Program: Hearing Conservation Program

Facility: Waimanalo Gulch Sanitary Landfill

Facility Location: 92-460 Farrington Highway, Kapolei, HI 96707

Site Manager: Joe Whelan

PURPOSE

To describe the Hearing Conservation Program requirements when employees are exposed to noise in excess of levels specified by OSHA 1910.95 Occupation Noise Exposure.

SCOPE

This procedure applies to all employees who may be exposed to noise levels above what OSHA regulatory requirements specify.

EXCLUSIONS

Employees whose noise exposure is less than 85-dBA time weighted over an 8-hour day or 50% equivalent dose.

DOT regulated drivers are excluded from requirements for wearing hearing protectors and participating in OSHA Hearing Conservation Programs. DOT requires interior cab noise levels to be 90 dBA or less. This does not preclude the facility from implementing appropriate practices.

RESPONSIBILITIES

The District Manager is responsible for administering the Hearing Conservation Program. This person:

Oversees the program.
Ensures that hearing protection is available.
Arranges for noise monitoring and audiometric tests as needed.
Reviews the program on an annual basis.
Provides employee training.
Posts notification in areas requiring hearing protection.
Checks that employees wear their hearing protection properly.

Waste Management supervisors are responsible for ensuring employees properly wears hearing protection in required areas, ensuring noisy areas are posted and personnel are following the requirements of this program.

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Waste Management employees must wear hearing protection properly where required and keep it clean and well maintained. Employees should tell their supervisors about work areas they believe are too noisy that may need monitoring or posting.

NOISE MONITORING

Waste Management conducts personal and/or area noise monitoring as needed to determine which areas have noise levels above eighty-five dBA or above a fifty percent dose for an eight-hour shift. A noise survey to determine areas of potential over-exposure should be conducted prior to personal noise dosimetry. OSHA requires use of the A-weighted decibel scale to determine compliance.

Area monitoring may be used to identify work areas, such as areas around pumps, motors, heavy equipment, or compressors, where workers must wear hearing protection. Personal noise monitoring determines which employees to include in the Hearing Conservation Program. Noise monitoring is important in determining which type of hearing protection will best protect hearing.

Until or unless site specific monitoring finds differently, all monitoring for site specific tasks performed by **Waste Managment** that indicate exposures above or equal to 85dBA TWA or equivalent will take precedence.

Each employee exposed at or above an 8-hour time-weighted average of 85 decibels will be notified of the results of the monitoring.

CONTROL MEASURES

The permissible noise level for OSHA compliance is ninety decibels on the A-weighted scale for an eight-hour, time-weighted average (TWA). If the noise levels exceed ninety dBA, **Waste Management** must implement appropriate administrative or engineering controls.

The OSHA action level for noise exposure is eighty-five dBA for an eight-hour TWA. If any **Waste Management** employee has a noise exposure that equals or exceeds the action level, a Hearing Conservation Program is mandatory. The facility will maintain a list of employees entered into the Hearing Conservation Program. The list is located with the Hearing Conservation Program binder.

Employees in areas of the facility where the eight-hour TWA noise level equals or exceeds eighty-five dBA, but is below ninety dBA, receive hearing protection. Use of hearing protection is recommended. However, if annual audiometric examination reveals a decline in the employee's hearing ability, the use of hearing protection becomes mandatory.

Any employee who is exposed to an eight-hour TWA of eighty-five dBA or greater who has not yet had a baseline audiogram, must wear hearing protection.

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Employees working in areas of the plant where the eight-hour TWA is ninety dBA or higher must wear appropriate hearing protection at all times.

AUDIOMETRIC TESTING

TESTING

Employees exposed above the action level will be included in **Waste Management** Hearing Conservation Program and given a baseline audiogram within 180 days of beginning work. An audiogram is a chart, graph, or table that displays the results of an audiometric test. Audiograms show an individual's hearing threshold levels as a function of frequency.

The initial audiogram becomes a baseline against which future audiograms are compared to determine if hearing loss has occurred. An employee's annual audiogram is compared to the baseline audiogram to determine if loss constitutes a standard threshold shift (STS). An STS is a change in hearing threshold relative to the baseline audiogram of more than ten dB or more at 2000, 3000, and 4000-hertz (Hz) in either ear. OSHA requires reporting of all work-related STS's with an average of **ten** dB or more at 2000, 3000, and 4000 Hz in either ear on the OSHA 300 log as an occupational illness. In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram.

