



1.0 POLICY

California State University, Sacramento (CSUS) administers an effective hearing conservation program designed to eliminate or control, in so far as is reasonable and practical, overexposure of students, faculty, and staff to harmful noise. The use of hearing protection equipment in these high noise environments is mandatory. CSUS will provide these services as part of the Hearing Conservation Program at no cost to employees as required by California Code of Regulations, Title 8, Article 105, Sections 3204, 5095 to 5100.

2.0 SCOPE

The provisions of the Hearing Conservation Program shall apply to all personnel at Sacramento State whenever noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent.

3.0 RESPONSIBILITIES

The following persons/entities have responsibilities as delineated below for implementation of this document:

3.1 Risk Management, Office of Environmental Health and Safety

- a) Administers the campus Hearing Conservation Program.
- b) Identifies what equipment or areas constitute hazardous noise environments.
- c) Conducts noise surveys in response to department requests or as part of a periodic noise survey.
- d) Provides expertise to departments in developing methods for noise abatement, reduction or control.
- e) Identifies and enrolls employees in the Hearing Conservation Program.
- f) Provides Hearing Conservation Training to employees in the program.
- g) Provides personal protective devices and training on proper usage for employees.
- h) Establishes an audiometric testing program for affected employees and provides consultation and notification of exam results to employees (as part of the employee medical monitoring program).
- i) Schedules medical (audiometric) appointments in support of the Hearing Conservation Program.
- j) Maintains Hearing Conservation Program training records.
- k) Maintains exposure measurement records.



3.2 Vice Presidents and Program Center Administrators, Department Heads, Chairs and Managers

- a) Ensure that noise reduction or control is considered when procuring equipment, machinery and tools.
- b) Support supervisors in providing all elements of the Hearing Conservation Program.
- c) Provide necessary safety equipment, to employees, at no cost to the employee.

3.3 Supervisors & Lead Personnel

- a) Develop workplace procedures to ensure effective compliance with this and other Safety Procedures.
- b) Refer to Environmental Health and Safety (EH&S) all new employees assigned to work in areas with known hazardous noise levels in order to schedule and perform a baseline audiogram as soon as possible after employment begins.
- c) Allow employees work time for completion of medical exams, training, and obtaining personal hearing protection
- d) Enforce the use of hearing protection devices or noise reduction procedures in the workplace.
- e) Identify newly suspected hazardous noise equipment or locations to their department and EH&S for a noise hazard evaluation.
- f) Arrange annual training of employees covered by the Hearing Conservation Program with the EH&S office.
- g) The supervising department shall continually monitor employee performance with regard to compliance with this program and shall correct any deviations or inadequacies observed.

3.4 Employees

- a) Read and comply with procedures and guidelines provided by their supervisors.
- b) Shall wear appropriate hearing protection whenever working in high-noise environments.
- c) Shall store and maintain their hearing protection devices in a clean and sanitary manner.
- d) Inform their supervisors of workplace hazards without fear of reprisal.
- e) Attend established education and training sessions; understand and comply with all applicable safety requirements. Failure to comply with established safety rules may be reflected in performance evaluations and may lead to disciplinary action consistent with procedures described in respective collective bargaining contracts, where applicable.
- f) Ask questions of their supervisors when there is concern about an unknown or potentially hazardous situation.



4.0 HEARING CONSERVATION PROGRAM QUALIFICATION

Employees known or believed to be exposed to an 8-hour time-weighted average noise level of 85 dBA or greater (California Code of Regulations, Title 8, Article 105, Appendix A), as determined by EH&S, shall be entered into the Hearing Conservation Program.

This level of noise is usually associated with the inability to carry on a conversation with someone within 3 feet away without raising your voice. Some locations where employees may be exposed to this level of noise or greater are: Grounds, Mechanical Rooms in buildings, Plumbing Shop, Locksmith Shop, Auto Shop, Carpentry Shop, Pest Control, Sheet Metal Shop, Theater, Scene Shop, Paint Shop, Boiler and Chiller Rooms of the Central Plant.

