

Hearing Conservation Plan



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Acronyms

ANSI	American National Standards Institute
CAOHC	Council of Accreditation in Occupational Hearing Conservation
CFR	Code of Federal Regulations
dB	Decibel
dBA	Decibel, A-weighted
EHS	Environmental Health and Safety Office
EHS-OHS	EHS - Occupational Health & Safety
HPD	Hearing Protection Device
Hz	Hertz
EHS	Environmental Health and Safety Office
LS	Laboratory Supervisors
NIHL	Noise Induced Hearing Loss
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PI/LS	Principal Investigator/ Laboratory Supervisors
STS	Standard Threshold Shift
TWA	Time-Weighted Average

Foreword

Noise-induced hearing loss (NIHL) is a permanent and irreversible occupational illness due to exposure to excessive noise. The Occupational Safety and Health Administration (OSHA) established 29 CFR 1910.95, *Occupational Noise Exposure*, to limit employee exposure to hazardous noise. The standard includes a Permissible Exposure Limit (PEL) of 90 decibels, A-weighted, (dBA) as an 8-hour time-weighted average (TWA) with a doubling rate of 5 dBA and an action level of 85 dBA for occupational exposure to noise. It also includes requirements for exposure monitoring, audiometric testing, use of hearing protection devices (HPD), training, and recordkeeping.

This *Hearing Conservation Plan* has been developed to protect George Mason University employees from exposure to excessive noise and complies with 29 CFR 1910.95. While implementing control measures to further reduce occupational exposure to noise, employees may be enrolled in the Hearing Conservation Program. Elements of the Hearing Conservation Program include: this *Hearing Conservation Plan*, exposure monitoring, audiometric testing, engineering and administrative controls, HPD, training, recordkeeping, and program evaluation.

Document History

Version	Date	Comments
1	May, 2008	Initial <i>Hearing Conservation Program</i>
2	September, 2009	Routine Review and Update
3	February, 2013	Routine Review and Update

1.0 Introduction

This *Hearing Conservation Plan* is established to fulfill OSHA's requirement for establishing a site-specific written program as detailed in 29 CFR 1910.95, Occupational Noise Exposure. This written program details requirements for key elements such as audiometric testing, training, and recordkeeping. George Mason University's Environmental Health and Safety Office (EHS) works with various departments to implement noise controls which protect employees from occupational hearing loss.

2.0 Roles and Responsibilities

This *Hearing Conservation Plan* for George Mason University personnel is a cooperative effort between the EHS, healthcare providers, supervisors, and employees. Specific responsibilities relating to this Hearing Conservation Program are outlined below.

2.1 Environmental Health and Safety Office

Specific responsibilities of EHS - Occupational Health & Safety (EHS-OHS) related to the Hearing Conservation Program are to:

- Conduct noise exposure monitoring in accordance with 29 CFR 1910.95 when:
 - Information suggests employee noise exposure may equal or exceed the action level;
 - It is determined that current HPD used are no longer adequate due to a change in production, process, or equipment; and/or
 - An employee has experienced a Standard Threshold Shift (STS).
- Notify employees or groups of employees of exposure monitoring results.
- Enroll an employee in the Hearing Conservation Program after learning that an employee is assigned to a work area or combination of work areas where the occupational noise exposure is known to exceed the action level for occupational noise.
- Notify employees and their supervisors in writing when an employee or group of employees is enrolled in the Hearing Conservation Program.
- Train personnel enrolled in the Hearing Conservation Program at initial enrollment and annually thereafter.
- Coordinate baseline audiometric testing within 6 months of an employee's enrollment in the Hearing Conservation Program.
- Coordinate annual audiometric testing for all employee enrolled in the George Mason University Hearing Conservation Program.
- Provide the healthcare provider with a copy of the following:
 - 29 CFR 1910.95.
 - George Mason University's Hearing Conservation Program; and
 - The employee's baseline and most recent audiograms, including the measured background sound pressure levels and records of audiometric calibrations.
- Obtain a written opinion including the audiogram from the healthcare provider.
- Coordinate follow-up medical evaluations recommended by the healthcare provider per 29 CFR 1910.95.
- Revise the baseline audiogram if the hearing threshold on an annual audiogram shows significant improvement from the baseline audiogram.