A licensed or certified audiologist, or a physician or technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, must perform the audiogram.

MAINTAINING RECORDS

Waste Management is responsible for maintaining records of noise measurements and audiometric testing for prescribed lengths of time:

Area noise measurements—two years.
Audiometric test records—the duration of the worker's employment. The audiometric test provider should maintain these records for Waste Management.

Audiometric test records must include:

The name and job classification of the employee
The date of the test
The audiometric examiner's name
The date of acoustic calibration
Measurements of background sound pressure levels in audiometric test rooms. (The testing company usually retains this information).

If an employee incurred hearing loss prior to employment, proper medical documentation must be on file.

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EMPLOYEE NOTIFICATION

Waste Management must notify all affected employees of personal and area monitoring results. The contract physician provides interpretation of the audiometric test results to the employee. Retain copies of this form in the employee's personnel file.

If the comparison of the annual audiogram to the baseline audiogram indicates an STS has occurred, **Waste Management** must inform the employee in writing within twenty-one days. The audiometric tester should explain the results of the audiogram to each employee.

Any employee whose audiogram indicates an STS may be re-tested within thirty days. **Waste Management** can use the results from the retest as the annual audiogram.

If a physician determines the STS is work related, the supervisor must take the following steps:

Fit and train an employee who has not been wearing hearing protectors in the use and care of hearing protection.
Refit an employee already wearing protection with protectors with a higher level of protection (attenuation) and retrain him or her in the proper use of hearing protection.

Refer the employee for a clinical audiological evaluation if wearing hearing protection causes or aggravates the problem.

If subsequent audiometric testing of an employee indicates that an STS is not persistent, **Waste Management** must inform the employee of this.

HEARING PROTECTORS

Waste Management employees in work areas where the noise level is over the action level (eighty-five dBA, eight-hour TWA) receive hearing protection. Workers can select hearing protection from a variety of types with the proper attenuation. The hearing protectors are available at each work location.

All hearing protection devices will have a noise reduction rating (NRR) of twenty or greater. Hearing protection must reduce employee exposure to less than eight-five dBA.

Hearing protectors are:

Supplied at no cost to employees in the Hearing Conservation Program. Replaced as necessary.

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EMPLOYEE INFORMATION

As part of the Hearing Conservation Program**, Waste Management** will post signs at the entrance to all rooms or work areas where the noise level exceeds eighty-five dBA. The signs say:

Hearing Protection Required Beyond This Point, or equivalent. **Waste Management** will provide access to a copy of the OSHA Noise Standard by posting it in a prominent location. Supervisors should instruct employees who operate mobile equipment (such as drilling or trenching equipment) to wear hearing protection.

Affected employees or their representatives have access to copies of this standard and a copy of the standard is also posted at the work location.

TRAINING (Refer to Appendix A)

Employees exposed to noise above eighty-five dBA will be trained annually. Training is to cover all of the requirements of the OSHA noise standard, including:

The effects of noise on hearing
The purpose, advantages, and disadvantages of various types of hearing protectors
The selection, fitting, and care of protectors
The purpose and procedures of audiometric testing

- The attenuation of different types of protection and what this means in terms of noise reduction.

RECORDKEEPING

RETENTION

Waste Management shall retain records required in this program for at least the following periods:

- Noise exposure measurement records shall be retained for two (2) years.
- Audiometric tests records shall be retained for the duration of the affected employee's employment.

ACCESS

All records required by this section shall be provided upon request to employees, former employees, and representatives designated by the individual employee.

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ENFORCE THE PROGRAM

Consistent enforcement of the Hearing Conservation Program is important. The message needs to be conveyed that the use of hearing protection is strictly required in some areas. All persons in hearing protection areas, including visitors, managers, and office employees, must wear required hearing protection devices.

REVIEW THE PROGRAM ANNUALLY

The program administrator conducts an annual review of the Hearing Conservation Program. The review addresses the following:

Monitoring

Review previous monitoring results.
Identify areas with altered or changed equipment or processes and arrange for monitoring in these areas.
Arrange for monitoring in these areas and areas where monitoring has not been performed within a year.