5.0 MEDICAL EFFECTS OF HEARING LOSS

5.1 Medical Effects of Hearing Loss

The ear has three sections:

- The outer, middle and inner ear.
- The outer ear directs sound into the ear canal.
- The middle ear, separated from the outer ear by the eardrum, consists of three connected bones that transmit the vibrations of the eardrum to the inner ear.
- The inner ear is a coiled hearing organ, the cochlea, which transforms the vibrations into nerve impulses for transmission to the brain along the auditory nerve.
- The cochlea is a fluid filled chamber lined with hairs. When liquid moves in response to the vibrations of the bones of the middle ear (eardrum), the hairs move. This movement creates signals that are transmitted to the brain. Overexposure to noise destroys the delicate hairs and leads to a permanent loss of hearing.

5.2 Signs of Hearing Loss

- a) Signs of hearing loss begin with the inability to hear frequency sounds first. To the individual the loss is first noted as an inability to understand what people say. They hear the words but lose the hard consonants so "bird" may sound like "bur" or "outer" like "our".



- b) People with hearing deficiencies will often remark on how they can no longer hear birds. When overexposure continues the ability to hear is progressively and permanently reduced. These damaged hair cells cannot be repaired or replaced.
- c) Another sign of hearing loss or damage is tinnitus, constant ringing in the ear. The use of a hearing aid makes the sound louder and newer ones will specifically increase higher frequencies to help clear the distortion.
- d) Some examples of the level of loss associated with specific audiogram results are:
 - Lost amount Symptoms Experienced 0 dB normal hearing results for young adults
 - no symptoms 0 –to 25 dB considered normal hearing "within normal limits"
 - 26 to 40 dB Mild hearing loss
 - 41 to 70 dB Moderate hearing loss
 - 71 to 90 dB severe hearing loss
 - 91 and above profound hearing loss

5.3 Other Effects on the Body

Overexposure to noise can affect the entire body. It is associated with:

- Increased pulse rate
- Hypertension
- increased secretion of certain hormones
- Tiredness, nervousness, sleeplessness, and other symptoms of stress.

6.0 HEARING CONSERVATION ELEMENTS

6.1 Medical Monitoring

a) Audiograms

- Employees in the CSUS Hearing Conservation Program receive audiograms (a test to measure hearing ability) **on an initial and annual basis**.
- This screening process helps identify areas where noise controls (administrative, personal protection, training, or monitoring) may be failing.
- It is first performed immediately after hiring and before exposure to high noise areas or tasks.
- Annual audiograms are compared to the initial or earliest reference audiogram to determine if hearing loss has occurred.
- Audiometric testing is conducted by a licensed audiologist, otolaryngologist, qualified physician, or trained technician.
- The results are made available to CSUS through EH&S and to the employee.



b) Hearing Loss Defined

- A loss of an average of 10 dBA or more at 2000, 3000, and 4000 Hz in one or both ear is considered a hearing loss and is called a "standard threshold shift". Note: Allowances for age related hearing loss may be considered when determining if a standard threshold shift occurred (See California Code of Regulations, Title 8, Article 105, Appendix B).

c) Scheduling exams

- Scheduling of initial medical monitoring exams is done by supervisors contacting EH&S at extension 8-6456.
- EH&S should be able to schedule appointments within 3 work days.
- Supervisors will be contacted by EH&S to schedule annual exams.
- Employees and supervisors will be made aware that the employee should not be exposed to high noise environments for at least 14 hours prior the appointment and be free of any medical condition effecting hearing (cold, stuffed-up ears, etc.)

d) Hearing Loss Follow-up

- If an annual audiogram suggests a standard threshold shift has occurred, then a second follow-up confirmation audiogram is performed within 30 days of the previous test.
- If a second audiogram still shows a significant hearing loss is present, the employee is then considered to have a standard threshold shift.
- The employee will be fitted or refitted with hearing protectors and trained or retrained in their use and help to ensure they're use by EH&S.
- Employees and the employee's supervisor with a standard threshold shift will be notified by EH&S with 21 days of the audiogram of the standard threshold shift (attachment 2).

***** Employees with a new standard threshold shift are instructed to schedule an appointment with their personal physician to evaluate the hearing loss. UC Davis Medical Group tracks the case until a summation of the personal physician's findings is provided for the UC Davis Medical Records.**

6.2 Workplace Noise Monitoring and Control

EH&S will monitor work environments to determine the level of noise exposure and based on findings recommend noise control measures (Engineering, Administrative or Personal Protective Equipment) to reduce or eliminate the threat to employee hearing.



