MENDOCINO COUNTY

HEARING CONSERVATON PLAN

ADOPTED: Board of Supervisors – July 24, 2001
PREPARED BY: Risk Management Division

MENDOCINO COUNTY
HEARING CONSERVATION PLAN

FORWARD

A HEARING CONSERVATION PROGRAM guides the County's responsibility for ensuring that monitoring is performed as required, hearing protectors are provided to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater, and an audiometric testing and evaluation program is in place.

When completed, each affected County department will have its own Hearing Conservation Program, as required by the California Code of Regulations, Title 8, General Industry Safety Orders, Section 5197 (Hearing Conservation Program) (As Amended). The Risk Management Division coordinates this planning effort.

This guide serves three purposes. First, it will help management and supervisors develop their department's Hearing Conservation Program; second, it will help guide monitoring efforts; and third, it provides background information for training. This guide has four sections:

1. General Information
   Contains the general information about Hearing Conservation. It explains when the program should be used and most importantly the roles and responsibilities of those employees involved in the program.

2. County Hearing Conservation Program
   Contains information to guide management, supervisors and employees who must deal with occupational noise exposure encountered in the workplace. Most of the information is generic. As you review your department's specific needs, you will need to develop detailed procedures.

3. Writing Your Department's Hearing Conservation Program
   Contains a sample Hearing Conservation Program for writing your department's program.

4. Hearing Conservation Program For (Your Department)
   Contains your department's Hearing Conservation Program.

If you have any questions or need additional information, contact the Risk Management Division at 841 Low Gap Road, Ukiah, California 95482, (707) 463-4445.

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I. GENERAL INFORMATION

A. SCOPE

This establishes the County of Mendocino's procedure for noise control and hearing conservation. It provides information and guidance on the process of identifying noise hazards and includes guidelines to be used by County departments in preparing individualized programs. It also provides procedures to ensure appropriate medical monitoring for those employees exposed to excess noise during the course of employment.

The program identifies documentation, communication, and training necessary to ensure the health and safety of County employees. This procedure sets forth minimum standards for all County departments. Individual departments may implement more stringent standards. Copies of department prepared programs are to be provided to the Risk Management Division as well as included immediately following the last section.

B. PURPOSE

The California Code of Regulations, Title 8, General Industry Safety Orders, Article 105, §5097 (Hearing Conservation Program) (As Amended) requires employers to establish an effective Hearing Conservation Program including procedures for employee training, noise monitoring and medical surveillance. Section 3203 (As Amended) of the above referenced code requires employers to prepare written programs relative to the prevention of occupational illness, injury and injurious exposure.

C. INTRODUCTION

Department heads, supervisors, employees, and the Risk Management Division shall share responsibilities for implementing and maintaining an effective Hearing Conservation Program within the County of Mendocino.

D. RESPONSIBILITIES OF MANAGEMENT AND SUPERVISORS

Department management and supervisors have the following responsibilities:

1. Ensure the implementation of the Hearing Conservation Program throughout all departments within the County.

2. Authorize budgeting and expenditure of necessary resources to implement the program.

3. Provide corrective action as may be deemed necessary or practical to modify or replace equipment, machinery, facilities and tools which are found to create noise levels above exposure limits if technologically feasible.

4. Request Risk Management Safety Officer or any contractors approved by the Risk Management Division to study specific operations, facilities, and equipment to determine employee noise level exposure.

5. Ensure that employees undergo annual Audiometric examinations (baseline, annual, and termination) as deemed necessary by the Risk Management Division.

