
**HEARING CONSERVATION PROGRAM
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HEARING CONSERVATION PROGRAM

I. INTRODUCTION

The Occupational Safety and Health Administration (OSHA) has established regulations for the control of occupational noise exposure that are found in 29 Code of Federal Regulations (CFR) 1910.95 and 1926.52.

The University of Oklahoma Health Sciences Center (OUHSC) has numerous shops in the Site Support and General Services divisions that provide maintenance to the campus infrastructure. Shops include Carpentry, Paint, Electric, Landscape, Utility Control, Telecommunications, Plumbing, Air Conditioning, Biomechanical Equipment, Housekeeping, Moving Services, and Motor Pool. Employees of these shops are potentially exposed during activities or areas or activities which exceed 85 decibels when measured on the A-scale (dBA) of a standard sound level meter at slow response. Areas of potential exposure include mechanical or air handling rooms located in more than 25 buildings, the Steam and Chilled Water Plant, and the Motor Pool area. Occupational exposure to noise may also occur through the use of power tools, lawn equipment, cleaning equipment, or other noisy activities. A list of hearing conservation areas and activities requiring hearing protection is available from the Environmental Health and Safety Office (EHSO).

II. SCOPE

Engineering and administrative controls will be investigated and recommended by the EHSO, when feasible, for workplace environments with sound levels greater than 90 dBA. When employees will be subjected to sound levels exceeding those listed below in Table 1, personal protective equipment (PPE) shall be provided and used to reduce sound levels within the levels of the table.

Table 1 - Permissible Noise Exposures

Hours per Day	Sound Level, dBA
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
.25 or less	115

Because all employees of the Steam & Chilled Water Plant (SCWP) may be potentially exposed to levels

greater than 85 dB, all employees of the SCWP will be covered by the *Hearing Conservation Program* whether or not their exposures normally equal or exceed the 8-hour time-weighted average sound level (TWA) of 85 dBA, a dose of fifty percent. Employees will be monitored and employee noise exposures will be computed in accordance with Tables A-1 and A-2 in Appendix A and without regard to any attenuation provided by use of PPE.

Employees of Site Support and the General Services Division will be monitored as needed, provided with PPE for use in designated hearing conservation areas or during specific activities, and trained in the proper use of this PPE.

III. MONITORING

- A. Quest M-7B noise dosimeters are used to monitor employee exposures. The A-weighted dosimeters are calibrated from an 80-dB threshold up to 120 dB for 7½ minutes, with an exchange rate of 5 minutes; the dosimeters meet American National Standards Institute (ANSI) standard S.125 1978.
- B. For the SCWP, operating engineers, the control floor janitor, and a representative sample of the remaining employees will be sampled annually or whenever a change in work practices, equipment, or controls increases noise exposure to the extent that:
 - 1. additional personnel are added to the workforce; or
 - 2. the attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements the section on hearing protector attenuation.
- C. For compliance purposes, only personal sampling will be carried out, but area sampling may be done as needed to identify problem noise areas. Forms for monitoring are provided in Appendix B.
- D. All noise sampling equipment will be calibrated before and after use, with the appropriate calibration equipment. Documentation of calibration will be kept in the EHSO records for a minimum of 30 years.
- E. If monitoring results indicate that employees are exposed at or above the 8-hour time-weighted average of 85 decibels, they will be notified by the EHSO within 15 days working days. The employee's supervisor will also be notified at the same time.
- F. The EHSO shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to the Hearing Conservation Program.

IV. AUDIOMETRIC TESTING PROGRAM

- A. OUHSC has established and will maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all OUHSC employees who equal or exceed the 8-hour time-weighted average of 85 dBA.
- B. The program is provided at no cost to employees.
- C. Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examination, obtaining valid audiogram, and properly using, maintaining and checking calibration and proper functioning of the audiometers being used. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist, or physician. For the OUHSC, a certified audiologist at the John Keys Speech and Hearing (JKSH) Center will administer the audiogram.
- D. All audiograms obtained pursuant to this section shall meet the requirements of Appendix C, *“Audiometric Measuring Instruments.”*
- E. **BASELINE AUDIOGRAM**
 - 1. Within 30 days of an employee's hire date, the supervisor will schedule an audiogram at the JKSH Center to establish a valid baseline audiogram against which subsequent audiogram can be tested.
 - 2. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirements that baseline audiogram be preceded by 14 hours without exposure to workplace noise. The supervisor shall notify the employees in writing of the need to avoid high levels of occupational and non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. Employees will not be allowed to enter their usual work facility the day of their audiogram before the audiogram has been given.
 - 3. The supervisor should also notify the employee in writing to take his/her choice of hearing protection to the JKSH Center on the day of the audiometric evaluation so that the certified audiologist may evaluate the fit.
 - 4. A written record of the above employee notifications (IV.E.1.3. above), with an employee signature and date, should be kept on file by the supervisor in the employee's confidential file. A copy of the notification is found in Appendix D.
 - 5. It is the responsibility of the employee to comply with the requirement for avoiding

