Hearing Conservation Program

CWRU
Environmental Health and Safety Department
(EHS)
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Section 1: Introduction

The adverse health effects of occupational exposure to high noise levels, including hearing damage or loss is a major concern in a vast majority of industries and other work environments. In this regard, The Occupational Safety and Health Administration (OSHA) has developed mandatory standards (29 CFR 1910.95) to protect employees against the effects of exposure to the high sound levels.

1.1 Policy

It is the policy of Case Western Reserve University (CASE) to provide all employees with a safe and healthy working environment. This is accomplished by utilizing tools such as inspection, training, monitoring, and application of different prevention and control methods once an overexposure is anticipated or established.

The principal objective of this Hearing Conservation Program is anticipation, recognition, evaluation, and control of the high noise exposures. This program will also explain the OSHA requirements that need to be in place when employee noise exposures equal or exceed the regulations.

1.2 Program Organization

The CASE Hearing Conservation program was developed and will be maintained by CWRU EHS Department in compliance with OSHA 29CFR 1910.95 and is organized and administered through the department’s Standard Operating Procedures (SOPs).
Section 2: Responsibilities

2.1 Case Western Reserve University

CWRU EHS Department is responsible for developing, implementing, and administering the Hearing Conservation Program.

Detailed responsibilities include:

1. Identifying areas and equipment within CASE and its affiliate buildings where noise levels are equal to or greater than regulations.
2. Quantifying employees’ 8-hour exposure within areas at which the noise level is equal to or greater than the action level (AL). This will be achieved by area and/or personal monitoring (noise dosimetry).
3. Consulting employees and CWRU Health Services about noise measurement and analysis results.
4. Coordinating with CWRU Health Services to perform audiometric tests, necessary for exposures within or above the AL, and annual retesting. Audiometric testing will be conducted within the first six months of employment (base line audiogram) for new hires working within high noise level areas. Audiometric testing will be repeated annually for identified at-risk employees, unless evaluation by CWRU EHS Department indicates that engineering or administrative control measures have decreased the noise level below the AL.
5. Evaluation of work areas and equipment every two years to determine where noise levels are suspected to equal or exceed the AL.
6. If evaluation is beyond the technical ability of CWRU EHS Department, the PI or supervisor will be financially responsible for additional testing conducted by an outside contractor.
7. Scheduling and conducting of annual retraining which will inform employees about noise hazards, methods of control, and proper use of hearing protection devices (HPDs).
8. Introducing proper engineering and administrative control methods to supervisors, and providing consultation to select proper HPDs.

2.2 University Health Services

CWRU Health Services and EHS Department will coordinate necessary audiometric tests and retests for both new and current employees. A list of employees requiring audiometric testing will be provided by CWRU EHS Department and sent to the Health Services for further actions. A copy of the audiometric test results will be included in the
employees’ medical file. Health Services will also further evaluate the cases where audiometric testing indicated hearing loss or damage.

2.3 PI/Supervisor

It is the responsibility of the PI or Supervisor to ensure that all possible employees exposed to noise levels equal to or greater than the regulations be informed about the potential hazard and are included in the hearing conservation program.

Other responsibilities of the PI/Supervisor include:

1. Informing CWRU EHS of any concern about high noise levels in their work area.
2. Posting adequate warning signs and a copy of the OSHA 29CFR 1910.95 standard (appendix A) on the entrance doors to the high noise level areas, recognized by CWRU EHS, the PI or Supervisor.
3. Coordination with CWRU Health Services for necessary initial audiometric tests and annual retests.
4. Implementing engineering and administrative control methods to reduce noise within or below acceptable levels.
5. Ensure that proper types of hearing protection devices (HPDs) are available for all employees exposed to noise levels equal to or greater than 85 dBA. Employer shall also enforce the use of HPDs and their proper application and maintenance.
6. Keep records of employee training, audiometric tests, and follow up documents.
7. Update annual trainings and conduct necessary on the job training.
8. Follow up with CWRU Health Services to protect effected employees against further over exposure and any necessary medical or legal actions.
9. Communicating any Standard Threshold Shift (STS) with employee, in writing, within 21 days after receiving test result. A STS is 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.

2.4 Employees

Employees exposed to excessive levels of noise greater than 85 dBA are responsible to use and maintain their HPDs as instructed. Employees are also responsible for:

1. Participating in initial and annual noise training program.
2. Participating in medical surveillance, including audiometric tests.
3. Informing their Supervisor or Safety Services about any noise concerns or symptoms of excessive exposure to noise.
Section 3: Noise Evaluation and Surveillance Procedures

3.1 Identification of the High Noise Level Areas:

Areas where noise levels may reach or exceed 85 dBA will be identified through annual inspections, complaint reports, and noise surveys. CWRU EHS Department will conduct sound pressure level (SPL) measurements to identify high noise level areas. These areas (SPL ≥ 85 dBA) will be monitored at least annually.