6. Supervisors of employees in areas or operations which have been determined to have noise levels above acceptable or controllable levels shall:

- Arrange to have exposed employees equipped with approved hearing protection devices as prescribed by the Risk Management Division.
- Conduct training and make frequent checks to ensure employees are properly using hearing protection devices. Strictly enforce the use of hearing protection devices where determined necessary.
- Cooperate with the Risk Management Division in completing required periodic audiometric examinations.
- Ensure employees comply with requirements specified in the California Code of Regulations, Title 8, General Industry Safety Orders, Article 105, §5097 (Hearing Conservation Program) (As Amended), and the policies or procedures specified herein.
- Utilize Risk Management Safety Officer or any contractors approved by the Risk Management Division to make sound level studies and surveys of specific equipment areas, facilities, work locations, and operations to determine the degree of employee noise level exposure.
- Use Risk Management Safety Officer or contractors to reevaluate work areas and locations where employees are known to be, or suspected of being, exposed to noise levels at or above an 8-hour time weighted average (TWA) of 85 dBA.
- Authorize the use of hearing protection devices as necessary to comply with the California Code of Regulations.
- Specify those areas, equipment, operations and employees having a noise exposure equal to or greater than 85 dBA time weighted average (TWA). Document those areas and send a copy to the Risk Management Division.
- Identify those areas and jobs where hearing protection is required. Document those areas and jobs and send a copy to the Risk Management Division.
- Prepare an educational program on hearing conservation for employees.

E. NOISE LEVEL EXPOSURE LIMITS

The following exposure limits are established to protect employees from harmful effects of noise in the workplace.

1. Continuous Noise

   Protection against the effects of noise exposure shall be provided when sound levels exceed those shown below when measured on the A-scale of standard Type II sound level meter at a slow response.

Permissible Noise Exposure Limits

Duration per day, hours	*Sound level, dBA, slow response*
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

2. Impulsive Or Impact Noise

   Exposure to impulsive or impact noise shall not exceed 140 dBA peak sound pressure level as measured by an impulsive-type sound level meter.

F. MEASUREMENT OF NOISE LEVELS

Noise and levels of exposure shall be measured by the Risk Management Safety Officer or qualified contractors using sound level meters meeting current ANSI S1.4 "Specification for Sound Level Meters", or dosimeters meeting current ANSI S1.25, "Specification for Personal Noise Dosimeters".

G. PERIODIC MONITORING OF NOISE LEVELS

Noise monitoring or measuring shall be conducted by the Risk Management Division or approved contractors when levels are suspected to be at or above 85 dBA; when employees complain of noise levels; or when supervisors believe that excessive noise exposure is occurring.

H. EMPLOYEE EXPOSURE TO NOISE LEVELS

As practical, exposure to excessive noise shall be eliminated by engineering and/or administrative controls.

I. DEFINITIONS

This glossary defines words and terms relevant to noise control and audiometry. It has been compiled to provide assistance in understanding terms used in this section.

1. 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.

2. Audiogram. A chart, graph or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of hearing (from 500 to 6000 Hertz).

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

4. A Weighted Sound Level (dBA). The ear does not respond equally to all frequencies. Therefore, to obtain a single number representing the sound level of a noise containing a wide range of frequencies in a manner representative of the ear's response, it is necessary to reduce, or weight, the effects of the low and high frequencies with respect to the middle frequencies. The result and sound level is said to be A-weighted.

5. Baseline Audiogram. The audiogram against which future audiograms are compared.

6. Criterion Sound Level. A sound level of 90 decibels.

7. Daily Noise Dose. The cumulative noise exposure of an employee during a working day.

8. Decibel (dB). A non-dimensional unit used to express levels. It is a logarithmic expression of the ratio of a measured quantity to reference quantity.

9. Dose. A single index number as defined by Cal/ OSHA.

10. Dosimeter. An instrument which registers the occurrence and accumulative duration of noise exceeding a predetermined level at a chosen point in the environment. As a calculation is based on the dose (Noise Exposure Index) concept, and is measured in a percent of the allowable limit.

11. Frequency. The time rate of repetition of a periodic phenomenon. It is expressed in Hertz (H2), formerly in cycles per second (cps).

12. Hearing Conservation Program (HCP). An integrated control program designed to prevent any significant permanent noise-induced hearing loss resulting from on-the-job noise exposure. An effective HCP will (a) identify and analyze the levels of noise exposure, (b) control the noise exposure by engineering controls, by the use of personal protective equipment, and/or administrative methods, (c) measure the degree of hearing loss (or confirm no loss) by pre-placement balance and periodic audiometric examinations.