high levels of non-occupational noise exposure.

F. ANNUAL AUDIOGRAM

The supervisor should arrange for a new audiogram for all employees at least annually after obtaining the baseline audiogram.

G. EVALUATION OF AUDIOGRAM

1. Each employee's audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift, as defined in Section IV.H. *Follow-up Procedures*, has occurred. This comparison will be done by a certified audiologist.
2. If the annual audiogram shows that an employee has suffered a standard threshold shift, the supervisor may request a retest within 30 days and consider the results of the retest as the annual audiogram.
3. The JKSH Center Coordinator shall review any audiograms that shows a standard threshold shift, defined as a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear, and shall determine whether there is a need for further evaluation. Age correction may be utilized in accordance with procedures in Appendix E.
4. The JKSH Center Coordinator shall have on file the following information:
 - a. a copy of the requirements for hearing conservation as set forth in this document;
 - b. the baseline audiogram and most recent audiogram of the employee to be evaluated;
 - c. measurements of background sound pressure levels in the audiometric test room as required in Appendix F, "*Audiometric Test Rooms*," and
 - d. records of audiometer calibrations as required below.

H. FOLLOW-UP PROCEDURES

1. If a comparison of the annual audiogram to the baseline audiogram indicates that a standard threshold shift as defined below has occurred, the supervisor and the employee shall be informed by the JKSH Center Coordinator of this fact in writing, within 21 calendar days of the determination.
2. Unless a physician from University Occupational Health Sciences determines that the standard threshold shift is not work related or not aggravated by occupational noise exposure, the supervisor shall ensure that the following steps are taken when

a standard threshold shift occurs:

- a. All employees should be fitted and trained in the use of hearing protectors by the EHSO. The employee who shows a standard threshold shift should be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation, if necessary.
 - b. The employee should be referred for a clinical audiological evaluation or an otological examination at University Occupational Health Sciences, as appropriate, by the JKSH certified audiologist, if additional testing is necessary or if the JKSH certified audiologist, supervisor, or the EHSO suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.
 - c. The employee will be informed by the JKSH certified audiologist of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.
3. If subsequent audiometric testing of an employee indicates that a standard threshold shift is not persistent, the JKSH certified audiologist shall inform the employee of the new audiometric interpretation in writing within 21 days of the determination.

I. REVISED BASELINE

An annual audiogram may be substituted for the baseline audiogram when, in the judgement of the JKSH Center Coordinator:

1. the standard threshold shift revealed by the audiogram is persistent, or
2. the hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

V. AUDIOMETRIC TEST REQUIREMENTS

- A. Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.
- B. Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with ANSI Specification for Audiometers, S3.6-1969.
- C. Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C, *Audiometric Measuring Instruments*.
- D. Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix F, *Audiometric Test Rooms*.

E. Audiometric calibration

1. The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.
2. Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix G, "*Acoustic Calibration of Audiometers.*" Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.
3. An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the ANSI Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

F. COMPLIANCE AND RECORD KEEPING

Compliance and record retention for this section of the *OUHSC Hearing Conservation Program* shall be the responsibility of the JKSH Center Coordinator. All records regarding calibration are to be kept on file at the JKSH Center.

VI. HEARING PROTECTORS

- A. Hearing protectors shall be made available to all employees who are potentially exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary at no cost to employees.
- B. The supervisor shall assure that hearing protectors are worn:
 1. by all employees who enter any designated hearing conservation area;
 2. by all visitors, including other OUHSC employees, entering any hearing conservation areas; or
 3. during any activity that generates greater than 85 dBA.
- C. Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the supervisor. The OUHSC has determined that a "variety" means three of any type or style of plug and/or muff. Suitability is addressed in Section VII. *Hearing Protector Attenuation.*
- D. The EHSO will provide training in the use and care of all hearing protectors provided to

employees.