Signs will be posted at the entrance to all work areas where noise levels are equal to or greater than 85 dBA. It is the responsibility of the PI/Supervisor to ensure that HPDs are available and used by all employees/personnel working in or visiting those areas.

3.2 Noise Measurement and Exposure Assessment:

Using Standard Operating Procedures (SOPs), area monitoring will be conducted first to determine if noise levels are equal to or greater than the Action Level (AL). The AL is an 8-hour time-weighted average of 85 decibels measured on the A-scale. Once high noise level areas are identified, personal monitoring (noise dosimetry) will be conducted to measure actual noise exposure. The employee’s Time Weighted Average (TWA) exposure will be compared to the OSHA noise exposure limits, which is based upon duration per day, hours and sound level (dBA):

Table 1. Permissible Noise Exposures

<table>
<thead>
<tr>
<th>Duration per Day (hour)</th>
<th>Sound Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>1.5</td>
<td>102</td>
</tr>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>0.5</td>
<td>110</td>
</tr>
<tr>
<td>0.25 or less</td>
<td>115</td>
</tr>
</tbody>
</table>

* Exposure to impulsive or impact noise shall not exceed 140 dB peak SPL.
3.2.1 Area Monitoring

Area monitoring is conducted to ascertain the noise level/pattern within an area. Using a calibrated sound level meter, environmental noise level is measured to identify areas where employees may be exposed to noise levels at or above the AL. This survey will identify whether further monitoring is necessary. Using a rough sketch, the room is divided into 1m x 1m squares. Readings will be taken at the center of each square (holding the monitor at normal working surface height and using slow mode). A noise contour will be drawn to show areas with equal sound level measurements.

Figure 1. Area Monitoring Sketch

If the TWA noise level is below 85 dBA in an area, no further routine monitoring will be required. If an exposure equal to or greater than 85 dBA is identified, monitoring records shall be kept on file, and annual monitoring shall be conducted to study any possible changes. Furthermore, in order to quantify personal exposure, personal monitoring will be required.

3.2.2 Personal Monitoring (Noise Dosimetry)

All employees with a TWA noise exposure at or above the AL will be monitored to identify personal noise exposure. Each employee to be monitored will have a calibrated noise dosimeter attached to the body with a microphone placed in their “hearing zone”.

Figure 2: Placement of Microphone in Hearing Zone
Measurements will continue throughout a full working shift. The dosimeter will be removed at the end of the shift and the data will be recorded. Employees with an 8-hour TWA exposure equal to or greater than 85 dBA will be referred to Health Services to be included in the medical surveillance program.

3.3 Annual Monitoring

An area or personal exposure with TWA noise levels at or above the AL, will be monitored annually. Any change in process/equipment requires re-monitoring to evaluate any increase/decrease in the noise level. Monitoring can be discontinued when the noise level has fallen below the AL.
Section 4: Noise Control Methods

4.1 Engineering Controls

Engineering controls are the most desirable noise control methods because the noise is controlled at the noise source or along the noise path.

Examples of engineering control methods include:

- Utilizing equipment that generates lower noise levels
- Enclosing the noise source or the worker
- Using shields or barriers between source and receiver.

4.2 Administrative Controls

Administrative controls are another method to eliminate the noise hazard or reduce it to a more manageable level.

Examples of administrative controls include:

- Decreasing the distance between receiver and the noise source
- Reducing the number of work hours in high noise areas
- Rotating tasks in high noise areas

4.3 Personal Protective Equipment

Hearing protection devices (HPDs) are the last method of control, chosen when engineering or administrative control methods are not feasible. HPDs shall be able to attenuate employee exposure at least to an 8-hour TWA of 90 dB or to 85 dB for employees who experience a STS.

4.3.1 Types of HPDs:

a) Ear plugs

There are three different categories of earplugs:

- Premolded earplugs come in different sizes and usually have one or three flanges. Premolded ear plugs are reusable, but employees need to make sure they are not deteriorated before each use.
- *Formable* earplugs usually come in one size. Most of the formable earplugs are made of materials which, after being compressed and inserted, expand to form a relatively complete seal in the ear canal. Many formable earplugs are washable and reusable.
- *Custom molded* earplugs are made to fit the exact size and shape of the individual’s ear canal. If custom molded earplugs are needed, individuals shall be referred to an audiologist.

Figure 3: Formable earplugs

Figure 4: Premolded earplugs

Figure 5: Custom molded earplugs

b) **Earmuffs**

Ear muffs are worn around the ear to reduce the noise level that reaches the air. To achieve the maximum protection, it is important to have an air tight seal between the cushions and the head.
4.3.2 Selection, Use, and Maintenance of HPDs

The HPD that is selected must reduce the existing noise level well below the 85 dBA. It is advised to give individuals a choice between different HPDs which fit them best and which they feel most comfortable using.