13. Hearing Protector. A device inserted into or placed over the ear for the purpose of reducing air-conducted sounds, e.g. ear plugs or earmuffs.

14. Hearing Threshold Level (HTL). The amount the threshold of hearing exceeds a standard audiometric reference. Current levels are referenced to ANSI-1969 standard or ISO-1964 standard.

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

16. Impulse of Impact Noise. A sound with a rise time of not more than 35 milliseconds to peak intensity and a duration of not more that 500 milliseconds to the time when the level is 20 dB below the peak. If the impulse recurs at intervals less than 1/2 second, they shall be considered as continuous noise.

17. Intermittent Noise. A steady state or continuous signal which is interrupted by periods of silence or periods of noise at levels below 55 dBA. Intermittent noise does not vary by more than 40 dBA in 500 milliseconds.

18. Noise. Disturbing, harmful or unwanted sound.

19. Noise Exposure Index. The integrated effect over a given time period at different noise levels and durations, often reported as a Dose.

20. Noise Induced Hearing Loss. The term used to refer to the slowly progressive inner ear hearing loss that results from exposure to continuous noise over a long time period as contrasted to acoustic trauma or physical injury to the ear.

21. Permanent Threshold Shift (PTS). The component of threshold shift which shows no progressive reduction with passage of time when the apparent cause is removed.

22. Representative Exposure. Measurements of an employee's noise dose or 8-hour time-weighted average sound level that the employers deem to be representative of the exposure to other employees in the work place.

23. Sound Level Meter (SLM). An instrument used to measure noise and sound levels, comprised of a microphone, amplier, rectifier, output meter, and optional frequency-weighing networks.

24. Standard Threshold Shift. A change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000 and 4000 Hertz in either ear.

25. Steady-Stake Noise. Noises that are continuous or that consist of impulses spaced less that 0.5 seconds apart.

26. Time-Weighted Average Sound Level. That sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.

27. Threshold of Hearing. The lowest detectable level of audible sound reported as a function of frequency.

II. COUNTY HEARING CONSERVATION PROGRAM

If an employee's exposure to noise equals or exceeds an 8-hour time weighted average (TWA) sound level of 85 dBA, an effective Hearing Conservation Program shall be initiated. An exposure level of 85 dBA or greater will trigger the Hearing Conservation Program.

The Hearing Conservation Program shall contain three basic parts: assessment of employee's noise exposure, control of noise exposure through engineering and/or administrative controls or hearing protection devices (to be used only after abatement of noise has been documented as engineering and/or economically infeasible) and Audiometric Testing.

A. NOISE MONITORING

The initiation of a monitoring program is to be considered whenever employees have the following:

1. Difficulty communicating by speech while in the noise area, and the listener and speaker face each other at a distance of two feet.

2. Complaints such as head noises or ringing in the ears after working in a noise area for extended periods.

3. Temporary loss of hearing that has the effect of muffling speech and other sounds after extended exposure to the noise.

Managers and Supervisors shall determine if any employee is exposed to a daily dose greater than exposure. If routine/periodic survey monitoring identifies an employee for inclusion in a Hearing Conservation Program, additional monitoring shall be conducted to obtain measurements of other employees who may be similarly exposed.

B. HEARING PROTECTORS

Those employees required to wear hearing protectors shall be given an opportunity to select hearing protectors from a variety of suitable types (i.e. earplugs or earmuffs). Procedures shall be established and implemented to ensure proper issuance, cleaning, maintenance and training in the use of hearing protectors.

Hearing protectors issued to employees shall provide a degree of protection to reduce noise exposure below limits prescribed. Each employee receiving a pair of earplugs for reduction of exposure shall be fitted by an individual qualified and/or trained in the proper selection and fitting of ear plugs.

Evaluation of hearing protection devices for specific noise environments shall be performed using one of the methods prescribed in the Cal/OSHA Hearing Conservation Amendment (29CFR 191095 Appendix B) (As Amended).

Hearing protection will be worn if it is determined that a standard threshold shift has occurred as evidenced by audiometric testing.