- E. The supervisor shall ensure that employees properly wear hearing protectors when required by this program.
- F. A JKSH certified audiologist shall verify the proper fitting of the employee's ear plugs or muffs when the employee receives the baseline and annual audiograms. The audiologist will conduct two audiograms for employees, first without protection and another while the employee is wearing protection to determine if the employee is properly wearing their protection. The EHSO and the supervisor is responsible for providing the JKSH Center Coordinator with the NRRs for the types of hearing protection that are selected for use by the employees. The certified audiologist administering the audiogram will compare the manufacturer's NRR with the employee's actual.

VII. HEARING PROTECTOR ATTENUATION

- A. The EHSO will evaluate the minimum level of hearing protector attenuation required for employees in accordance with personal dosimetry sampling results. The EHSO will use the OSHA method for C-weighted measurement for estimating the adequacy of hearing protector attenuation, which may be found in Appendix H.
- B. The EHSO recognizes that the calculated attenuation values reflect the realistic attenuation values only to the extent that the protectors are properly fitted. Training of employees by the EHSO will be designed to minimize the problem of improperly fitted or worn hearing protectors. The EHSO has determined that all hearing protection shall have a minimum NRR of 25.
- C. Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels as required by section (b)(1) of the Occupational Noise Standard.
- D. For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.
- E. The adequacy of hearing protector attenuation will be evaluated by the EHSO whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The supervisor will provide more effective hearing protectors where necessary.
- F. Dual hearing protection may be issued in situations when warranted.

VIII. TRAINING PROGRAM

- A. The EHSO has instituted a training program for all employees. The supervisor shall ensure employee participation in the training program.

- B. New employees are required to participate in training within 30 days of employment. The training program will be repeated annually for all employees. Information provided in the training program shall be reviewed annually and updated to be consistent with changes in protective equipment and work processes.
- C. The EHSO shall ensure that each employee is informed of the following:
 - 1. the effects of noise on hearing;
 - 2. the purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
 - 3. the purpose of audiometric testing, and an explanation of the test procedures.
- D. The JKSH certified audiologist administering the audiogram will review with each employee the purpose of audiometric testing and the audiometric test procedures.

IX. ACCESS TO INFORMATION AND TRAINING MATERIALS

- A. The EHSO or supervisor shall make available to all employees or their representatives copies of the OSHA Hearing Conservation Standard (see Appendix I) and shall post a copy in the workplace. The *OUHSC Hearing Conservation Program* will also be available for examination by all employees.
- B. The EHSO will provide to the supervisors and employees any informational materials pertaining to the standard that are supplied to the OUHSC by OSHA or the Oklahoma Department of Labor.
- C. The supervisor, EHSO, and JKSH Center Coordinator will provide, upon request, all materials related to the OUHSC training and education program pertaining to this standard to any requesting official from the Oklahoma Department of Labor.

X. RECORDKEEPING

A. EXPOSURE MEASUREMENTS

The EHSO will maintain an accurate record of all noise measurements required by the *Hearing Conservation Program* and the OSHA Hearing Conservation Amendment. A report containing results of personal dosimetry exposure measurements will be sent by the EHSO to the supervisor and employee within 15 working days.

- B.
 - 1. **AUDIOMETRIC TESTS**
 - 2. **Tests**

The supervisor, the JKSH Center Coordinator, and the EHSO will retain in a confidential manner all employee audiometric test records obtained pursuant to the audiometric testing requirements of the *OUHSC Hearing Conservation Program* and the OSHA Hearing Conservation Amendment. The record will include:

- a. name, social security number and job classification of the employee, (supervisor);
- b. date of the audiogram, (JKSH);
- c. the examiner's name, (JKSH);
- d. date of the last acoustic or exhaustive calibration of the audiometer, (JKSH);
- e. employee's most recent noise exposure assessment; and (EHSO & supervisor);
- f. the measurements of the background sound pressure levels in audiometric test rooms, (JKSH).