Audiometric Testing

Review audiometric results for all employees.
Check to determine if repeat testing for employees who show an STS has been performed. If not, arrange for repeat testing.
Arrange for all employees working in areas where the noise level is above the action level to have audiometric testing annually.

Review Hearing Loss Patterns

Recognize jobs that seem to cause hearing loss.
List employees who show a loss of hearing above twenty-five dB (Standard Threshold Shift) on the OSHA 300 log as an occupational illness.

Identify Potential Hearing Loss Causes

Do employees wear their hearing protection?
Do they wear hearing protection properly?
Is the protection sufficient?
Has noise increased in the work area?
Was this increase caused by the addition of new equipment?
Was this increase caused by old equipment becoming noisier?

Implement Additional Controls

Reduce noise sources with an engineering control. Document any noise abatement activity.
Get different hearing protectors.
Conduct additional training in the correct use of hearing protection.

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Enforce the use of hearing protection.

Retrain and issue hearing protection with a higher protection level to any employee showing hearing loss. If these employees continue to show an occupationally related hearing loss over two consecutive years, place them in a new job without a noise hazard.

Make a list of the names of the persons included in the Hearing Conservation Program.

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	Average Exposure (dBA)	Exposure Range (dBA)	Avg. Dose %	Dose Range %
Hauling				
Driver – Commercial	86	76 – 90	79	19 - 151
Driver – Dump Truck	78	69 – 88	27	5 – 34
Driver – Recycle	85	81 – 91	70	9 – 138
Driver – REL	85	83 – 87	57	42 – 81
Driver – Residential	87	82 – 99	92	2 – 481
Driver – Roll-Off	87	76 – 92	103	18 – 191
Driver – Semi-Truck	86	83 – 88	68	28 – 101
Driver – Sweeper	86	83 – 90	80	39 – 119
Drivers – Overall	86	71 – 99	78	2 – 481
Landfill/Transfer				
Driver – Site Truck	84	78 – 89	43	18 – 85
Driver – Water Truck	84	70 – 91	103	18 – 192
Gas Plant/Gas Recovery	90	82 – 98	102	22 – 316
Laboratory Personnel	78	56 – 90	36	0.4 – 299
Loaders – Transfer/Tipping	86	70 – 95	71	4 – 299
Operator – Compactor	91	91	115	96 – 134
Operator – Landfill Equip.	85	64 – 99	79	3 – 319
Spotter – Transfer / Tipping	85	71 – 93	57	6 – 131
Maintenance				
Mechanic – Hauling/Landfill	81	69 – 96	35.8	3 – 236
Mechanic – MRF	83	69 – 89	52	4 – 94
Tire Men	83	71 – 88	57	8 – 91
Material Recovery Facility				
Baler Operator	87	76 – 104	77	13 – 200
Forklift/Bobcat Operator	87	81 – 93	73	54 – 187
Sorters	88	72 – 103	101	1.9 – 1243
Ticket Collector MRF	87	86 – 87	69	56 – 88

Note:

8-Hour Average Exposures of 85 dBA or Greater (or 50% of the Allowable Dose) Require Hearing Conservation Training, Audiograms and the Availability of Hearing Protection.
8-Hour Average Exposures of 90 dBA or Greater (or 100% of the Allowable Dose) Require Mandatory Use of Hearing Protection in Addition to Other Hearing Conservation Program Requirements.
If the Data Above Indicates Excessive Exposures, Implement Hearing Conservation OR Conduct Monitoring to Determine the Specific Exposures at Your Location. Send a Copy of the Results to Corporate Safety.
DOT Drivers are Covered by 49 CFR 394 Inside of Their Cabs, and Not 29 CFR 1910.95. They **Must Not** Wear Hearing Protection While Driving on Public Roadways

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DOCUMENT REVIEW RECORD

Use this form to document plan reviews and plan revisions.

Date	Reviewer's Signature	Plan Revisions Made

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§29 CFR 1910.95
OCCUPATIONAL NOISE EXPOSURE.

(a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on the graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1.G-16.

(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

(2) If the variations in noise level involve maximums at intervals of 1 second or less, it is to be considered continuous. Table G-16. -- Permissible Noise Exposures{1}.