C. AUDIOMETRIC TESTING AND EVALUATION

All employees identified by monitoring for inclusion in a Hearing Conservation Program shall be administered a preliminary (baseline) and subsequent (annual monitoring) audiometric test. Annual re-testing shall be conducted so long as the employee meets the established exposure criteria. Audiometric testing shall be approved by the Risk Management Division.

All employees approved to have audiometric testing and evaluation shall receive a memorandum to present to the physician's receptionist at the time of the appointment, a copy of which is included in this program as Appendix G.

D. RECORDKEEPING

The Risk Management Division shall establish a record keeping system, which meets the requirements of the California Code of Regulations, Title 8, General Industry Safety Orders, Article 105, §5100 (Record keeping) (As Amended). These records shall be maintained for at least 2 years. The following shall be maintained:

1. Noise exposure measurements.

2. Audiometric test results including audiograms, name and classification of employee, date of audiogram, the name of the examiner, date of audiometer calibration and date of employee's last noise assessment.

3. Background noise levels in audiometric test rooms.

4. Training records.

E. ACCESS TO RECORDS

All records shall be provided upon written request to affected employees, former employees, representatives designated by the individual employee or a designated representative of Cal/OSHA. Managers and Supervisors will follow the Mendocino County guideline to comply with requests for employee exposure and medical records.

F. TRAINING

Employees shall be informed of hazardous areas through appropriate signing and instructions. Hearing protectors shall not be issued to an employee until proper use and maintenance procedures have been demonstrated by the supervisor. All employee training shall be documented on the Mendocino County Safety Orientation Checklist form, a copy of which is included in this plan as Appendix H.

1. <u>Training Program Contents</u>

Training sessions for employees identified for inclusion in a Hearing Conservation Program will include the following:

a. Discussion of the effects of noise on hearing.
b. Purpose of hearing protectors.
c. Use and care of hearing protectors
d. Advantages and disadvantages of different hearing protectors. Note: Alternation of various types and instructions on selection and fitting shall also be reviewed with employees.
e. Purpose and explanation of audiometric testing.

Supervisors are to make use of audio/visual and written materials available through the Risk Management Division in training programs.

2. Annual Training
Annual re-training will be required for employees exposed to excessive noise levels as specified in this procedure.

G. TECHNICAL EVALUATION

It is the policy of Mendocino County to implement the practices outlined in Appendixes of the California Code of Regulations, Title 8, General Industry Safety Orders, Article 105, §5100 (As Amended) (Hearing Conservation Program) that deals with the technical aspects of noise control. These appendixes (see attached) are as follows:

1. Appendix A: Noise Exposure Computation.
2. Appendix B: Audiometric Measuring Instruments.
3. Appendix C: Audiometric Test Rooms.
4. Appendix D: Acoustic Calibration of Audiometers.
5. Appendix E: Methods of Estimating the Adequacy of Hearing Protection Attenuation.
6. Appendix F: Determination and Application of Age Corrections to Audiograms

It is the responsibility of departmental management to either provide or arrange for consultation to ensure that the practices outlined in Appendixes B, C, and D are implemented throughout all departments and by using Risk Management or contractors performing services for the County of Mendocino.

It is the responsibility of departmental management to provide or to arrange for consultation to ensure that the practices outlined in Appendixes A and E are implemented.

H. DISCIPLINARY ACTION

Employees who violate the provisions of the Hearing Conservation Program are subject to disciplinary action per the employee's bargaining unit Memorandum of Understanding.

III WRITING YOUR DEPARTMENT HEARING CONSERVATION PROGRAM

A. DEVELOPING A PLAN

Department Heads and safety representatives should work together to prepare a Hearing Conservation Program for their department. Examples are provided to illustrate the format and content that is to be used for all County facilities.

Your plan should be modeled after the examples on the following pages.

1. GETTING STARTED
   Read Sections I and II before writing your actual program. They explain the roles and responsibilities of those employees involved in the program.