PPE shall be used, maintained, and cleaned in accordance with the manufacturer’s instructions. Reusable earplugs need to be washed by the employee in lukewarm water with hand soap, rinsed in clean water, and dried thoroughly before each use. All earplugs must be cleaned regularly and must be dry before storing.

Earmuff cushions need to be kept clean. While plastic or foam cushions may be cleaned in the same way as earplugs, inside the muff shall never get wet. When not in use, earmuffs shall be placed in open air to allow possible absorbed moisture to evaporate.
Section 5: Medical Surveillance

5.1 Notification

Upon recognition of employee’s TWA exposure at or above 85 dBA, DOES will inform the PI or Supervisor in writing that employee should be included in the Hearing Conservation Medical Surveillance Program. CWRU EHS Department will conduct training and the PI or Supervisor will be responsible to post the hazard area with appropriate noise hazard signs and coordinate with CWRU Health Services for audiometric testing. CWRU Health Services will notify the employee and CWRU EHS Department regarding test results within 15 working days regarding test results.

5.2 Audiometric test

Audiometric testing is conducted annually, for all individuals working in areas with noise levels at or above 85 dBA. Annual testing is required in order to identify workers who may be at the beginning stages of hearing loss. Audiometric testing is also conducted within the first six months of employment if employed in high noise areas to establish a baseline audiogram. This baseline information will be compared with annual audiometric test results for early recognition of possible hearing loss. This test shall be conducted at 500, 1000, 2000, 4000 and 6000 Hz.

While Health Services will coordinate audiometric testing, it is the responsibility of the PI or Supervisor to make sure that employees who are employed in high noise areas are sent to Health Services for proper screening.

At least 14 hours before audiometric testing is conducted, both occupational and non-occupational exposure to high noise levels should be avoided. Once a STS is observed in an audiogram, retest will be obtained within 30 days and considered as final test results.

Figure 7. Audiometric Testing

Figure 8. Audiometric Testing Booth
Section 6: Training

All employees who are assigned to enter or work in a known high level noise area shall be trained by CWRU EHS Department before starting the task. Annual retraining is required. Refer to Appendix B for training program.

Training will provide the following information:

- a. Adverse health effects of noise
- b. Noise-induced hearing loss
- c. Recognizing hazardous noise
- d. Symptoms of noise overexposure
- e. Noise control methods
- f. Types of HPDs and associated advantages and disadvantages
- g. Selection, use, and maintenance of HPDs
- h. Noise measurement process
- i. Audiometric tests
- j. OSHA CFR 1910.95 and hearing conservation requirements
Section 7: Program Evaluation

The Hearing Conservation program and relevant standard operating procedures (SOPs) will be evaluated annually or whenever there is a change in the process or regulatory mandates. Changes may include addition of an engineering control or a change in current regulations.

Section 8: Standard Operating Procedures

Detailed SOPs are to be developed and kept up to date as a major element of this plan. The following SOPs are developed as part of CWRU Hearing Conservation Program.

   a. Sound survey using a sound level meter
   b. Sound survey using a noise dosimeter
   c. Method of incorporating noise dosimetry results into the Hearing Conservation Program.

Section 9: Recordkeeping

Hearing Conservation Program records will be kept as follows:

   a. All noise survey, noise dosimetry records, and training records will be kept at CWRU EH&S Department. Individual training records will be accessible online.
   b. PI or Supervisor will keep a copy of training and noise survey/dosimetry records.
   c. All medical records, including audiometric test results and follow ups, will be kept at CWRU Health Services.
   d. Record of any actions, such as job changes due to hearing loss, will be kept with both CWRU EHS Department, CWRU Health Services and CWRU Human Resources Department.
Appendix A

29 CFR 1910.95

Regulations (Standards - 29 CFR)

Occupational noise exposure. - 1910.95

Part Number: 1910
Part Title: Occupational Safety and Health Standards
Subpart: G
Subpart Title: Occupational Health and Environment Control
Standard Number: 1910.95
Title: Occupational noise exposure.

Appendix: A, B, C, D, E, F, G, H, I

1910.95(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:

![FIGURE G-9 - Equivalent A-Weighted Sound Level](For Figure G-9, Click Here)

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this 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.

1910.95(b)

1910.95(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.
1910.95(b)(2)

If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

TABLE G-16 - PERMISSIBLE NOISE EXPOSURES (1)

<table>
<thead>
<tr>
<th>Duration per day, hours</th>
<th>Sound level dBA slow response</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.........................</td>
<td>90</td>
</tr>
<tr>
<td>6.........................</td>
<td>92</td>
</tr>
<tr>
<td>4.........................</td>
<td>95</td>
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<tr>
<td>3.........................</td>
<td>97</td>
</tr>
<tr>
<td>2.........................</td>
<td>100</td>
</tr>
<tr>
<td>1 1/2 .....................</td>
<td>102</td>
</tr>
<tr>
<td>1.........................</td>
<td>105</td>
</tr>
<tr>
<td>1/2 ......................</td>
<td>110</td>
</tr>
<tr>
<td>1/4 or less...............</td>
<td>115</td>
</tr>
</tbody>
</table>

Footnote(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 fractions: 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. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

..1910.95(c)

1910.95(c)

"Hearing conservation program."