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

{1} When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following factions: C(1) / T(1) + C(2) / T(2) C(n) / T(n) exceeds unity, then the mixed exposure should be considered to exceed the limit value. C(n) indicates the total time of exposure at a specified noise level, and T(n) indicates the total time of exposure permitted at the level.

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

(b) Hearing Conservation Program.

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(1) The employer shall administer a continuing, effective Hearing Conservation Program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels

(2) measures on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the Hearing Conservation Program, employee noise exposures shall be computed in accordance with Appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

(3) For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

(d) 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 develop and implement a monitoring program.

(i) The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

(ii) Where circumstances such as high worker mobility, significant component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

(2) (i) All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

(ii) Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

(3) Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

(i) Additional employees may be exposed at or above the action level; or

(ii) The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

(e) Employee notification. The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

(f) Observation of monitoring. The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

(g) Audiometric testing program.

(1) The employer shall establish and maintain an Audiometric testing program as provided in this paragraph by making Audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

(2) The program shall be provided at no cost to employees.

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 examinations, obtaining valid Audiograms, and properly using, maintaining and checking calibration and proper functioning of the audiometers being used.

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(3) A technician who operates microprocessor audiometers does not need to be certified. A technician who performs Audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

(4) All Audiograms obtained pursuant to this section shall meet the requirements of Appendix C: Audiometric Measuring Instruments.

(5) Baseline Audiogram.

(i) Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline Audiogram against which subsequent Audiograms can be compared.

(ii) Mobile test van exception. Where mobile test vans are used to meet the Audiometric testing obligation, the employer shall obtain a valid baseline Audiogram within 1 year of an employee's first exposure at or above the action level. Where baseline Audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees shall wearing hearing protectors for any period exceeding six months after first exposure until the baseline Audiogram is obtained.

(iii) 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 requirement that baseline Audiograms be preceded by 14 hours without exposure to workplace noise.

(iv) The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the Audiometric examination.

(6) Annual Audiogram. At least annually after obtaining the baseline Audiogram, the employer shall obtain a new Audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

(7) Evaluation of Audiogram.

(i) Each employee's annual 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 paragraph (g)(10) of this section has occurred. This comparison may be done by a technician.

(ii) If the annual Audiogram shows that an employee has suffered a standard threshold shift, the employer may obtain a retest within 30 days and consider the retest the results of the retest as the annual Audiogram.

(iii) The audiologist, otolaryngologist, or physician shall review problem Audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

(A) A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

(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 D; Audiometric Test Rooms.

(D) Records of audiometer calibrations required by paragraph (h)(5) of this section.

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(8) Follow-up procedures.

(i) if a comparison of the annual Audiogram to the baseline Audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination. (ii) Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

(A) Employees not using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(B) Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(C) The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

(D) The employee is informed 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.

(iii) If subsequent Audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

(A) Shall inform the employee of the new Audiometric interpretation; and

(B) May discontinue the required use of hearing protectors for that employee.

(9) Revised baseline. An annual Audiogram may be substituted for the baseline Audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the Audiogram:

(i) The standard threshold shift revealed by the Audiogram is persistent; or

(ii) The hearing threshold shown in the annual Audiogram indicates significant improvement over the baseline Audiogram.

(10) Standard threshold shift.

(i) As used in this section, a standard threshold shift is 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.

(ii) In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual Audiogram according to the procedure described in Appendix F: Calculation and Application of Age Correction to Audiograms.

(h) Audiometric test requirements.

(1) 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.

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(2) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969, which is incorporated by reference as specified in § 1910.6.

(3) Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: Audiometric Measuring Instruments.

(4) Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: Audiometric Test Rooms.

(5) Audiometer calibration.

(i) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing threshold'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.

(ii) Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: 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.

(iii) 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 American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

(i) Hearing protectors.

(1) Employers shall make hearing protectors available to all employees 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.

(2) Employers shall ensure that hearing protectors are worn:

(i) By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

(ii) By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

(A) Has not yet had a baseline Audiogram established pursuant to paragraph (g)(5)(ii); or

(B) Has experienced a standard threshold shift.

(3) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

(4) The employer shall provide training in the use and care of all hearing protectors provided to employees.

(5) The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

(j) Hearing protector attenuation.

(1) The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in Appendix B: Methods for Estimating the Adequacy of Hearing Protection Attenuation.

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(2) Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels are required by paragraph (b) of this section.