- Arrange for a re-test within 30 days of results of initial audiometric testing if the audiogram reading suggests that an STS has occurred.
- If the repeat audiogram shows a persistent STS:
 - Notify the affected individual in writing within 21 days of confirmation of a persistent STS due to occupation exposure to noise.
 - Revise the baseline audiogram against which future results will be compared.
- Inform Workers' Compensation Specialist of any STS so it can be reflected on the OSHA 300 Log. The age correction calculation used in 29 CFR 1910.95 Appendix F will be used and considered prior to reporting an STS on the 300 Logs.
- Evaluate noise sources and consider feasible engineering and administrative controls that may be used to reduce employee exposure to occupational noise below the action level.
- Evaluate the effectiveness of administrative and engineering controls by measuring the sound pressure levels.
- Recommend HPD for employees exposed to noise in excess of the action level.
- For employees who have experienced an STS, re-train the employee on the fit, use, care, and limitation of HPD and re-evaluate the effectiveness and fit of HPD used.
- Remove enrolled employees from the Hearing Conservation Program upon receipt of one of the following:
 - Noise exposure monitoring results that show administrative or engineering controls have been implemented and have reduced employee exposure to occupational noise below the action level.
 - Notification that an employee's job responsibilities change so that the employee is no longer a member of a similar exposure group included in the Hearing Conservation Program.
 - Notification that the employee has terminated employment.
- Notify employees and their supervisors in writing when an employee or group of employees is removed from the Hearing Conservation Program.
- Coordinate exit audiometric testing.
- Maintain training records, audiometric test records, and any medical reports related to 29 CFR 1910.95 for the duration of employment.
- Conduct program evaluation.

2.2 Healthcare Providers

A healthcare provider for the Hearing Conservation Program is a licensed or certified audiologist, otolaryngologist, or other physician, or a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation (CAOHC), 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. Specific responsibilities of healthcare providers related to George Mason University's Hearing Conservation Program are to:

- Verify that the employee has avoided high levels of occupational and non-occupational noise for at least 14 hours prior to audiometric testing and reschedule if this has not occurred.
- Conduct audiometric testing as outlined in 29 CFR 1910.95.
- Notify EHS-OHS if any medical condition related to the use of HPD are found during the audiometric examination.
- Inform employee of the need for otological examination if a medical condition unrelated to the use of HPD is suspected.
- Provide EHS-OHS with a written opinion containing a copy of the audiogram following each audiometric evaluation.
- Conduct a re-test audiometric evaluation for an employee within 30 days if requested by EHS-OHS.

2.3 Supervisors

Supervisors include Principal Investigators/ Laboratory Supervisors (PI/LS), and other staff supervisors that oversee work, activities, and employees. Specific responsibilities of supervisors related to the Hearing Conservation Program are to:

- Inform EHS-OHS if noise is a concern in their area so it can be monitored and properly evaluated.
- Provide HPD to employees working in environments where EHS-OHS determines that noise exposure exceeds the action level.
- Replace HPD as necessary.
- Require employees exposed to noise in excess of the action level to wear HPD properly and to attend annual training, audiogram appointments, and any subsequent medical evaluations.
- Allow time during normal working hours for employees to attend audiometric testing and Hearing Conservation training.
- Forward employee concerns regarding the use of HPD to EHS-OHS.
- Notify EHS-OHS if an employee enrolled in the Hearing Conservation Program transfers to a new position or terminates employment.
- Provide feedback for program evaluation.

2.4 Employees

Employees include all George Mason University employees. Specific responsibilities of employees related to the Hearing Conservation Program are to:

- Review the written program.
- Use required HPD according to training and product instructions when working in areas where exposure to noise in excess of the OSHA PEL is suspected or determined or if employee has experienced a STS.
- Attend initial audiogram within 6 months of enrollment in the Hearing Conservation Program.
- Attend annual, repeat, and exit audiogram appointments and any subsequent medical evaluations within two weeks of receiving notification from EHS-OHS.
- Register for and attend initial training and annually thereafter.

- Avoid high levels of occupational or non-occupational noise 14 hours prior to audiometric testing.
- Notify the supervisor or EHS-OHS of any concerns related to the use of HPD.