1910.95(c)(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 measured 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.

1910.95(c)(2)

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.

1910.95(d)

"Monitoring."

1910.95(d)(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.

1910.95(d)(1)(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.

1910.95(d)(1)(ii)

Where circumstances such as high worker mobility, significant variations in sound level, or a 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.

1910.95(d)(2)

1910.95(d)(2)

1910.95(d)(2)(i)

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

1910.95(d)(2)(ii)

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

1910.95(d)(3)

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

1910.95(d)(3)(i)

Additional employees may be exposed at or above the action level; or
1910.95(d)(3)(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.

1910.95(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.

1910.95(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.

..1910.95(g)

1910.95(g)

"Audiometric testing program."

1910.95(g)(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.

1910.95(g)(2)

The program shall be provided at no cost to employees.

1910.95(g)(3)

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. 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.

1910.95(g)(4)

All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: "Audiometric Measuring Instruments."
**1910.95(g)(5)**

"Baseline audiogram."

1910.95(g)(5)(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.

**1910.95(g)(5)(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.

1910.95(g)(5)(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.

1910.95(g)(5)(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.

1910.95(g)(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.

**1910.95(g)(7)**

"Evaluation of audiogram."

1910.95(g)(7)(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.

..1910.95(g)(7)(ii)

1910.95(g)(7)(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 results of the retest as the annual audiogram.

1910.95(g)(7)(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:

1910.95(g)(7)(iii)(A)

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

1910.95(g)(7)(iii)(B)

The baseline audiogram and most recent audiogram of the employee to be evaluated;

1910.95(g)(7)(iii)(C)

Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

1910.95(g)(7)(iii)(D)

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

..1910.95(g)(8)

1910.95(g)(8)

"Follow-up procedures."

1910.95(g)(8)(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.
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:

1910.95(g)(8)(ii)(A)

Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

1910.95(g)(8)(ii)(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.

1910.95(g)(8)(ii)(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.

1910.95(g)(8)(ii)(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.

---1910.95(g)(8)(iii)

1910.95(g)(8)(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:

1910.95(g)(8)(iii)(A)

Shall inform the employee of the new audiometric interpretation; and

1910.95(g)(8)(iii)(B)

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

1910.95(g)(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:
1910.95(g)(9)(i)
The standard threshold shift revealed by the audiogram is persistent; or

1910.95(g)(9)(ii)
The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

1910.95(g)(10)
"Standard threshold shift."

1910.95(g)(10)(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.

1910.95(g)(10)(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."

1910.95(h)
"Audiometric test requirements."

1910.95(h)(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.

1910.95(h)(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 Sec. 1910.6.

1910.95(h)(3)
Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in
Appendix C: "Audiometric Measuring Instruments."

1910.95(h)(4)

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

..1910.95(h)(5)

1910.95(h)(5)

"Audiometer calibration."

1910.95(h)(5)(i)

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.

1910.95(h)(5)(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.

1910.95(h)(5)(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.

1910.95(i)

"Hearing protectors."

1910.95(i)(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.

1910.95(i)(2)

Employers shall ensure that hearing protectors are worn:
1910.95(i)(2)(i)

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

..1910.95(i)(2)(ii)

1910.95(i)(2)(ii)

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

1910.95(i)(2)(ii)(A)

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

1910.95(i)(2)(ii)(B)

Has experienced a standard threshold shift.

1910.95(i)(3)

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

1910.95(i)(4)

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

1910.95(i)(5)

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

1910.95(j)

"Hearing protector attenuation."

1910.95(j)(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."

..1910.95(j)(2)
1910.95(j)(2)

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

1910.95(j)(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.

1910.95(j)(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.

1910.95(k)

"Training program."

1910.95(k)(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.

1910.95(k)(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.

1910.95(k)(3)

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

..1910.95(k)(3)(i)

1910.95(k)(3)(i)

The effects of noise on hearing;

1910.95(k)(3)(ii)

The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
1910.95(k)(3)(iii)
The purpose of audiometric testing, and an explanation of the test procedures.

1910.95(l)
"Access to information and training materials."

1910.95(l)(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.

1910.95(l)(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.

1910.95(l)(3)
The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

1910.95(m)
"Recordkeeping" -

1910.95(m)(1)
"Exposure measurements." The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

1910.95(m)(2)
"Audiometric tests."