These control measures may be associated with certain locations or use of noise generating equipment.

a) Engineering Controls:

- Making changes in the machinery, the way the machinery operates, or the design of the structure in which the machinery is housed can control noise levels.
- Engineering controls include purchasing quieter equipment using barriers, damping, isolation, muffling, noise absorption, mechanical isolation, variations in force, pressure or driving speed, or combinations of these as a means of reducing noise emissions.
- The way that these solutions are applied depends on the particular source of the noise and the characteristics of the noise being produced

b) Administrative Controls:

- These controls are also referred to as operational controls
- These controls limit the length of time employees are exposed to noise in the work area.
- This involves assigning the employee to less noisy areas in the workplace so that the average of his/her daily exposure is less than the action level of 85 dBA.

c) Personal Protective Equipment:

- Use of Personal Protective Equipment When engineering and/or administrative controls are not feasible, hearing protectors must be used.
- CSUS has a sufficient variety of earmuffs or earplugs available to choose from in order to ensure that employees can get a good fit. It is important to use the right hearing protection to meet the employee's needs
- Employees in the Hearing Conservation Program are provided free hearing protection devices and are trained on their use and maintenance by EH&S.

d) Earmuffs and Earplugs

- Sized reusable earplugs are available at EH&S. Call 8-7233 or 8-6456
- Earmuffs can be purchased through the employee's department.
- When earmuffs are used, make sure that the seal between the muff and the head is tight. Insert the outer ear into the muff.
- Long hair, glasses, and other obstructions may diminish the effectiveness of the device and require use of earplugs.*
- Disposable, malleable, and one size fits earplugs are purchased by the employee's department.



e) Report High Noise Environments

- If anyone suspects a work area is a previously unknown new high noise environment, report it to the supervisor who in turn should report it to EH&S so that a noise survey can be performed.
- Common indications of a high noise environment are: Temporary hearing loss, ringing in the ears after leaving the work area, or difficulty hearing normal speech while the noise is being generated.
- The results of the noise survey and recommendations are provided to supervisors and available to employees.

6.3 Use of Hearing Protectors

Employees must wear hearing protectors when they are exposed to a sound level of 85 dBA (TWA) or greater (noise in excess of the limits set in the California Code of Regulations, Title 8, Section 5096). Employees exposed to only 85-89 dBA are encouraged to wear hearing protection and mandated to wear hearing protection if they have had a standard threshold shift.

6.4 Training Program

Employees in the Hearing Conservation Program are required to participate in an annual training program. The program includes the effects of noise on hearing, the purpose and effectiveness of hearing protectors, and the purpose of and an explanation of audiometric testing. This training is provided by EH&S and scheduled through supervisors. New employees are trained when they obtain their hearing protectors at EH&S.

6.5 Record Keeping and Records Access

- a) CSUS will maintain noise exposure measurements (of the workplace or equipment) for two years through EH&S.
- b) Audiogram tests will be maintained for the duration of employment.
- c) Medical records will be maintained for 30 years if the employee works for more than one year.
- d) These records must be made available to the employee, former employees, employee representatives, and authorized representatives of the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal-OSHA).

7.0 DEFINITIONS



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, which is certified by the American Speech, Hearing and Language Association or licensed by a state board of examiners

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 square of the measured A-weighted sound pressure to the square 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



Appendix A

Hearing Conservation Program: Noise Exposure Computation

I. Computation of Employee Noise Exposure

(a) Noise dose is computed using Table A-1 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 work day, in hours, and T is the reference duration corresponding to the measured sound level, L , as given in Table A-1 or by the formula shown as a footnote to that table.

(b) 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 A-1.

(c) The eight-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 eight-hour workshift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

(d) A table relating dose and TWA is given in Section II

II. Conversion between "Dose" and "8-Hour Time-Weighted Average" Sound Level.

Noise exposure is usually measured with an audiodosimeter 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 A-2. This table applies to dosimeters that are set to calculate dose or percent exposure according to the relationships in Table A-1. So, for example, a dose of 91 percent over an eight hour day results in a TWA of 89.3 dB, and a dose of 50 percent corresponds to a TWA of 85 dB.

If the dose as read on the dosimeter is less than or greater than the values found in Table A-2, the TWA may be calculated by using the formula:

$TWA = 16.61 \log_{10} (D/100) + 90$ where TWA = 8-hour time-weighted average sound level and D = accumulated dose in percent exposure.