3. **Record Retention**

The noise exposure measurement records shall be retained by the EHSO. Written results of all noise exposure measurements will be provided to the supervisor within working 15 days. The actual audiometric test records will be retained in a confidential manner by the JKSH Center Coordinator and the supervisor for the duration of the affected employee's employment. After an employee's termination, the audiometric test record will be microfiched and stored for an unlimited period.

4. **Access to Records**

All records required by the *OUHSC Hearing Conservation Program* and the OSHA Hearing Conservation Amendment will be provided upon request to employees, former employees, representatives designated by the individual employee, and OSHA representatives. The provisions of 29 CFR 1910.1020(a)-(e) and (g)-(i) apply to access to records under this section. See Appendix J for details.

5. **Transfer of Records**

If the OUHSC ceases to do business, OUHSC will transfer to the another Agency of the State all records required to be maintained by this section, and the State shall maintain them for the remainder of the period prescribed in the section, Record keeping of the *OUHSC Hearing Conservation Program* and the OSHA Hearing Conservation Amendment.

APPENDIX A
EMPLOYEE NOISE EXPOSURE COMPUTATION

EMPLOYEE NOISE EXPOSURE COMPUTATION

Compliance with the OSHA Hearing Conservation Amendment and the *OUHSC Hearing Conservation Program* is determined by the amount of exposure to noise in the workplace. The amount of such exposure is calculated as an eight hour time weighted average exposure (8-hour TWA) and/or dose (D) from measurements collected either by the use of a sound level meter or an audio dosimeter as follows.

I. DOSE

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

- 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 or by the formula $T = 8/2^{(L-90)/5}$.

II. TWA

- A. For an eight-hour work shift with the noise level constant over the entire work shift, the 8-hour TWA is equal to the measured sound level (L).
- B. To convert dose (D), in percent, from either a dosimeter reading or the calculated dose from Section I. above, to an 8-hour TWA, see Table A-2 which applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table A-1, or use the formula:

$$TWA = 16.61 \log_{10} (D/100) + 90$$

TABLE A-1

A-weighted sound level, L(decibels)	Reference duration T(hour)	A-weighted sound level, L(decibels)	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	0.44
87	12.1	113	0.38
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	16		

TABLE A-2

Dose or percent noise exposure	TWA	Dose or percent noise exposure	TWA
10	73.4	107	90.5
15	76.3	108	90.6
20	78.4	109	90.6
25	80.0	110	90.7
30	81.3	111	90.8
35	82.4	112	90.8
40	83.4	113	90.9
45	84.2	114	90.9
50	85.0	115	91.1
55	85.7	116	91.1
60	86.3	117	91.1
65	86.9	118	91.2
70	87.4	119	91.3
75	87.9	120	91.3
80	88.4	125	91.6
81	88.5	130	91.6
82	88.6	135	92.2
83	88.7	140	92.4
84	88.7	145	92.7
85	88.8	150	92.9
90	89.2	155	93.2
91	89.3	160	93.4
92	89.4	165	93.6
93	89.5	170	93.8
94	89.6	175	94.0
95	89.6	180	94.2
96	89.7	185	94.4
97	89.8	190	94.6
98	89.9	195	94.8
99	89.9	200	95.0
100	90.0	210	95.4
101	90.1	220	95.7
102	90.1	230	96.0
103	90.2	240	96.3
104	90.3	250	96.6
105	90.4	260	96.9
106	90.4	270	97.2

TABLE A-2 cont.

Dose or percent noise exposure	TWA	Dose or percent noise exposure	TWA
280	97.4	650	103.5
290	97.7	660	103.6
300	97.9	670	103.7
310	98.2	680	103.8
320	98.4	690	103.9
330	98.6	700	104.0
340	98.8	710	104.1
350	99.0	720	104.2
360	99.2	730	104.3
370	99.4	740	104.4
380	99.6	750	104.5
390	99.8	760	104.6
400	100.0	770	104.7
410	100.2	780	104.8
420	100.4	790	104.9
430	100.5	800	105.0
440	100.7	810	105.1
450	100.8	820	105.2
460	101.0	830	105.3
470	101.2	840	105.4
480	101.3	850	105.4
490	101.5	860	105.5
500	101.6	870	105.6
510	101.8	880	105.7
520	101.9	890	105.8
530	102.0	900	105.8
540	102.2	910	105.9
550	102.3	920	106.0
560	102.4	930	106.1
570	102.6	940	106.2
580	102.7	950	106.2
590	102.8	960	106.3
600	102.9	970	106.4
610	103.0	980	106.5
620	103.2	990	106.5
630	103.0	999	106.6
640	103.4		

APPENDIX B

AREA NOISE MONITORING AND DOSIMETRY DATA FORMS

AREA NOISE MONITORING FORM

Building and Room #: _____ **Date:** _____

Project or Action Report #: _____

Noise Sources: _____

Sound Level Meter #: _____

Overall dBA: _____

No.	63	125	250	500	1K	2K	4K	6K	8K

Dosimeter #: _____

Pre-Cal.	Start	Stop	Total	Reading	Post-Cal.