1910.95(m)(2)(i)
The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

1910.95(m)(2)(ii)
This record shall include:
1910.95(m)(2)(ii)(A)  
Name and job classification of the employee;

1910.95(m)(2)(ii)(B)  
Date of the audiogram;

1910.95(m)(2)(ii)(C)  
The examiner's name;

1910.95(m)(2)(ii)(D)  
Date of the last acoustic or exhaustive calibration of the audiometer; and

1910.95(m)(2)(ii)(E)  
Employee's most recent noise exposure assessment.

1910.95(m)(2)(ii)(F)  
The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

1910.95(m)(3)  
"Record retention." The employer shall retain records required in this paragraph (m) for at least the following periods.

..1910.95(m)(3)(i)  

1910.95(m)(3)(i)  
Noise exposure measurement records shall be retained for two years.

1910.95(m)(3)(ii)  
Audiometric test records shall be retained for the duration of the affected employee's employment.

1910.95(m)(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.
1910.95(m)(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.

1910.95(n)

"Appendices."

1910.95(n)(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.

1910.95(n)(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 obligations.

1910.95(o)

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

1910.95(p)

"Startup date." Baseline audiograms required by paragraph (g) of this section shall be completed by March 1, 1984.

Appendix B

Noise Safety Training 1. Case Western Reserve University
Hearing Conservation Program
Occupational Noise Exposure
OSHA Standard 29CFR 1910.95

2. What is a Hearing Conservation Program?
   - A written program which will be effective when noise level/dose is equal to or greater than 85 dB (8-hour TWA).
   - Includes a written program covering:
     - Noise monitoring
     - Audiometric test program (initial and annual)
     - Training
     - Control methods
     - Record keeping

3. What Is Noise?
   - Noise is defined as “unpleasant/unwanted sound”
   - Frequency in Hertz (HZ) is one of the noise criteria and means the number of times per second a vibrating object traces one complete cycle.

4. What Is Noise Loudness?
   - Noise loudness is defined as Sound Pressure Level (SPL) and is expressed in dB.
   - Using a sound level meter and analyzer, we are able to measure SPL at different frequencies.

5. OSHA Permissible Exposure Limit (PEL)
   - No exposure allowed above 140 dBA
   - Time Weighted Average (TWA)
     A sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.

   \[
   \text{TWA} = \frac{C_1T_1 + C_2T_2 + C_3T_3 + \ldots + C_nT_n}{T_1 + T_2 + T_3 + \ldots + T_n} \]

   * C – Concentration
   * T – Time

   Example:
   \[
   \text{TWA} = \frac{92\text{dB}(1\text{hr}) + 75\text{dB}(6\text{hr}) + 44\text{dB}(1\text{hr})}{1 + 6 + 1} = \frac{586}{8} = 73\text{dB}
   \]

6. Types of Noise
- Impulsive noise:  
  Such as an explosion or gunfire

- Continuous Noise:  
  Such as noise from grinders or lawn mowers

7. Effects of Noise on Hearing
   - Short term exposure to very high noise levels may cause:
     - Pain
     - Trauma
     - Permanent/temporary hearing loss.
   - Long term exposure to high noise levels may cause:
     - Permanent hearing loss.

8. How Hearing Loss Can be Detected?
   - At the beginning stages of hearing loss, it can only be recognized by an audiometric test.
   - Once over exposure is continued, hearing loss will become more distinguishable by the person.
   - At this stage, it’s too late to take action.

9. How Hearing Loss Can be Detected?
   - Early indication of exposure to high noise levels include:
     - Ringing or buzzing in the ears
     - Muffled hearing which may last a few hours after high noise exposure
     - Excessive fatigue
     - Rule of thumb is if you have to shout at an arms length (3’) to talk face to face, you are probably being exposed to high noise levels.

10. How Can We Measure Noise?
    - There are two measuring devices:
      - Sound Level Meter (SLM) or Sound Pressure Level Meter (SPLM):
        - Is used to evaluate sound level at a work station or within a room (noise survey).
      - Noise Dosimeter:
        - Is used to evaluate an 8-hour personal exposure to noise, especially when task demands movement at different locations with different noise levels.

11. What is an Audiometric Test?
    - An audiometric test is a clinical test which can evaluate your hearing.
    - In this test, ears are exposed to noise with different frequencies and pressure levels.
Audiometric tests shall be done initially within the first six months of employment.
The test shall be repeated at least annually.

12. How Does an Audiometric Test Work?
   - The test must be done by a licensed or certified professional.
   - At least 14 hours before the test, exposure to the high noise levels shall be avoided.
   - A baseline audiogram is needed within the first six months of employment.
   - Further tests will be compared to the baseline find if there is a Standard Threshold Shift (STS).