Table A-1

A-weighted sound level, .. L (decibel) ...	Reference .. Duration ... T (hour) ...	A-weighted sound level, .. L (decibel) ...	Reference Duration T (hour)
80.....	32	106.....	0.87
81.....	27.9	107.....	0.76
82.....	24.3	108.....	0.66
83.....	21.1	109.....	0.57
84.....	18.4	110.....	0.5
85.....	16	111.....	0.44
86.....	13.9	112.....	0.38
87.....	12.1	113.....	0.33
88.....	10.6	114.....	0.29
89.....	9.2	115.....	0.25
90.....	8	116.....	0.22
91.....	7.0	117.....	0.19
92.....	6.1	118.....	0.16
93.....	5.3	119.....	0.14
94.....	4.6	120.....	0.125
95.....	4	121.....	0.11
96.....	3.5	122.....	0.095
97.....	3.0	123.....	0.082
98.....	2.6	124.....	0.072
99.....	2.3	125.....	0.063
100.....	2	126.....	0.054
101.....	1.7	127.....	0.047
102.....	1.5	128.....	0.041
103.....	1.3	129.....	0.036
104.....	1.1	130.....	0.031
105.....	1		

In the above table, the reference duration, T, is computed by

$$T = 8 / 2^{(L-90)/5}$$

Where L is the measured A-weighted sound level.



Table A-2

Conversion from "Percent Noise Exposure" or "Dose" to "8-Hour Time-Weighted Average Sound Level" (TWA)

Dose or Percent Noise Exposure	TWA	Dose or Percent Noise Exposure	TWA	Dose or Percent Noise Exposure	TWA
10	73.4	116	91.1	510	101.8
15	76.3	117	91.1	520	101.9
20	78.4	118	91.2	530	102.0
25	80.0	119	91.3	540	102.2
30	81.3	120	91.3	550	102.3
35	82.4	125	91.6	560	102.4
40	83.4	130	91.9	570	102.6
45	84.2	135	92.2	580	102.7
50	85.0	140	92.4	590	102.8
55	85.7	145	92.7	600	102.9
60	86.3	150	92.9	610	103.0
65	86.9	155	93.2	620	103.2
70	87.4	160	93.4	630	103.3
75	87.9	165	93.6	640	103.4
80	88.4	170	93.8	650	103.5
81	88.5	175	94.0	660	103.6
82	88.6	180	94.2	670	103.7
83	88.7	185	94.4	680	103.8
84	88.7	190	94.6	690	103.9
85	88.8	195	94.8	700	104.0
86	88.9	200	95.0	710	104.1
87	89.9	210	95.4	720	104.2
88	89.1	220	95.7	730	104.3
89	89.2	230	96.0	740	104.4
90	89.2	240	96.3	750	104.5
91	89.3	250	96.6	760	104.6
92	89.4	260	96.9	770	104.7
93	89.5	270	97.2	780	104.8
94	89.6	280	97.4	790	104.9
95	89.6	290	97.7	800	105.0
96	89.7	300	97.9	810	105.1
97	89.8	310	98.2	820	105.2
98	89.9	320	98.4	830	105.3
99	89.9	330	98.6	840	105.4
100	90.0	340	98.8	850	105.4
101	90.1	350	99.0	860	105.5
102	90.1	360	99.2	870	105.6
103	90.2	370	99.4	880	105.7
104	90.3	380	99.6	890	105.8



105.....	90.4 ..	390.....	99.8 ...	900.....	105.8
106.....	90.4 ..	400.....	100.0 ..	910.....	105.9
107.....	90.5 ..	410.....	100.2 ..	920.....	106.0
108.....	90.6 ..	420.....	100.4 ..	930.....	106.1
109.....	90.6 ..	430.....	100.5 ..	940.....	106.2
110.....	90.7 ..	440.....	100.7 ..	950.....	106.2
111.....	90.8 ..	450.....	100.8 ..	960.....	106.3
112.....	90.8 ..	460.....	101.0 ..	970.....	106.4
113.....	90.9 ..	470.....	101.2 ..	980.....	106.5
114.....	90.9 ..	480.....	101.3 ..	990.....	106.5
115.....	91.1 ..	490.....	101.5 ..	999.....	106.6
		500.....	101.6		

Note: Authority and reference cited: Section 142.3, Labor Code.