(3) 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.

(4) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

(k) Training program.

(1) The employer shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

(2) The training program shall be repeated annually for each employee included in the Hearing Conservation Program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

(3) The employer shall ensure that each employee is informed of the following:

(i) The effects of noise on hearing;

(ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and

(iii) The purposes of Audiometric testing, and an explanation of the test procedures.

(l) Access to information and training materials.

(1) The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

(2) The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

(3) The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to the standard to the Assistant Secretary and the Director.

(m) Recordkeeping

(1) Exposure measurements. The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

(2) Audiometric tests.

(i) The employer shall retain all employee Audiometric test records obtained pursuant to paragraph (g) of this section:

(ii) This record shall include:

(A) Name and job classification of the employee;

(B) Date of the Audiogram;

(C) The examiner's name;

(D) Date of the last acoustic or exhaustive calibration of the audiometer; and

(E) Employee's most recent noise exposure assessment.

(F) The employer shall maintain accurate records of the measurements of the background sound pressure levels in Audiometric test rooms.

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(3) Record retention. The employer shall retain records required in this paragraph (m) for at least the following periods.

(i) Noise exposure measurement records shall be retained for two years.

(ii) Audiometric test records shall be retained for the duration of the affected employee's employment.

(4) Access to records. All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20(a) - (e) and (g) - (i) apply to access to records under this section.

(5) Transfer of records. If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m)(3) of this section.

(n) Appendices.

(1) Appendices A, B, C, D, and E to this section are incorporated as part of this section and the contents of these Appendices are mandatory.

(2) Appendices F and G to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligation.

(o) Exemptions. Paragraphs (c) through (n) of this section shall not apply to employers engaged in oil and gas well drilling and servicing operations.

(p) Startup date. Baseline Audiograms required by paragraph (g) of this section shall be completed within six months of hire date.

Purpose

The purpose of this training is to give you the basic knowledge needed to understand why hearing conservation is an important part of the safety and health equation.

Objectives:

By the end of this training, participants should be able to understand:

1. The Effects of noise on hearing;
2. The purpose of hearing protectors.
3. The advantages, disadvantages, of various types of hearing protection.
4. Selection, use and care of hearing protection.
5. The purpose of audiometric testing.

HOW WE HEAR…... It's as simple as 1, 2, 3...

1) Your **outer ear**, called the pinna, collects sound waves and channels them down the ear canal to a thin, tight piece of skin called the ***tympanic membrane (eardrum)***.

2) The eardrum vibrates in response to these pressure waves and pushes on the small bones of your **middle ear**. These bones act like a set of levers, transferring their mechanical motion to a fluid-filled structure in the **inner ear**, called the ***cochlea***.

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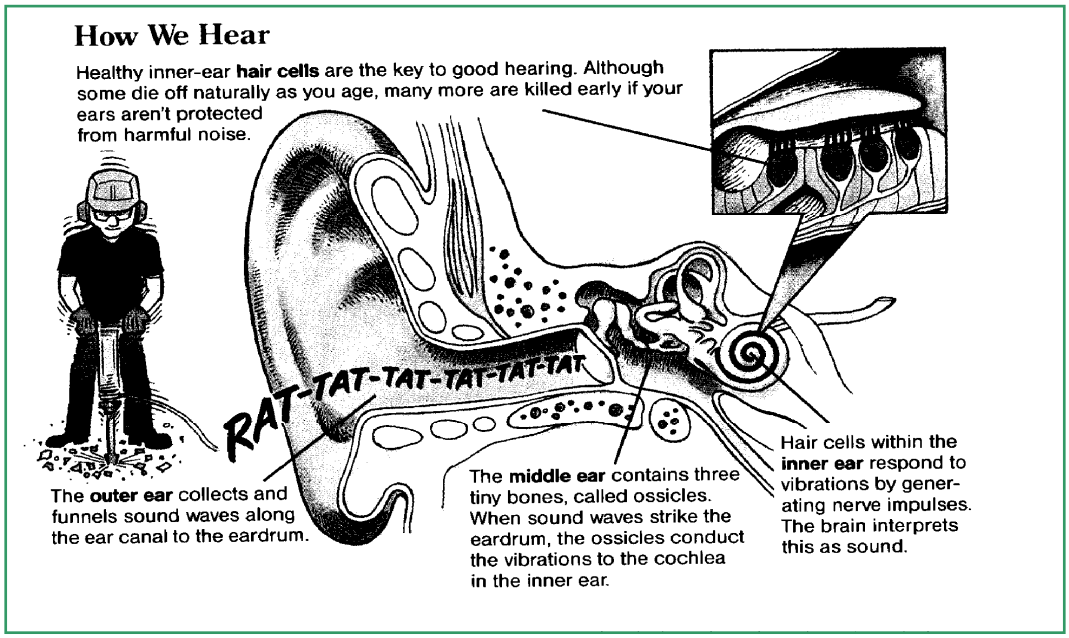
4) In the cochlea, cells with tiny sensing hairs transform the fluid movement into electrical signals. These signals travel along the auditory nerve to your brain. Once in the brain, the nerve signals are decoded and processed into what we recognize as sound.