13. How an Audiometric Test Works?
   - While wearing headphones, each ear is tested with different frequencies at different intensities.
   - Results shall be compared to an individual’s baseline audiogram. A 10 dB shift is considered as a Standard Threshold Shift (STS)

14. How Can We Decrease Noise Level?
   - A noise control method needs to be able to reduce exposure within 90dBA or 85dBA for individuals experiencing a STS.
   - An engineering control:
     - Is the most desirable control method. It will reduce the noise level at the source before it reaches the person.
   - Examples include:
     - Dampening source vibration
     - Using barriers between individuals and source
     - Source enclosure

15. How Can We Decrease Noise Level?
   - Administrative controls:
     - Decreasing working hours
     - Better work practices
     - Increasing the distance between the worker and the noise source.

16. How Can We Decrease Noise Level?
   - Personal Protective Equipments (PPE)
     - Earplugs:
       - Insert ear plugs with one to three flanges
       - This offers different sizes
       - Washable and reusable

17. How Can We Decrease Noise Level?
   - Personal Protective Equipments (PPE)
     - Earplugs:
       - Formable earplugs
18. How Can We Decrease Noise Level?
   • Personal Protective Equipments (PPE)
     Earplugs:
     • Custom molded earplugs
     • Made to fit the exact size and shape of an individual’s ear canal.
     • Are more comfortable but more costly

19. How Can We Decrease Noise Level?
   • Personal Protective Equipments (PPE)
     Advantages of Earplugs:
     • Comfortable devices, specially in warm and humid environments
     • DO NOT interfere with other PPEs
     • DO NOT need maintenance
     Disadvantages of Earplugs:
     • Require more skill for application
     • May loosen with time and require reseating
     • Difficult to be monitored

20. How Can We Decrease Noise Level?
   • Personal Protective Equipments (PPE)
     Advantages of Earmuffs:
     • One size may fit everyone
     • A fit check is needed for initial use
     • Easy to be removed and reused
     • Good for cold environments
     Disadvantages of Earmuffs
     • Requires maintenance and cleaning
     • May become uncomfortable in long term uses and in hot/humid environments
     • Long hair and scars may interfere with effectiveness
     • Are subject to modification by user.

21. Which One Is Better? Earmuffs or Ear plugs
   It depends on:
   • Noise level
   • Type of job and job environment
   • Employees’ preference

22. PPE - Use and Maintenance
   • Always follow manufacturers recommendation first
   • For ear plugs:
     • Wash reusable ear plugs in lukewarm water using hand soap
     • Cleaning shall be done as needed
• Don’t place wet or damp earplugs in their containers

23. PPE - Use and Maintenance
   ▪ Always follow manufacturers recommendation first
   ▪ For earmuffs:
     • Wash plastic or foam cushions in lukewarm water using hand soap as needed
     • The inside of the muff should not get wet
     • When not in use, place earmuff in open air to allow moisture to evaporate from cups.

24. More information?
   OSHA 29 CFR 1910.95
   www.osha.gov
   - or -
   CWRU EHS Department
   www.case.edu/finadmin/ehs
   (216) 368-2907
CWRU EH&S Department
Hearing Conservation Program
OSHA Standard 29CFR 1910.95

Noise Safety Training Quiz

1. A Hearing Conservation Program should include:
   a. Noise monitoring
   b. Audiometric testing
   c. Training
   d. Control Methods
   e. All of the above

2. A Hearing Conservation Program needs to be in place when the noise level is equal to or greater than:
   a. 95 dB
   b. 75 dB
   c. 85 dB
   d. 60 dB
   e. 65 dB

3. An example(s) of an impulsive noise is:
   a. Gunfire
   b. Hair dryer
   c. Chainsaw
   d. Hammer drill
   e. Both a and c

4. Short term exposure to very high noise levels may result in:
   a. Pain
   b. Trauma
   c. Permanent hearing loss
   d. Temporary hearing loss
   e. All of the above

5. The beginning stages of hearing loss:
   a. Cannot be recognized
   b. Can only be recognized by an audiometric test
   c. Can be recognized by the person
   d. Both a and c
   e. All of the above
6. Early indication of exposure to high noise levels include(s):
   a. Ringing or buzzing in the ears
   b. Muffled hearing which may last a few hours after high noise exposure
   c. Excessive fatigue
   d. None of the Above
   e. All of the Above

7. The following measuring device(s) are used to monitor noise:
   a. Sound Level Meter
   b. Atmosphere Monitor
   c. Noise Dosimeter
   d. Dragger Tubes
   e. Both a and c

8. A noise dosimeter is used to monitor:
   a. Sound level at a work station
   b. An 8 hour personal exposure to noise
   c. A 15 minute noise exposure
   d. Both a and c
   e. None of the above

9. Initial audiometric tests need be given to personnel within the first ___ months of employment.
   a. Six
   b. Eight
   c. Ten
   d. Twelve
   e. None of the above