Appendix B

**Hearing Conservation Program:
Determination and Application of Age Corrections to Audiograms**

Determination and Application of Age Corrections to Audiograms

As permitted by Section 5097(d)(9), increases in an employee's hearing thresholds, as evidenced by an audiogram taken subsequent to a baseline audiogram, may be adjusted (lowered) for presbycusis (hearing loss due to aging). The applicable correction values at various ages and sound frequencies are included in Table F. If the employer chooses to adjust an employee's audiogram pursuant to Section 5097(d)(9), the employer shall follow the procedure described below.

(a) Obtain from Table F the age correction values at each audiometric test frequency of interest (the hearing losses at 2000, 3000, and 4000Hz are relevant to the determination of whether a standard threshold shift, as defined by Section 5097(d)(8), may exist) for the employee by:

- (1) Finding the age at which the most recent audiogram was taken and recording the corresponding age correction values; and
- (2) Finding the age at which the baseline audiogram was taken and recording the corresponding age correction values.

(b) Subtract the values found in (a)(2) from those found in (a)(1). (The remainders from these subtractions represent the values (in decibels) which may be attributed to aging and are the values by which the most recent audiogram may be adjusted at the respective audiometric test frequencies.)

(c) Subtract the values found in (b) from the hearing threshold values of the most recent audiogram. When the adjustment of an audiogram for hearing loss due to aging is performed for the purpose of determining whether a standard threshold shift has occurred, the above-described calculations may be restricted to the 2000, 3000, and 4000 Hz frequencies. If the average of the hearing threshold values at 2000, 3000, and 4000 Hz found in step (c), above, is equal to or greater than 10, then the employee has exhibited a standard threshold shift, and the employer must comply with various provisions of Section 5097(d) as well as certain other requirements such as Sections 5098(a)(2)(B)2 and (b)(3).

Table F Age Correction Values in Decibels for Males (M)



And Females (F)

Age	Audiometric Test Frequencies (Hz)									
	1000		2000		3000		4000		6000	
	M	F	M	F	M	F	M	F	M	F
20 or Younger	5	7	3	4	4	3	5	3	8	6
21.....	5	7	3	4	4	4	5	3	8	6
22.....	5	7	3	4	4	4	5	4	8	6
23.....	5	7	3	5	4	4	6	4	9	7
24.....	5	7	3	5	5	4	6	4	9	7
25.....	5	8	3	5	5	4	7	4	10	7
26.....	5	8	4	5	5	5	7	4	10	8
27.....	5	8	4	5	6	5	7	5	11	8
28.....	6	8	4	5	6	5	8	5	11	8
29.....	6	8	4	5	6	5	8	5	12	9
30.....	6	8	4	6	6	5	9	5	12	9
31.....	6	8	4	6	7	6	9	5	13	9
32.....	6	9	5	6	7	6	10	6	14	10
33.....	6	9	5	6	7	6	10	6	14	10
34.....	6	9	5	6	8	6	11	6	15	10
35.....	7	9	5	6	8	7	11	7	15	11
36.....	7	9	5	7	9	7	12	7	16	11
37.....	7	9	6	7	9	7	12	7	17	12
38.....	7	10	6	7	9	7	13	7	17	12
39.....	7	10	6	7	10	8	14	8	18	12
40.....	7	10	6	7	10	8	14	8	19	13
41.....	7	10	6	8	10	8	14	8	20	13
42.....	8	10	7	8	11	9	16	9	20	13
43.....	8	11	7	8	12	9	16	9	21	14
44.....	8	11	7	8	12	9	17	9	22	14
45.....	8	11	7	8	13	10	18	10	23	15
46.....	8	11	8	9	13	10	19	10	24	15
47.....	8	11	8	9	14	10	19	11	24	16
48.....	9	12	8	9	14	11	20	11	25	16
49.....	9	12	9	9	15	11	21	11	26	16
50.....	9	12	9	10	16	11	22	12	27	17
51.....	9	12	9	10	16	12	23	12	28	17
52.....	9	12	10	10	17	12	24	13	29	18
53.....	9	13	10	10	18	13	25	13	30	18
54.....	10	13	10	11	18	13	26	14	31	19
55.....	10	13	11	11	19	14	27	14	32	19
56.....	10	13	11	11	20	14	28	15	34	20
57.....	10	13	11	11	21	15	29	15	35	20
58.....	10	14	12	12	22	15	31	16	36	21
59.....	11	14	12	12	22	16	32	16	37	21
60 or Older..	11	14	13	12	23	16	33	17	38	22

NOTE: Authority and reference cited: Section 142.3, Labor Code.