3.0 Exposure Monitoring

EHS-OHS will conduct representative noise exposure monitoring when necessary to identify employees in similar exposure groups for inclusion in this Hearing Conservation Program and to enable proper selection of HPD when:

- Supervisors inform EHS-OHS that noise is a concern in the work area. Inspection of work area by EHS-OHS reveals that noise exposure may exceed the action level.
- It is determined that the current HPD are no longer adequate due to a change in production, process, or equipment.
- An employee has experienced an STS.

EHS-OHS will notify affected employees of exposure monitoring results and an explanation of what those results mean.

3.1 Exposure Limits

The OSHA PEL for noise is based on an eight-hour TWA of 90 dBA. The OSHA action level is 85 dBA with a doubling rate of 5 dBA. Exposure to impulse or impact noise should not exceed 140 decibels (dB) without proper hearing protection.

4.0 Hearing Conservation Program Enrollment

Employees must be enrolled in the Hearing Conservation Program if they are assigned to a work area (or work in a similar exposure group) where occupational exposure to noise exceeds the action level of 85 dBA.

4.1 Enrolling Employees in the Hearing Conservation Program

Upon receipt of written results that an employee or a group of employees who are exposed to occupational noise above the action level, EHS-OHS will enroll the employee or group of employees in the Hearing Conservation Program.

4.2 Removing Employees from the Hearing Conservation Program

EHS-OHS will remove employees from the Hearing Conservation Program if any of the following criteria are met:

- Exposure monitoring results indicate that an employee or a group of employees who work in a similar exposure group are no longer exposed to occupational noise above the action level after implementing engineering or administrative controls.
- Notification from the employee's supervisor that an employee's job responsibilities have changed and the employee is no longer a member of a similar exposure group included in the Hearing Conservation Program.
- Notification that the employee has terminated employment.

EHS-OHS will send a letter to the employee and the supervisor, prior to removing the employee from the Hearing Conservation Program. The letter will contain the following information:

- Explanation of why the employee is being removed from the Hearing Conservation Program, including the following, if applicable:
 - Description of the engineering or administrative controls implemented; and
 - Summary of exposure monitoring results.

5.0 Audiometric Testing

EHS-OHS coordinates all audiometric testing for employees enrolled in the Hearing Conservation Program, including initial, annual, repeat, and exit audiometric evaluations. For new enrollees in the program, employees are required to attend audiometric testing within six months of being enrolled in the Hearing Conservation Program and annually thereafter.

The employee is instructed in training to avoid exposure to occupational and non-occupational noise for at least 14 hours prior to testing. Before testing, the healthcare provider must verify that the employee has avoided exposure to occupational and non-occupational noise for at least 14 hours prior to testing and reschedule if this has not occurred.

The healthcare provider must conduct audiometric testing with an audiometer (including microprocessor audiometers) that has been calibrated prior to use and meets American National Standards Institute (ANSI) Standard S3.6-1996, *American National Standard Specifications for Audiometers*. If a pulsed tone or self-recorded audiometer is used, it must meet the requirements outlined in 29 CFR 1910.95 Appendix C, *Audiometric Measuring Instruments*. Audiometric testing must be administered in a room meeting the requirements outlined in 29 CFR 1910.95 Appendix D, *Audiometric Test Rooms*. The audiometer must be checked at least annually, in accordance with 29 CFR 1910.95 Appendix E, *Acoustic Calibration of Audiometers*.

EHS-OHS must obtain a written opinion from the healthcare provider, including a copy of the audiogram, following each audiometric evaluation. EHS-OHS will maintain a copy of the calibration certificate for the audiometer used for testing.

5.1 Information Provided to Healthcare Providers

EHS-OHS will provide the examining healthcare provider with copies of the following if the healthcare provider does not already have it on file:

- 29 CFR 1910.95.
- The baseline and most recent audiograms EHS-OHS have on file for the employee, including measured background sound pressure levels and records of audiometer calibrations (This information is provided by contractor doing audiometric testing).
- The *Hearing Conservation Plan*.