10. Audiometric tests need to be administered to personnel working in high noise level areas on a(n) ________ basis.
    a. Semiannual
    b. Annual
    c. Biannual
    d. Monthly
    e. Weekly

11. Exposure to high noise levels should be avoided for at least ____ hours before the audiometric test.
    a. 8
    b. 10
    c. 12
    d. 14
    e. 16
12. A Standard Threshold Shift (STS) is a change of how many decibels?
   a. 2
   b. 4
   c. 6
   d. 8
   e. 10

13. Which is the most desirable control method for noise?
   a. Ear muffs
   b. Engineering controls
   c. Ear plugs
   d. Administrative Controls
   e. Distance between the source and the worker

14. Example(s) of engineering controls include:
   a. Dampening source vibration
   b. Using barriers between individuals and source
   c. Source enclosure
   d. Both a and b
   e. All of the above

15. Example(s) of administrative controls include:
   a. Decreasing work hours
   b. Sound barriers
   c. Increasing the distance between the worker and the source
   d. Both a and c
   e. None of the above

16. Advantage(s) of Earplugs include:
   a. They are comfortable devices, especially in warm and humid weather
   b. They do not interfere with other Personal Protective Equipment
   c. They do not need maintenance
   d. Both a and c
   e. All of the above

17. Disadvantage(s) of Earmuffs include:
   a. Requires maintenance and cleaning
   b. May become uncomfortable in long term uses and in hot/humid environments
   c. Long hair and scars may interfere with effectiveness
   d. Are subject to modification by user
   e. All of the above

18. Which one is the best choice when choosing hearing protection?
   a. Formable ear plugs
   b. Ear muffs
c. It depends upon noise level, type of job and job environment, and employee’s preference
d. Custom molded ear plugs
e. Ear plugs with one to three flanges

19. Earmuffs should be stored:
   a. In open air to allow moisture to evaporate from cups
   b. In a sealed container
   c. In the workers locker
   d. None of the above
   e. Both b and c

20. For more information refer to OSHA 29 CFR _______.
   a. 1912.12
   b. 1814.20
   c. 1910.95
   d. 1514.60
   e. 1920.65
Appendix C

Sound Survey Using a Sound Level Meter

PURPOSE
To determine how to measure noise exposures utilizing the sound level meter. This procedure should be used in order to do an initial assessment of the room, source and workstation. If the employee is performing a non stationary task, which would cause the noise level to vary by the location of the task, a noise dosimeter should be utilized. This will provide an average noise exposure reading for a given period of time, such as an 8-hour workday. Please refer to the Standard Operating Procedure for Monitoring Noise with the Dosimeter.

REFERENCES
29 CFR 1910.95 (OSHA Occupational Noise Exposure) Appendix G
Case Western Reserve Hearing Conservation Program

SCOPE
The Occupational Safety and Heath Administration (OSHA) requires that employees be placed in a hearing conservation program if they are exposed to average noise levels of 85 dB or greater during an 8 hour workday. In order to determine if exposures are at or above this level, it may be necessary to measure or monitor the actual noise levels in the workplace and to estimate the noise exposure received by employees during the workday.

Factors which suggest that noise exposures in the workplace may be at an elevated level include employee complaints about the loudness of noise, indications that employees are losing their hearing or noisy conditions which make normal conversation difficult. Actual workplace noise measurements can suggest whether or not a monitoring program should be initiated.

PROCEDURE
1. When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, CWRU EHS Department shall develop and implement a monitoring program.
2. The sampling strategy will be designed to identify employees for inclusion into the hearing conservation program and to enable the proper selection of hearing protectors.
3. To ensure accurate results the sound level meter will be calibrated before each use.
4. The sound level meter needs to be positioned within the immediate vicinity of the exposed personnel and the microphone should be stationed near the employee's head.
5. Since sound level meters provide a measure of sound intensity at only one point in time, it is generally necessary to take a number of measurements.
at different times during the day to estimate noise exposure over a workday.

6. If noise levels fluctuate, the amount of time noise remains at each of the various measured levels must be determined.

7. To estimate employee noise exposures with a sound level meter it is also generally necessary to take several measurements at different locations within the workplace.

8. A map of the area should be drawn out recording the sound levels within different areas of the workplace.

9. By using a sound level map and information on employee locations throughout the day, estimates of individual exposure levels can be developed.

10. A Time Weighted Average (TWA) should be calculated to estimate the personal exposure level:

   a. \[
   \text{TWA} = \frac{C_1T_1 + C_2T_2 + C_3T_3 + \ldots + C_nT_n}{T_1 + T_2 + T_3 + \ldots + T_n}
   \]

   * C: Concentration
   * T: Time

   b. Example:

   \[
   \text{TWA} = \frac{92\text{dB (1hr)} + 75\text{dB (6hr)} + 44\text{dB (1hr)}}{1 + 6 + 1} = \frac{586}{8} = 73\text{dB}
   \]

11. When there are significant changes in machinery or production processes that may result in increased noise levels, re-monitoring must be conducted to determine whether additional employees need to be included in the hearing conservation program.