EFFECTS OF NOISE ON HEARING

Prolonged exposure to excessive noise levels can cause a noise-induced hearing loss.

When you are exposed to excessive noise levels, the first effect usually is a temporary hearing loss. You may have difficulty in conversation or the ears may feel "plugged and "ring." Over a period of time, an individual who experiences repeated temporary hearing loss will have gradual, permanent, irreversible hearing loss.

Noise-induced hearing loss (called "acoustic trauma") involves damage to the receptor cells in the inner ear and is classified as sensori-neural impairment. A noise-induced hearing loss typically begins with a drop in hearing level at the higher frequencies of sound. As the hearing loss increases, it includes the lower sound frequencies that include speech. Early noise-induced hearing loss normally is not detected by an individual, since it occurs above the speech range. By the time an individual is aware of a hearing loss, the amount of loss may be significant.

Noise exposure is cumulative. So the noise at home or at play must be counted in the **total** exposure during any one day. If the maximum allowable noise level is reached while on the job, any following exposure during non-working hours, such as a noisy lawnmower or loud music will may cause you to exceed the safe daily limit.

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PICTURE THIS: (similarity to hairs cells in your ears)

You take a shortcut across a luxuriant green lawn with tall, healthy blades of grass reaching proudly toward the sky. Where you have walked, the blades are trampled, bent over, bruised and damaged. You can see the outline of each of your steps in the thick carpet of grass.

Tomorrow, you decide to take the same shortcut. As you look, there is no sign you passed this way yesterday. This time, however, some of your co-workers see you and decide to do the same thing. Soon, many people begin taking this route, not just once a day but throughout the day as well. Before long, bicyclists are using the path. Eventually, the blades of grass have no time to repair themselves between uses. Gradually, some of the blades break off, and then more as time progresses. Eventually, where once there was a beautiful lawn, there now is a dirt trail with only a blade or two of grass here and there.

PURPOSE OF HEARING PROTECTORS

Hearing protectors either are plugs of various shapes and sizes that are inserted into the ear canals or muffs that are placed over the ears. In either case, their job is to reduce the intensity of sound that reaches the ear so as to protect the ear from potentially damaging noise.

Advantage and Disadvantage of Hearing Protectors:

Foam Hearing Protectors:

A cylinder of sound-attenuating foam. The foam is compressed and inserted in the ear canal, where the foam expands to fill the canal.

- Advantages: Readily available, inexpensive, disposable, adequately comfortable, lightweight.
- Disadvantages: Requires regular replacement, can become uncomfortable with prolonged wear.

Ribbed Hearing Protectors:

Made of rubber in a "one size fits all" shape. They are inserted in the ear canal as deeply as possible.

- Advantages: Generally available, durable, lightweight, washable.
- Disadvantages: Slip easily, uncomfortable, may not provide tight fit.

Muff Hearing Protectors:

Resemble stereo head sets that completely cover the ears.

- Advantages: Good noise reduction, hard to lose, more durable with infrequent replacement.
- Disadvantages: Heavy and cumbersome, more expensive, hot, uncomfortable.

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Custom Molded Protectors: Made of silicone and are molded to exactly fit the individual's ear.

- Advantages: Good noise rating, durable, very comfortable for long periods of time.
- Disadvantages: Requires initial impression of ear, more expensive, possible replacement.