2. INSTRUCTIONS
   The following pages are examples of what should be included in your department Hearing Conservation Program. The instructions for completing each page are included on each page. Examples include:
   - Title Page - fill in the department name, street address and city.
   - Introduction - use the copy supplied. It is the same for all County facilities and has been completed for you.
   - Table of Contents - organize your program as listed in this example.
   - Monitoring -- establish a monitoring procedure that best suits your department.
   - Hearing Protectors – have a list of hearing devices for employees to choose from.
   - Audiometric Testing and Evaluation - establish testing procedures for employees involved in the program.
   - Recordkeeping - establish a record keeping system per OSHA guidelines.
   - Training -- developing training for employees.

3. In preparing your Hearing Conservation Program, coordinate with those agencies that may assist the department in approval of hearing protectors, such as Risk Management and the department Safety Representative.

4. When you have completed the department Hearing Conservation Program for your department, place it in the back of this document as Section IV.

5. If you have questions regarding the development of your Program, contact the Risk Management Division at (707) 463-4445.

B. COVER PAGE

MENDOCINO COUNTY
HEARING CONSERVATION PLAN

EXAMPLE

DEPARTMENT HEARING CONSERVATION PROGRAM

For

(Department Name)

(Address)

(City)

C. INTRODUCTION

1. INSTRUCTIONS

The example below includes the information that is helpful to include in your introduction.

Example:

This is the Department Hearing conservation Program for (your department).

Many operations and pieces of equipment used at (your department) produce noise. Exposure to excessive levels of noise can result in a permanent loss of hearing acuity, development of tinnitus (i.e., ringing of the ears), a possible increase in blood pressure, and stress-related problems. Noise may also cause annoyance or difficulty in communicating or working effectively and safely. Thus, a Hearing Conservation Program must be instituted to protect employees from harmful noise.

This Program contains:

- Identification of exposed personnel (Noise Monitoring).
- Implementation of noise-reducing engineering and administrative controls.
- Use of hearing protectors (plugs, ear muffs).
- Audiometric Testing and Evaluation.
- Recordkeeping Procedures.
- Training.

2. TABLE OF CONTENTS

Organize your program according to the example below:

Example:

D. NOISE MONITORING

This should be the first page in the Department Hearing Conservation Program. The example illustrates some information most likely needed.

Example:

Noise monitoring (a sound level survey) is conducted whenever there is knowledge or a suspicion that noise levels exceed 85 dB(Aweighted) 8 hour time-weighted-average (TWA). This monitoring may be repeated when any production, equipment or administrative changes occur which might alter the noise exposure of any employee.

When levels which exceed 85dBA TWA are found, all reasonable efforts will be made to use administrative and/or engineering controls to reduce exposure.

E. HEARING PROTECTION

Hearing protection devices should be page two of your Department Hearing Conservation Program. Below is an example of the information that should be listed.

Example:

All employees exposed to 85dBA TWA noise must have available hearing protectors. It is the employer's responsibility to ensure such hearing protectors are worn by employees whose noise exposure exceeds 90dBA TWA; or those whose exposure equals or exceeds 85dBA TWA and has not yet had a baseline evaluation; or those who have experienced a significant threshold shift.

(Your department) will make hearing protectors available to employees exposed to an 8-hour TWA of 85dBA or greater. Hearing protectors will be replaced as necessary and can be obtained by (your department procedure).

Employees will be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided.

(Your department) will ensure proper initial fitting. Departmental supervisors will supervise the correct use of all hearing protectors.

If there is any change in any process or operation, hearing protection will be re-evaluated by (your department).

F. AUDIOMETRIC TESTING

Audiometric Testing procedures should be page three of your department's Hearing Conservation Program. Below is an example of what to include in testing procedures.

Example:

Every employee who is exposed to noise levels at or above an 8-hour TWA of 85dBA will be offered an annual Audiometric test.

New employees will be offered a baseline test within six months of employment in an environment requiring hearing protection.

(your department) will arrange for Audiometric testing for employees and (your department) will notify the employees when it is time for the annual Audiometric test.

All testing will be performed by the employees primary care physician or Job Care at (707) 463-7334. OSHA Amendments guide for testing procedures, equipment and calibration requirement will be followed.