Description of Building Materials

Walls: Concrete / Sheet Rock / Wood / Other: _____ **Floors:** Concrete / Tile / Carpet / Wood / Other: _____

Door: Wood / Metal / Other: _____

Ceilings: Concrete / Ceiling Tile / Wood / Acoustic / Other: _____

(Room Sketch, Equipment Layout, and Measurement Locations)

PERSONAL NOISE DOSIMETRY FORM

TWA: _____

Employee: _____

SS #: _____

Project or Action Report #: _____

Date: _____

Department / Shop: _____

Work Performed: _____

Location of Work: _____

Machines / Equipment Used: _____

Dosimeter #: _____

Pre-Cal

Start

Stop

Reading

Post Cal.

(Calculations / Notes)

APPENDIX C
AUDIOMETRIC MEASURING INSTRUMENTS

AUDIOMETRIC MEASURING INSTRUMENTS

- I. In the event that pulsed-tone audiometers are used, they shall have a 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 least $\frac{1}{4}$ 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 attenuator manually at the 10-dB increment lines for calibration purposes.

 - C. The slewing 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 required 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 that threshold shall be the average of the midpoints of the tracing excursions.

APPENDIX D
SAMPLE EMPLOYEE NOTIFICATION LETTER

(Your letterhead here)

MEMORANDUM

TO: Employee's Name
FROM: Supervisor's Name
DATE:
REGARDING: Audiometric Testing

You are scheduled to report for your annual audiogram at John Keys Speech and Hearing (JKSH) Building at (time) on mo/dy/yr. Under the *Hearing Conservation Program*, it is your responsibility to avoid exposure to workplace noise for 14 hours before the test. It is also the employee's responsibility to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric test. For example, if you engage in personal activities that expose you to high levels of noise, it is your responsibility to avoid these activities. Noise exposure may result from personal activities such as operation of noisy equipment (lawn mowers, power tools, engines), stereo equipment, or other sources of loud noise such as gunfire or hammering.

Finally, it is also your responsibility to take your chosen hearing protection to the JKSH so that the fit may be evaluated.

Please read, sign, and return the attached sheet to _____.

(Your letterhead here)

Date

I understand the information in the attached memorandum and agree to avoid exposure to loud noises for 14 hours before my scheduled audiometric test.

I understand that I must take my chosen hearing protection to JKSH to be evaluated.

I also understand that I will not be allowed into my work facility on the day of the scheduled audiogram before the audiogram has been given to me.

Signature

Date

APPENDIX E
CALCULATIONS AND APPLICATION OF AGE
CORRECTIONS TO AUDIOGRAMS

CALCULATIONS AND APPLICATION OF AGE CORRECTIONS TO AUDIOGRAMS

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the procedures described below should be followed. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in the criteria document entitled "Criteria for Recommended Standard . . . Occupational Exposure to Noise," ((HSM)-11001). For each audiometric test frequency:

- I. Determine Tables E-1 or E-2 the age correction values for employee by:
 - A. Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz; and
 - B. Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.
- II. Subtract the values found in step I.B. from the values found in step I.A.
- III. The differences calculated in step II. represented that portion of the change in hearing that may be due to aging.