Attenuation of Hearing Protectors (Noise Reduction by Hearing Protectors)
Manufacturers of hearing protection assign a Noise Reduction Rating (NRR) to each type of hearing protector. The NRR is an indication of the relative level of protection provided by the plug or muff. The higher the NRR, the more protection the equipment provides. The NRR is determined under ideal laboratory conditions and should not be used as a direct measurement of the protection that each wearer will receive.

Field Attenuation of Hearing Protection: To estimate the attenuation afforded to a noise-exposed employee in an actual work environment by muffs, plugs, or a combination of both, proceed as follows.
a. For muffs or plugs:

Determine the laboratory-based noise attenuation afforded by the given hearing protector. This is based on laboratory testing using human subjects and is provided by the manufacturer. It is referred to as the Noise Reduction Rating or NRR and should be on the packaging.

Subtract 7dB from the NRR to correct for using A-weighted measurements.

To adjust for workplace conditions, applying a safety factor of 50% is recommended. This is because the field use of ear protectors does not afford the same degree of protection achieved in the laboratory using well-trained subjects under ideal test conditions.

b. For dual protection (i.e. muffs and plugs):

Determine the laboratory-based noise attenuation (NRR) for the higher rated hearing protector, subtract 7dB, and (it is recommended that you) apply a safety factor of 50%.

Then add 5 dB to the field-adjusted NRR to account for the use of the second hearing protector.

Example 1: TWA = 100 dBA and Muff NRR = 19 dB
Approximate Field Attenuation is: (19-7) × 50% = 6 dB
100 dBA TWA - 6 dB = 94 dBA

Conclusion: The protected TWA can be assumed to be 94 dBA. Feasible engineering controls must be implemented. Since the HCA does not require applying a 50% correction factor, the protected TWA is 88 dBA. Therefore, better hearing protection (with greater attenuation) is not required by the standard. If an employee exhibits an STS, better hearing protection may be required.

Example 2: Given TWA = 98 dBA and Plug NRR = 29 dB
Approximate Field Attenuation is: (29-7) × 50% = 11 dB
98 dBA TWA - 11 dB = 87 dBA

Conclusion: The protected TWA can be assumed to be 87 dBA. Unless the employee exhibits

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an STS, the employer meets one of the necessary conditions for being excused from the requirement to implement engineering controls. Better hearing protection (with greater attenuation) is not required since the protected TWA, without the safety factor, is 76 dBA. If an employee exhibits an STS, better hearing protection should be recommended.

Example 3: Given TWA_8 = 110 dBA, Plug NRR = 29 and Muff NRR = 25 dB
Employer requires dual protection.
Calculate field-adjusted NRR for the higher-rated protector:
(29-7) × 50% = 11 dB
Add 5 dB to this field-adjusted NRR: 11+5 = 16 dB
Calculate the protected TWA_8: 110 dBA TWA_8 - 16 dB = 94 dBA

Conclusion: The protected TWA_8 can be assumed to be 94 dBA. If feasible, engineering controls must be implemented. The protected TWA_8, without using the 50% safety factor, is 83 dBA. Therefore, better hearing protection is not required by the HCA. Hearing protectors with greater attenuation should be recommended.

SELECTION OF EAR PROTECTORS

Ear protector selection should be based on employee convenience, comfort, and proper degree of attenuation. Under attenuation would lead to excessive noise exposure. Over attenuation in moderate noise levels can lead to a feeling of isolation and, consequently, poor acceptance of the protectors.

Fitting

Earplugs must fit tightly to provide a good seal. Grasping the ear with the opposite hand, pulling it up and out to open the ear canal and then inserting the plug with the other hand insert the earplug.

Muffs will normally fit all people without any difficulty. Eyeglasses may interfere with the proper fitting of the muff. Muffs that attach directly to hard hats are also available.

Ear stoppers are usually easy to position. The headband can be worn on top of or behind the head, or under the chin.

When hearing protectors are initially worn, it may take a short time for the employee to adjust to the new level of sound. The same sounds are heard, but at a lower intensity.

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Care and Use of Protectors

Ear protectors must be maintained in sanitary condition. It is important that earplugs be clean when inserted into the ears. If plugs are dirty when inserted, they may cause irritation, which could lead to infection of the ear canal. The same applies to stoppers.

Earplugs, when not in use, should be stored in some type of container that can be closed to seal out dust or dirt. Earplugs should be replaced when they no longer can be cleaned or loose their pliability.