Test records will be maintained for the duration of the employee's employment at (your department).

Each employee's annual audiogram will be compared to the employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift has occurred. This evaluation will be performed by the employee's primary care physician or Job Care.

If the test indicates a standard threshold shift, (your department) may arrange a retest of the affected employee with 30 days.

The employees primary care physician or Job Care will determine whether a stand threshold shift is work related or may be aggravated by occupational noise exposures. When a standard threshold shift occurs, the following steps will be taken:

- If an employee is not using hearing protectors he/she will be fitted with hearing protectors; trained in their use and care, and required to use them; and
- If the employee is already using hearing protectors he/she will be refitted and retrained in their proper use, and if necessary, be provided with hearing protectors offering greater attenuation.

The cost of the initial test will be paid for by (your department). Any additional test or examinations to determine the cause of any hearing loss, will be paid through workers' compensation.

G. RECORDKEEPING

Recordkeeping procedures should be page four in your department's Hearing Conservation Program. Below are examples of language for this procedure.

Example:

All records of employee exposure measurements including the results of all surveys, Audiometric tests and training will be retained for the following periods:

- Noise exposure measurement records will be retained for at least two years at (your department).
- Audiometric tests records will be retained for the duration of the affected employee's employment at (your department).

H. TRAINING

Training procedures should be page five in your department's Hearing Conservation Program. Below are examples of training procedures.

Example:

All employees who are exposed to noise at or above an 8-hour TWA of 85dBA will receive training.

(your department) will provide annual training to each employee.

The training will cover, at a minimum, the following aspects of the Hearing Conservation Program:

- The effects of noise on hearing.
- The purposes of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
- The purpose of Audiometric testing, and an explanation of the test procedures.
- The findings of any work area monitoring.

Appropriate handouts will be provided as part of the training curriculum.

An attendance roster will be signed by each trainee and maintained on file at (your department).

(your department) will make available to affected employees any information materials pertaining to this standard.

IV. DEPARTMENT HEARING CONSERVATION PROGRAM

YOUR DEPARTMENT PLAN

APPENDIX A

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 /T + C /T +C /T), where Cn indicates the total of time of exposure at a specific noise level, and Tn 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 (D/100) + 90. For an eight-hour work shift 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.

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.

II. Conversion Between "Dose" and "8-Hour Time-Weighted Average" Sound Level. Noise exposure is usually measured with an audio dosimeter, which gives 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 log10 (D/100) + 90 where TWA = 8-hour time-weighted average sound level and D = accumulated dose in percent exposure.

Table A-2
Conversion from "Percent Noise Exposure" or "Dose" to "8-Hourn 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
Dose or Percent Noise Exposure	TWA	Dose or Percent Noise Exposure	TWA	Dose or Percent Noise Exposure	TWA
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	500	101.6		

APPENDIX B

Audiometric Measuring Instruments

I. In the event that pulsed-tone audiometers are used, they shall have tone on time of at least 200 milliseconds.

II. Self-recording audiometers shall comply with the following requirements:

(a) The chart upon which the audiogram is traced shall have lines at positions corresponding to all multiples of 10 dB hearing level within the intensity range spanned by the audiometer. The lines shall be equally spaced and shall be separated by at lease ¼ inch. Additional increments are optional. The audiogram pen tracings shall not exceed 2 dB in width.

(b) It shall be possible to set the stylus manually at the 10-dB increment lines for calibration purposes.

(c) The slowing rate for the audiometer attenuator shall not be more than 6 dB/sec except that an initial slewing rate greater than 6 dB/sec is permitted at the beginning of each new test frequency, but only until the second subject response.

(d) The audiometer shall remain at each require test frequency for 30 seconds (±3 seconds). The audiogram shall be clearly marked at each change of frequency and the actual frequency change of the audiometer shall not deviate from the frequency boundaries marked on the audiogram by more than 3 seconds.

(e) It must be possible at each test frequency to place a horizontal line segment parallel to the time axis on the audiogram, such that the audiometric tracing crosses the line segment at least six times at that test frequency. At each test frequency, the threshold shall be the average of the midpoints of the tracing excursions.