5.2 Review of Audiogram Results

The healthcare provider will compare the annual audiogram to the baseline to determine whether the employee has experienced an STS as a result of exposure to occupational noise. An STS is defined as a loss of 10dB or more averaged over the 2000, 3000 and 4000 Hz octave bands. The healthcare provider will review the audiograms and determine whether there is a need for further evaluation.

If the healthcare provider determines that an STS has occurred as a result of occupational noise exposure or aggravated by occupational noise exposure, EHS-OHS must request a re-test within 30 days of the initial test. If the results still indicate that an STS has occurred as a result of occupational noise exposure, the following actions will be taken:

- EHS-OHS will notify the employee in writing that an STS has occurred as a result of occupational noise exposure (or aggravated by occupational noise exposure) within 21 days of being notified by the healthcare provider.
- The supervisor must obtain HPD for the employee. EHS-OHS will fit the employee with HPD and provide training in the care, use, and limitations of HPD.
- If the employee already uses HPD, EHS-OHS will evaluate the fit of HPD the employee is using and make recommendations for any changes to the HPD, such as for those with greater noise attenuation capabilities. The supervisor will obtain the recommended HPD. EHS-OHS will then fit and provide training in the care, use, and limitations of HPD.
- If additional testing or medical evaluations are needed or the employee exhibits a medical condition that may be caused or aggravated by wearing HPD, the healthcare provider will recommend the appropriate level of care for the employee, such as a clinical audiological or otological evaluation. EHS-OHS will coordinate follow-up medical evaluations per the healthcare provider's recommendations.
- The healthcare provider will inform the employee of the need for a medical examination if a medical condition of the ear unrelated to the use of HPD is suspected.
- EHS-OHS must record any STS of 10 dB or more (as an average within the 2000, 3000, and 4000 Hz range) on the OSHA 300 log, per 29 CFR 1904.10, *Recording Criteria for Cases Involving Occupational Hearing Loss*.

5.3 Revised Baseline

EHS-OHS will designate the annual audiogram as the new baseline audiogram if one of the following occurs:

- A persistent STS is confirmed.
- The hearing threshold in the annual audiogram indicates significant improvement over the baseline.

6.0 Controls

After enrolling an employee or a group of employees in the Hearing Conservation Program, EHS-OHS must evaluate the noise sources and consider feasible administrative or engineering controls to reduce occupational exposure to noise. EHS-OHS will conduct additional exposure monitoring to determine the effectiveness of these controls.

If data demonstrates that the employee exposure to occupational noise has been reduced below the action level, EHS-OHS will remove the affected individuals from the Hearing Conservation Program.

6.1 Administrative Controls

Administrative controls that may be used to reduce employee exposure to hazardous noise include implementing work/rest cycles and increasing the distance between the employee and the noise source.

EHS-OHS will evaluate the area and make appropriate administrative control recommendations or requirements. This will be done with the help of the employee as well as the supervisor.

6.2 Engineering Controls

Examples of engineering controls designed to reduce employee noise exposure include replacing the noise source with a quieter machine or enclosing the machine. EHS-OHS will evaluate the work area to determine what engineering controls may be feasible.

6.3 Evaluating Noise Sources

Before implementing engineering and administrative controls to reduce employee exposure to occupational noise, EHS-OHS must evaluate the noise levels and frequencies by conducting noise surveys with an octave band analyzer. Noise surveys to evaluate the effectiveness of administrative and engineering controls should also be conducted after implementation of controls.

7.0 Hearing Protection Devices

EHS-OHS will recommend a selection of HPD when it is not feasible to reduce employee noise exposure below the action level with engineering or administrative controls and while those controls are being implemented. Supervisors must provide HPD to employees working in environments where noise exposure is believed to exceed the action level; HPD must be replaced as necessary. Employees are required to use HPD according to training and product instructions when working in environments where exposure to noise is believed to exceed the action level.

7.1 Types of Hearing Protection Devices

HPD, a type of personal protective equipment designed to reduce noise exposure, include formable and pre-molded earplugs and ear muffs. Ear plugs are worn inside the ear and seal against the ear canal walls. Ear muffs seal against the side of the head, outside the ear and are typically mounted on a headband.