12. High noise areas should also be re-monitored periodically (once every year or two) to ensure that all exposed employees are included in their hearing conservation programs.
Appendix D

Sound Survey Using a Noise Dosimeter

PURPOSE
To determine how to measure noise exposures utilizing the dosimeter. A dosimeter should be utilized to measure an employee’s exposure when the employee is performing a non stationary task, which would cause the noise level to vary by the location of the task. This will provide an average noise exposure reading for a given period of time, such as an 8-hour workday.

REFERENCES
29 CFR 1910.95 (OSHA Occupational Noise Exposure) Appendix G
Case Western Reserve Hearing Conservation Program

SCOPE
The Occupational Safety and Health Administration (OSHA) requires that employees be placed in a hearing conservation program if they are exposed to average noise levels of 85 dB or greater during an 8 hour workday. In order to determine if exposures are at or above this level, it may be necessary to measure noise exposure received by employees during the workday.

Factors which suggest that noise exposures in the workplace may be at an elevated level include employee complaints about the loudness of noise, indications that employees are losing their hearing or noisy conditions which make normal conversation difficult. Actual workplace noise measurements can suggest whether or not a monitoring program should be initiated.

PROCEDURE
2. When information indicates that any employee's exposure may equal or exceed 85 decibels, CWRU EH&S Department shall develop and implement a monitoring program.
13. The sampling strategy will be designed to identify employees for inclusion into the hearing conservation program and to enable the proper selection of hearing protectors.
14. To ensure accurate results the dosimeter will be calibrated before each use.
15. A dosimeter stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour workday.
16. The employee should be instructed to keep the dosimeter on for the entire work day, and to go about their day as if the microphone is not on their shoulder. Encourage the employee not to fiddle with the microphone as this may produce inaccurate measurements.
17. Proper positioning of the microphone is necessary to obtain accurate measurements. The microphone is attached to the employee's clothing...
near the hearing zone. The microphone is generally located on the shoulder and remains in that position for the entire workday. The dosimeter is then clipped to the employee's belt or somewhere that is convenient and comfortable for them.

18. The exposure measurement is simply read at the end of the desired time period.

19. When there are significant changes in machinery or production processes that may result in increased noise levels, re-monitoring must be conducted to determine whether additional employees need to be included in the hearing conservation program.

20. High noise areas should also be re-monitored periodically (once every year or two) to ensure that all exposed employees are included in their hearing conservation programs.
Appendix E

Hearing Conservation Program

PURPOSE
To determine the scope, elements, and framework of the Hearing Conservation Program.

REFERENCES
29 CFR 1910.95 (OSHA Occupational Noise Exposure)
Case Western Reserve Hearing Conservation Program

SCOPE
CWRU EHS Department shall administer a continuing, effective hearing conservation program, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale.

When employees are subjected to sound levels exceeding the OSHA exposure limits listed in the table below, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

<table>
<thead>
<tr>
<th>Duration per Day (hours)</th>
<th>Sound Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>97</td>
</tr>
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<td>2</td>
<td>100</td>
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<tr>
<td>1.5</td>
<td>102</td>
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<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>0.5</td>
<td>110</td>
</tr>
<tr>
<td>0.25 or less</td>
<td>115</td>
</tr>
</tbody>
</table>

* No exposure is allowed above 140dBA

Contact CWRU EHS Department at 216 368-2907, for any consultation regarding your work area.

PROCEDURE
3. When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, Safety Services shall develop and implement a monitoring program.
2. The sampling strategy will be designed to identify employees for inclusion into the hearing conservation program and to enable the proper selection of hearing protectors.

4. Instruments used to measure employee noise exposure will be calibrated to ensure measurement accuracy.

3. Monitoring will be repeated whenever a change in production, process, equipment or controls increases noise exposures.

4. CWRU Health Services will notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

- The employer shall establish and maintain an audiometric testing program by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels. Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician.

5. Within 6 months of an employee's first exposure at or above the action level (85dBA), the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared. Subsequent audiograms need to be administered on an annual basis to determine if there is a standard threshold shift. 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.

6. CWRU Health Services will fit employees with hearing protectors and train the employees in their use and care.

7. The training program shall be repeated annually for each employee included in the hearing conservation program.

8. Supervisors are responsible for requiring the use of the hearing protectors.

9. A caution sign, stating the requirement of hearing protection is required to be posted on the door of the high noise area. The OSHA 29 CFR 1910.95 Standard must also be posted in the area.

10. Records documenting training will be maintained by CWRU EHS Department, and records documenting audiometric testing will be retained by CWRU Health Services.