APPENDIX C

Audiometric Test Rooms

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table C-1 when measured by equipment conforming at least to the Type 2 requirements of ANSI S1.4-1971 (R1976), and to the Class II requirements of ANSI S1-1971 (R1976).

Table C-1
Maximum Allowable Octave-Band Sound Pressure Levels for Audiometric Test Rooms

Octave-band Center Frequency (Hz)	500	1000	2000	4000	8000
Sound pressure level (db)	40	40	47	57	62

APPENDIX D

Acoustic Calibration of Audiometers

I. Audiometer calibration shall be checked acoustically, at least annually, according to the procedures described in this Appendix. The equipment necessary to perform these measurements is a sound level meter, octave-band filter set, and a National Bureau of Standards 9A coupler. In making these measurements, the accuracy of the calibrating equipment shall be sufficient to determine that the audiometer is within the tolerances permitted by ANSI S3.6-1969.

(a) Sound Pressure Output Check
- (1) Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.
- (2) Set the audiometer's hearing threshold level (HTL) dial to 70 dB.
- (3) Measure the sound pressure level of the tones at each test frequency from 500 Hz through 6000 Hz for each earphone.
- (4) At each frequency the readout on the sound level meter should correspond to the levels in Table D-1 or Table D-2, as appropriate, for the type of earphone, in the column entitled "sound level meter reading."

(b) Linearity Check.
- (1) With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70 dB.
- (2) Measure the sound levels in the coupler at each 10 dB decrement fro 70 dB to 10 dB, noting the sound level meter reading at each setting.
- (3) For each 10-dB decrement on the audiometer, the sound level meter should indicate a corresponding 10 dB decrease.
- (4) This measurement may be made electrically with a voltmeter connected to the earphone terminals.

(c) Tolerances. When any of the measured sound levels deviate from the levels in Table D-1 or Table D-2 by 3 dB at any test frequency between 500 and 3000 Hz, 4 dB at 4000 Hz, or 5 dB at 6000 Hz, an exhaustive calibration is advices. An exhaustive calibration is required if the deviations are 15 dB or greater at any test frequency.

Table D-2
Reference Threshold Levels for Telephonic TDG-39 Earphones

Frequency Hz	*Reference Threshold Level for TDH-39 Earphones, dB*	*Sound Level Meter Reading dB*
500	11.5	81.5
1000	7	77
2000	9	79
3000	10	80
4000	9.5	79.5
6000	15.5	85.5
500	13.5	83.5
1000	7.5	77.5
2000	11	81.0
3000	9.5	79.5
4000	10.5	80.5
6000	13.5	83.5

APPENDIX E

Methods for Estimating the Adequacy of Hearing Protector Attenuation

I. For employees who have experienced a standard threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. Employers must select one of the following methods by which to estimate the adequacy of hearing protection attenuation.

II. The most convenient method is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). According to EPA regulation, the NRR must be shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector. This Appendix describes four methods of using the NRR to determine whether a particular haring protector provides adequate protection within a give exposure environment. Selection among the four procedures is dependent upon the employer's noise measuring instruments.

III. Instead of using the NRR, employers may evaluate the adequacy of hearing protector attenuation by using of the three methods developed by the National Institute for Occupational Safety and Health (NIOSH), which are described in the "List of Personal Hearing Protectors and Attenuation Data", HEW Publication No. 76-120, 1975, pages 21-37. These methods are known as NIOSH methods #1, #2 and #3. The NRR described below is a simplification of NIOSH method #2. The most complex method is NIOSH method #1, which is probably the most accurate method since it uses the largest amount of spectral information from the individual employee's noise environment. As in the case of the NRR method described below, if one of the NIOSH methods is used, the selected method must be applied to an individual's noise environment to assess the adequacy of the attenuation. Employers should be careful to take a sufficient number of measurements in order to achieve a representative sample for each time segment.

Note: The employer must remember that the calculated attenuation values reflect realistic values only to the extent that the protectors are properly fitted and worn.

