Noise</u> <u>Exposure</u> | <u>TWA</u> |
|-------------------------------------------------|------------|
| 10 | 73.4 |
| 30 | 81.3 |
| 60 | 86.3 |
| 90 | 89.2 |
| 120 | 91.3 |
| 150 | 92.9 |
| 180 | 94.2 |
| 210 | 95.4 |
| 240 | 96.3 |
| 270 | 97.2 |
| 300 | 97.9 |
| 330 | 98.6 |
| 360 | 99.2 |
| 390 | 99.8 |
| 420 | 100.4 |
| 450 | 100.8 |
| 480 | 101.3 |
| 510 | 101.8 |
| 540 | 102.2 |
| 570 | 102.6 |
| 600 | 102.9 |
| 630 | 103.3 |
| 660 | 103.6 |
| 690 | 103.9 |
| 720 | 104.2 |
| 750 | 104.5 |
| 840 | 105.4 |
| 870 | 105.6 |
| 900 | 105.8 |
| 930 | 106.1 |
| 960 | 106.3 |
| 990 | 106.5 |
| 780 | 104.8 |
| 810 | 105.1 |

4.1 Audiometric Testing Program

California State University, Chico, provides audiometric testing at no charge, to all employees whose exposure may equal or exceed the action level. The audiometric tests are conducted through a contract with a local medical facility. All audiograms will follow the guidelines outlined in this section.

4.1.1 Baseline Audiogram

For each employee exposed at or above the action level, CSU, Chico's contracted medical facility is required to establish a valid baseline audiogram against which subsequent audiograms can be compared.

4.1.2 Baseline Testing

Testing to establish a baseline audiogram will be preceded by at least 14-hours without exposure to workplace noise. This requirement may be met by wearing hearing protectors that will reduce the employee's exposure to a sound level of 80 dBA or below. CSU, Chico, will inform employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

After an evaluation of workplace noise levels determines affected employees, a training program will be initiated and repeated annually for each employee included in the Hearing Conservation Program. Information provided in the training program will be updated to be consistent with changes in protective equipment and work processes. Some of the information made available through the training seminar includes:

- The effects of noise on hearing.
- The purpose and advantages of hearing protection, attenuation of various types, and instructions on selecting, fitting, use, and care.
- The purpose of audiometric testing, and an explanation of the test procedures.

Upon request, EHS will provide employees with any informational materials related to the Hearing Conservation Program.

The University Human Resources Department maintains records of all employee exposure measurements required by CCR Section 5097(b). The information regarding audiograms includes the following:

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

The University will retain the Noise Exposure Records for 2- years. Audiometric test records will be retained for the duration of the affected employee's employment.

Action Level

An 8-hour time-weighted average of 85 decibels measured on the A-scale, slow response, or equivalently a dose of fifty percent.

Audiogram

A chart, graph, or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency.

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.

Attenuation

To reduce in intensity. To weaken or lessen.

Baseline Audiogram

The audiogram against which future audiograms are compared.

Criterion Sound Level

A sound level of 90 decibels.

Decibel (dB)

Unit of measurement of sound level.

dBA (Decibels-A-Weighted)

A unit of measurement of sound level corrected to the A-weighted scale, as defined in ANSI S1.4-1971 (R1976), using a reference level of 20 micropascals (0.00002 Newton per square meter).

Hertz (Hz)

Unit of measurement of frequency numerically equal to cycles per second.

Medical Pathology

A disorder or disease. For purposes of this regulation, a condition or disease affecting the ear, which should be treated by a physician specialist.

Otolaryngologist

A physician specializing in diagnosis and treatment of disorders of the ear, nose, and throat.

Representative Exposure

Measurements of an employee's noise dose or 8-hour time-weighted average sound level that the employer deems to be representative of exposures of other employees in the workplace.

Sound Level

Ten times the common logarithm of the ratio of the standard reference pressure of 20 micropascals. Unit: decibels (dB). For use with this regulation, SLOW time response, in accordance with ANSI S1.4-1971 (R1976), is required.

Sound Level Meter

An instrument for the measurement of sound level.