7.1.1 Formable Ear Plugs

Formable earplugs are made of a flexible material designed to expand and conform to the user's ear canal and are available in a variety of shapes and sizes. Formable ear plugs are preferred over pre-molded ear plugs because they may be adapted to the user and obtain a better fit. Formable ear plugs are recommended for low frequency noise sources up to 1000 Hz.

The following procedures should be followed in order to obtain a proper fit:

- Roll the formable ear plug into a crease-free cylinder thin enough for half the length of the plug to easily fit into the ear canal.
- Reach over the head and open the ear canal by pulling the ear upwards using the opposite hand.
- Use the other hand to insert the ear plug into the ear canal and allow the ear plug to expand inside the ear.

Formable ear plugs may be washed and re-used up to five times.

7.1.2 Pre-molded Ear Plugs

Pre-molded ear plugs are made from silicone, plastic or rubber and are manufactured as either “one-size-fits-most” or are available for small, medium or large ear canals. Sometimes users need a different size plug for each ear. Pre-molded ear plugs are also recommended for low frequency noise sources.

The following procedures should be followed in order to obtain a proper fit:

- Reach over the head and open the ear canal by pulling the ear upwards using the opposite hand.
- Use the other hand to insert the ear plug into the ear canal by gently rocking the plug until it seals the ear canal.

Pre-molded ear plugs may be washed and re-used up to five times.

7.1.3 Ear Muffs

Ear muffs form a seal covering the entire ear held in place with an adjustable headband. As a result, users with facial hair and who wear glasses are the most likely to have difficulty obtaining a proper fit. Ear muffs are recommended for high frequency noise sources.

To obtain a proper fit, the headband should be adjusted so that the tension allows the cushion to form a seal against the head without resting on the outer ear.

Ear muffs may be shared among multiple users. After use, users should clean the ear muffs by wiping them with soap and water.

7.2 Noise Reduction Rating (NRR)

The Noise Reduction Rating (NRR) is the minimum protection most users can obtain when HPD is worn. Scientific research shows that HPD used in the field provides less than half the attenuation obtained by manufacturers in the laboratory setting.

Formula to use when evaluating effectiveness of HPDs

$$\text{Exposure level with plugs} = \text{Measured noise level} - ((\text{NRR on package} - 7 \text{ dBA}) * 0.5)$$

For exact formula and derivation, please contact EHS-OHS.

When noise exposure exceeds 105 dBA, employees must use both ear plugs and muffs. The combined use typically adds more protection than either used alone, however the noise reduction is much less than the NRR added together. In these situations EHS-OHS sure evaluate noise levels and provide HPD recommendations.

8.0 Training

Hearing Conservation Training is provided by EHS-OHS. All employees enrolled in the Hearing Conservation Program must register for and attend Hearing Conservation Training after initial enrollment and annually thereafter. The training must include:

- Hazards associated with excess noise;
- Explanation of regulations outlined in 29 CFR 1910.95;
- Description of engineering controls designed to reduce employee exposure to hazardous noise;
- Instructions in the fit, care, use, and limitations of HPD; and
- Description of the purpose and procedures of audiometric testing.

9.0 Recordkeeping

Audiometric test records must be maintained by EHS-OHS throughout the duration of an individual's employment. Audiometric test records should include:

- Employee name, G#;
- Date of audiogram;
- Healthcare provider's name;
- Baseline audiometric results;
- Annual audiometric results;
- Date of last acoustic or exhaustive calibration of the audiometer; and
- Measurements of background sound pressure levels in audiometric test room.

Copies of noise exposure monitoring records, including area and personal sampling results, must be maintained by EHS-OHS for at least two years following sampling.

Noise exposure monitoring records will include:

- Employee name, G#;
- Name of PI/LS or supervisor;
- Location of work area;
- Date of sampling;
- Sampling start and stop times
- Name of inspector conducting sampling;
- Make, model, and serial number of device used;
- Equipment calibration date; and
- Sampling results (i.e., L-average, dose, TWA, peak).

EHS-OHS will maintain copies of current training materials and training records for employees in the Hearing Conservation Program.

10.0 Program Evaluation

All elements of the Hearing Conservation Program to include this Plan will be reviewed by EHS-OHS, incorporating feedback from the supervisors and employees enrolled in the program. Revisions will be made as necessary to reflect changes in George Mason University policies, industry standards, and government regulations.