IV. When using the NRR to assess hearing protector adequacy, one of the following methods must be used:

(a) When using a dosimeter that is capable of C-0weighted measurements:
  (1) Obtain the employee's C-weighted dose for the entire work shift, and convert to TWA (See Appendix A).
  (2) Obtain the employee's C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(b) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:
  (1) Convert the A-weighted dose to TWA (see Appendix A).
  (2) Subtract 7 dB from the NRR.
  (3) Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(c) When using a sound level meter set to the A-weighting network:
  (1) Obtain the employee's A-weighted TWA.
  (2) Subtract 7 dB from the NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(d) When using a sound level meter set on the C-weighted network:

(1) Obtain a representative sample of the C-weighted sound levels in the employee's environment.

(2) Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector

APPENDIX F

Determination and Application of Age Corrections to Audiograms
As permitted by Section 5097(d)(9)(As amended), 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)(as amended), 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)(as amended), 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 calculation 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 amended) as well ascertain other requirements such as Sections 5098(a)(2)(B)2 and (b)(3)(as amended).

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

	Audiometric Test Frequency (Hz)									
Age	*1000*		*2000*		*3000*		*4000*		*6000*	
	M	*F*	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*
0-20	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

Audiometric Test Frequency (Hz)

Age	*1000*		*2000*		*3000*		*4000*		*6000*	
	M	*F*	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*
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+	11	14	13	12	23	16	33	17	38	22

APPENDIX G

DATE:

TO:

FROM:

SUBJECT: HEARING CONSERVATION PROGRAM--HEARING TEST APPOINTMENT

The California Code of Regulations, Title 8, General Industry Safety Orders, Article 105, §5197 (Hearing Conservation Program) (As Amended) requires the following:

> (b) Monitoring. (1) "When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall obtain measurements for employees who may be exposed at or above that level".
>
> (c) Audiometric Testing Program. (10) "At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above the action level".

Please contact your primary care physician for an appointment or make an appointment with Job Care at 275 Hospital Drive, Ukiah, California 95482 at 707 463-7334

Workplace noise exposure should be avoided fourteen (14) hours prior to your appointment in order to establish an accurate baseline audiogram. The appointment should not take more than a half-hour. A copy of the test results will be sent to you and the Risk Management Division.

PLEASE GIVE THIS MEMORANDUM TO THE RECEPTIONIST WHEN YOU GO TO YOUR APPOINTMENT.

Please send invoices to the following address:

> Mendocino County
> Risk Management Division
> 841 Low Gap Road
> Ukiah, CA 95482

If you have any questions or need additional information, please contact the Risk Management Division at (707) 463-4445.

cc: Risk Management Division

SAFETY ORIENTATION CHECKLIST

Distribution: Original—Departmental File/Department Safety Representative
Copy--Risk Management Division

(This Checklist is to be completed by the Supervisor and New Employee within ten working days of employment)

DATE: _____

EMPLOYEE'S NAME: _____

DEPARTMENT/DIVISION: _____

HIRE DATE: _____

JOB CLASSIFICATION: _____

New employees are to be instructed in health and safety procedures as part of their orientation. Instruction is to be completed within the first week of employment. Mark subject as instruction is completed.

1. Mendocino County Safety Manual _____
   * Injury and Illness Prevention Program
   * Emergency Action Plan
   * Bloodborne Pathogens Program
   * Hearing Conservation Plan
   * Fire Prevention Plan
   * Lockout Tagout Policy
   * Airport Policy
2. Discuss General Safety Rules _____
3. Explanation of Safety Rules for Specific Jobs _____
4. General Discussion of Safety Devices _____
5. Personal Protective Equipment _____
6. Proper Lifting Techniques _____
8. Reporting Injuries _____
9. Hazardous Materials _____
10. First Aid and Qualified Personnel _____
11. Reporting Unsafe Conditions _____
12. Job Conduct _____
13. Storage of Materials _____
14. Safety Suggestions _____
15. Additional Training Unique to Department _____

I have received instructions and understand the above checked health and safety procedures.

Employee's Signature: _____ Date: _____