Earmuffs have a replaceable seal, which should be kept clean. The seal should be replace whenever it becomes stiff or cracked.

AUDIOMETRIC TESTING

Audiometric testing is a means of determining your hearing ability. "Normal" hearing includes the median hearing level of a large group of American adults between 18 and 25 years of age, having no known history of ear disease and no appreciable high-level noise exposure. The accepted normal range of hearing is between 0 and 25 decibels.

The audiometric test consists of exposing each ear separately to sound at six different frequencies. The audiometric test will indicate the amount of hearing loss, if any, of an individual. The higher the decibel reading, the greater the hearing loss. As an individual ages there is a natural hearing loss, which takes place. This is called presbycusis. A cold, an ear infection, or recent high noise exposure can cause a temporary hearing loss, which would produce poor test results. Tests should not be administered to anybody with a cold or an ear infection. Test will need to be administered once cold or ear infection has passed. Audiogram should be preceded by at least 14 hours of quiet. If audiogram is to be administered during work shift the supervisor should require it mandatory for employees to wear hearing protectors prior to taking audiogram test.

RIGHT TO ACCESS RECORDS

All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the director.

Conclusion

The more intense or louder the noise, the more likely it will contribute to hearing loss. The longer an employee is exposed to a particular noise at work or at home, the greater the chance an injury will occur to the auditory system. To minimize the risk of hearing loss occurring it is up to each employee to take responsibility and wear hearing protectors at work or at home.

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Glossary

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

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

(3) Baseline audiogram - The audiogram against which future audiograms are compared.

(4) Criterion sound level - A sound level of 90 decibels.

(5) Decibel (dB) - Unit of measurement of sound level.

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

(7) Impulsive or impact noise - Noise levels which involve maxima at intervals greater than one second. Where the intervals are less than one second, the noise levels shall be considered continuous.

(8) 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.

(9) Noise dose - The ratio, expressed as a percentage, of (a) the time integral, over a stated time or event, of the 0.6 power of the measured SLOW exponential time-averaged, squared A-weighted sound pressure and (b) the product of the criterion duration (8 hours) and the 0.6 power of the squared sound pressure corresponding to the criterion sound level (90 dB).

(10) Noise dosimeter - An instrument that integrates a function of sound pressure over a period of time in such a manner that it directly indicates a noise dose.

(11) Otolaryngologist - A physician specializing in diagnosis and treatment of disorders of the ear, nose and throat.

(12) 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 the exposure of other employees in the workplace.

(13) Standard threshold shift - A hearing level change, relative to the baseline audiogram, of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

(14) Sound level - Ten times the common logarithm of the ratio of the 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 unless specifically specified otherwise.

(15) Sound level meter - An instrument for the measurement of sound level.

(16) Time-weighted average sound level - That sound level, which if constant over an 8-hour period, would result in the same noise dose as if measured in the time varying noise level environment. A sound's volume level, which your brain perceives as loudness, is measured in ***deciBels***.

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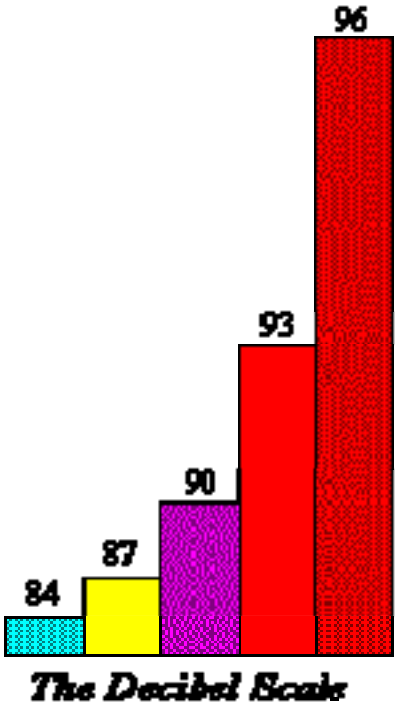
RELATION SHIP OF THE DECIBEL TO SOUND INTENSITY IN NON-LOGARITHMIC UNITS

Decibels	Units
0	1
10	10
20	100 (10^2=100)
30	1,000
40	10,000
50	100,000
100	10,000,000,000
150	1,000,000,000,000,00



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