TABLE E-1
AGE CORRECTION VALUES IN DECIBELS FOR MALES

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

Table-E-1 (continued)

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
____55	10	11	19	27	32
56	10	11	20	28	34
57	10	11	21	29	35
58	10	12	22	31	36
59	11	12	22	32	37
60 or older	11	13	23	33	38

TABLE E-2
AGE CORRECTION VALUES IN DECIBELS FOR FEMALES

Years	Audiometric Test Frequency (Hz)				
	1000	2000	3000	4000	6000
20 or younger.....	7	4	3	3	6
21	7	4	4	3	6
22	7	4	4	4	6
23	7	5	4	4	7
24	7	5	4	4	7
25	8	5	4	4	7
26	8	5	5	4	8
27	8	5	5	5	8
28	8	5	5	5	8
29	8	5	5	5	9
30	8	6	5	5	9
31	8	6	6	5	9
32	9	6	6	6	10
33	9	6	6	6	10
34	9	6	6	6	10
35	9	6	7	7	11
36	9	7	7	7	11
37	9	7	7	7	12
38	10	7	7	7	12
39	10	7	8	8	12
40	10	7	8	8	13
41	10	8	8	8	13
42	10	8	9	9	13
43	11	8	9	9	14
44	11	8	9	9	14
45	11	8	10	10	15
46	11	9	10	10	15
47	11	9	10	11	16
48	12	9	11	11	16
49	12	9	11	11	16
50	12	10	11	12	17
51	12	10	12	12	17
52	12	10	12	13	18
53	13	10	13	13	18

Table E-2 (continued)

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
54.....	13	11	13	14	19
55.....	13	11	14	14	19
56.....	13	11	14	15	20
57.....	13	11	15	15	20
58.....	14	12	15	16	21
59.....	14	12	16	16	21
60 or older.....	14	12	16	17	22

APPENDIX F
AUDIOMETRIC TEST ROOM

AUDIOMETRIC TEST ROOM

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table F-1 when measured by equipment conforming at least to the Type 2 requirements of ANSI Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of ANSI Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

TABLE F-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 G
ACOUSTIC CALIBRATION OF AUDIOMETERS

ACOUSTIC CALIBRATION OF AUDIOMETERS

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 A9 coupler. In making these measurements, the accuracy of the calibration equipment shall be sufficient to determine that the audiometer is within the tolerances permitted by ANSI Specification for Audiometers, S3.6-1969.

I. SOUND PRESSURE OUTPUT CHECK

- A. Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.
- B. Set the audiometer's hearing threshold level (HTL) dial to 70 dB.
- C. Measure the sound pressure level of the tones that [sic] each test frequency from 500 Hz through 6000 Hz for each earphone.
- D. At each frequency the readout on the sound level meter should correspond to the levels in Table G-1 or Table G-2, as appropriate, for the type of earphone, in the column entitled "sound level meter reading."

II. LINEARITY CHECK

- A. With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70 dB.
- B. Measure the sound levels in the coupler at each 10-dB decrement form 70 dB to 10 dB, noting the sound level meter reading at each setting.
- C. For each 10-dB decrement on the audiometer the sound level meter should indicate a corresponding 10 dB decrease.
- D. This measurement may be made electrically with a voltmeter connected to the earphone terminals.

III. TOLERANCES

When any of the measured sound levels deviate from the levels in Table G-1 or Table E-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 advised. An exhaustive calibration is required if the deviations are 15 dB or greater at any test frequency.

TABLE G-1

**Reference Threshold Levels for
Telephonics – TDH-39 Earphones**

Frequency Hz	Reference Threshold Levels for TDH-39 Earphones	Sound 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

TABLE G-2
Reference Threshold Levels for
Telephonics – TDH-49 Earphones

Frequency Hz	Reference Threshold Levels for TDH-49 Earphones	Sound Meter Reading dB
500	13.5	81.5
1000	7.5	77
2000	11	79
3000	9.5	80
4000	10.5	79.5
6000	13.5	85.5

APPENDIX H

**METHODS FOR ESTIMATING THE ADEQUACY OF
HEARING PROTECTOR ATTENUATION**

METHODS FOR ESTIMATING THE ADEQUACY OF HEARING PROTECTOR ATTENUATION

For employees who have experienced a significant (standard) threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. In accordance with 29 CFR 1910.95, Appendix B, method ii when using a dosimeter that is not capable of C-weighted measurements, the following method will be used:

- I. Convert the A-weighted dose to TWA (See Appendix A -Table A-1).
- II. Subtract 7 dB from the NRR.
- III. Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.
- IV. If the A-weighted TWA is greater than 85 dB, hearing protection with a higher NRR will be selected by the EHSO for the employee's use so that the TWA will be less than 85 dB.

APPENDIX I
29 CFR 1910.95
NOISE STANDARD

APPENDIX J

29 CFR 1910.1020

ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS