

Hearing Conservation Program

Bryant University

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1.0 Purpose

Bryant University (Bryant) aims to provide all employees with a safe working environment. The goal of this Hearing Conservation Program (HCP) is to mitigate hearing damage or loss due to occupational exposure to harmful noise in the workplace. This program is written in accordance with the Occupational Safety and Health Administration (OSHA) Occupational Noise Exposure Standard (29 CFR 1910.95).

1.1 Scope

This program applies to all employees of Bryant who have noise exposure equal or exceeding the action level which is an 8-hour time-weighted average (TWA) of 85 decibels measured on the A scale (dBA).

2.0 Definitions

Action Level: An exposure to an 8-hour time-weighted average of 85 decibels measured with a dosimeter or sound-level meter on the A-scale at slow response; or equivalently, a dose of 50 percent.

Administrative Control: Any procedure that limits noise exposure by control of work schedules.

Affected Employee: Employees who are exposed to the action level or above.

Attenuation: Reduction in noise or sound.

Audiogram: A chart, graphs, or tables that result from an audiometric test. An audiogram shows an individual's hearing threshold level as a function of frequency (Hz).

Audiologist: A professional who specializes in the study and rehabilitation of hearing and who is certified by the American Speech, Hearing, and Language Association, or licensed by a State Board of Examiners.

Audiometer: An electronic instrument that measures hearing threshold levels and conforms to the requirements and specifications of the current ANSI Standard S3.6.

Baseline Audiogram: An audiogram against which future audiograms are compared. It may also be described as a reference, preplacement, or entrance audiogram.



Biological "Functional" Calibration Check: An audiometric test that uses one or more individuals with known, stable hearing levels to check proper functioning and stability of an audiometer and to identify any unwanted or distracting sounds.

Cut-off Level: All sound levels at or above the cut-off level are averaged into the calculations that relate to noise exposure. All sound levels below the cut-off level are not included.

Deafness: The otological condition in which the hearing threshold for speech, or the average hearing threshold level for pure tones at 500, 1000, 2000, and 3000 Hz, is at least 93 decibels (reference ANSI S3.6-1969). This is generally accepted as representing a 100 percent hearing handicap for normal speech.

Decibel (dB): A unit of measurement of sound-pressure level. The decibel level of a sound is related to the logarithm of the ratio of sound pressure to a reference pressure. The dB has meaning only when the reference is known. The internationally accepted reference pressure used in acoustics is 20 micropascals.

Decibels, A-Weighted (dBA): A sound level reading in decibels made on the A- weighting network of a sound-level meter at slow response.

Decibels, Peak (dB_P): A unit used to express peak sound-pressure level of impulse noise.

Designated Representative: Any individual or organization to whom an employee gives written authorization to exercise a right of access. For the purposes of access to employee exposure records and analyses using exposure or medical records, a recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

Dose Criterion Sound Level: The average sound level at a given dose criterion length for which the dose represents 100 percent of the allowable exposure. The Federal Occupational Safety and Health Administration (Fed-OSHA) requires a dose criterion sound level of 90 dBA for exposure duration of eight hours. MPT has a dose criterion level of 85 dBA for an eight-hour exposure, per section 29.6.

Dose Criterion Length: The permissible exposure duration (in hours) for a given dose criterion sound level for which the dose represents 100 percent of the allowable exposure.

Eight-hour Dose: The actual dose (as a percentage) accumulated over the duration of the work shift and based on a regulation defined criterion level and criterion length.

Engineering Control: Any mechanical device, physical barrier, enclosure, or other design procedure that reduces the sound level at the source of noise generation or along the path of propagation of the noise to



the individual. This does not include protective equipment such as earmuffs, plugs, or administrative controls.

Hazardous Noise: Noise generated by an operation, process, or procedure that is of sufficient duration and intensity to be capable of producing a permanent loss of hearing in an unprotected person. Generally, this is interpreted as persistent noise levels equal to or greater than 85 dBA or combinations of higher intensities for durations shorter than eight-hours.

Hearing Protection Device (HPD): A form of personal protective equipment (PPE) used as a last line of defense to protect the wearer from hazardous noise. HPDs may come in the form of ear plugs, earmuffs, etc.

Hertz (Hz): A unit of measurement of frequency that is numerically equal to cycles per second.

Impulsive or Impact Noise: Variations in noise levels that involve peaks of intensity that occur at intervals of greater than one second. If the noise peaks occur at intervals of one second or less, the noise is considered continuous.

L_{av}: The average sound level (in dBA) computed for a chosen averaging time duration.

L_{av} (80): The average sound level (in dBA) computed for a chosen averaging time duration, using an 80-dBA cut-off level. The 80-dBA cut-off level is used by OSHA for hearing conservation compliance requirements.

Medical Pathology: A disorder or disease. For the purposes of this chapter, a condition or disease that affects the ear and should be treated by a physician specialist.

Monitoring Audiogram: An audiometric test obtained at least annually to detect shifts in an individual's threshold of hearing by comparison to the baseline audiogram.

Noise: Unwanted sound.

Noise Dose: A measure of cumulative noise exposure over a stated period, which takes into account both the intensity of the sound and the duration of the exposure.

Noise Dosimeter: An electronic instrument that integrates cumulative noise exposure over time and directly indicates a noise dose.

Noise Reduction Rating (NRR): An EPA method of valuing attenuation of hearing protection devices.



Noise Hazard Area: Any work area with a noise level of 85 dBA or greater.

Otolaryngologist: A physician who specializes in the diagnosis and treatment of disorders of the ear, nose, and throat.

Representative Exposure: The measurements of an employee's noise dose or an eight-hour time-weighted average sound level that a qualified person deems representative of the exposure of other employees in that work area or job classification.

Standard Threshold Shift (STS): An average hearing threshold shift of 10 dB or more at 2000, 3000, and 4000 Hz in either ear relative to the baseline audiogram.

Sound-pressure level: The term used to identify a sound measurement (expressed in decibels) obtained with a sound-level meter that has a flat frequency response. This is mathematically equivalent to 20 times the common logarithm of the ratio of the measured A-weighted sound pressure to the standard reference pressure of 20 micropascals (measured in decibels). For use with this standard, slow time response is required in accordance with the current ANSI.S1.4.

Sound-level meter (SLM): An electronic instrument for the measurement of sound levels that conforms to the requirements for a Type II sound-level meter as specified in ANSI S1.4-1971.

Time-Weighted Average (TWA) Sound Level: The sound level that, if constant over an eight-hour workday exposure, would result in the same noise dose as is measured.

TWA (80): The time-weighted average level that corresponds to a noise dose computed with an 80-dBA cut-off level.

3.0 Responsibilities

3.1 Risk Management and Safety

Risk management and safety (RMS) will be responsible for overseeing and assistance of compliance with this HCP at Bryant.

- Aid in selecting and purchasing hearing protection devices (HPD) for affected employees.
- Assist in coordinating noise monitoring and hazard assessments in noise hazard areas.



- Maintain records of noise monitoring and hazard assessments.
- Ensuring written Hearing Conservation Program is administered across all applicable departments of Bryant.
- Assist in providing required signage in applicable areas.
- Assist in coordinating/providing training to affected employees.
- Review this written program at least annually and update as needed.

3.2 Department Supervisors

- Notify employees exposed at or above an 8-hour time-weighted average of 85 decibels of the results of noise monitoring.
- Ensure all affected employees participate in the audiometric testing program.
- Selecting and purchasing all hearing protection devices (HPD) for affected employees.
- Identify noise hazard areas and communicate these to all employees.
- Assist in coordinating noise monitoring and hazard assessments in noise hazard areas.
- Maintain records of noise monitoring and hazard assessments.
- Provide HPD to affected employees, where required.
- Post signs in areas of hazardous noise.
- Ensure affected employees receive training on the contents of this plan and proper use of HPD.
- Ensure affected employees utilize HPD in noise hazard areas and wear all PPE correctly and safely.

3.3 Employees

- Properly wear and maintain all HPD and PPE.
- Attend required training program(s) associated with hearing conservation and PPE.
- Participate in baseline and annual audiograms and any other required medical supervision.
- Notify supervisors of any areas or equipment that may produce hazardous noise.



4.0 Monitoring

Noise monitoring is required whenever information indicates that employee exposure may equal or exceed an 8-hour time-weighted average of 85 decibels. The noise exposure should be measured without attenuation provided by hearing protection devices. This information may come from a variety of sources, including hazard assessments. One indicator of potential hazardous noise is when it is hard to hear normal conversation of a speaker who is two feet away. The method of sampling must be designed so employees can be identified for inclusion in this Program. It must also allow for proper selection of PPE and HPD.

All sound levels (continuous, intermittent, and impulsive) from 80-130 decibels will be included in the measurements. Where area monitoring is inappropriate or logistically challenging, Hilco Vision may use representative personal sampling.

Repeat monitoring is required when:

- There is a change in production, process, equipment, or controls that increases noise exposure;
- Additional employees may be exposed at or above the action level; or
- Hearing protection is inadequate.

Any employee who is found to be exposed at or above the 8-hour time-weighted average of 85 decibels must be notified of the monitoring results. The affected employees, or their representatives, must be provided an opportunity to observe noise measurements as well. Copies of all monitoring will be kept on file in accordance with **Section 9.0** of this Program.

4.1 Monitoring Equipment

To ensure accuracy of the readings or measurements, all instruments must be calibrated correctly. Follow all manufacturer instructions on calibration of specific pieces of equipment.

5.0 Audiometric Testing

Bryant ensures any affected employee whose exposure meets or exceeds the action level is provided audiometric testing at no cost to them. The person performing the test must be:

- A licensed or certified audiologist, otolaryngologist, or other physician;



- Technicians who:
 - Are certified by the Council of Accreditation in Occupational Hearing Conservation;
 - Satisfactorily demonstrate competence in audiometric exams, obtain valid audiograms, and properly use, maintain, and check calibration and proper functioning audiometers; and
 - Are responsible to audiologist, otolaryngologist, or physician.

The tests performed must meet the following criteria:

- Test must be pure tone, air conduction hearing threshold examinations;
- Test frequencies including 500, 1000, 2000, 3000, 4000, 6000; and
- Test shall be taken separately for each ear at each frequency.
- Performed in a room meeting the criteria outlined in 29 CFR 1910.95 Appendix D.

Audiometric testing equipment must also meet the following criteria:

- Test must use audiometers meeting American National Standard Institute (ANSI) S3.6-1969 (Specifications for Audiometers);
- Pulsed-toned & self-recording audiometers shall meet 29 CFR 1910.95 Appendix C requirements, if used;
- Audiometers must be checked for functional operations before each days use;
 - Must test an individual with known, stable hearing thresholds;
 - Ensure output is free from distorted or unwanted sound(s);
 - If a deviation of ≥ 10 decibels exists, calibration is required.
- Calibration shall be checked acoustically, at least annually in accordance with 29 CFR 1910.95 Appendix E; and
- At least every two (2) years, an exhaustive calibration shall be performed on the audiometer in accordance with ANSI S3.6-1969.

5.1 Baseline Audiogram

Employees must receive a baseline audiogram within 6 months of their first exposure at or above the action level. This baseline will be compared with future audiograms to determine any potential hearing loss. If using a mobile van for complete the audiogram, Bryant has one year to obtain the baseline audiogram from initial exposure. If this method is used, hearing protection must be worn after 6 months of first exposure until the baseline is obtained. Prior to the audiogram, the employee should not have



workplace noise exposure for a minimum of 14 hours. This may be achieved by using hearing protection. Bryant will advise employees to avoid non-occupation noise for 14 hours prior to the audiogram.

5.2 Annual Audiogram & Evaluation

Once the baseline audiogram is obtained, new audiograms must be completed at least annually for all affected employees. These will be compared to the baseline audiogram to assess for validity and a standard threshold shift (STS). If the audiogram shows a standard threshold shift has occurred, Bryant may obtain a retest with 30 days. The results of the retest may be used as the annual audiogram. The person reviewing the audiogram will determine whether any additional evaluation is necessary. Bryant will provide the audiologist, otolaryngologist, or physician completing the evaluation with:

- A copy of the hearing conservation standard;
- Baseline and most recent audiogram of employee;
- Measurements of background sound pressure levels in audiometric test room; and
- Records of audiometer calibrations.

5.3 Follow-Up

If the audiogram shows a standard threshold shift, the employee must receive notification in writing within 21 days of the initial determination. Bryant will ensure these employee(s) are fitted or refitted with HPD and receive the appropriate training or retraining to use them. Hearing protection with greater attenuation than was already being used may be implemented, if necessary. Only a physician may determine if the STS is non-work related or not aggravated by occupational noise exposure.

Employees will be informed of any interpretations of subsequent audiometric testing if it indicates a STS is non persistent and their exposure is less than an 8-hour time weighted average of 90 decibels. If this is the case, Bryant may choose to discontinue use of HPD for that employee.

If any medical pathology of the ear related to the use of HPD is suspected in the individual, the employee will be referred for additional evaluation or examination, as appropriate. If unrelated medical pathology is suspected, the employee will be notified of the need for additional ontological examination.



5.4 Revised Baseline Audiogram

If an employee's audiogram reveals that an STS is persistent or that there has been significant improvement from the baseline, the annual audiogram may be substituted for the baseline.

6.0 Hearing Protection Controls

Bryant is responsible for ensuring employees are not exposed to hazardous noise above the permissible levels outlined by OSHA. **Appendix A** of this Plan outlines the permissible noise exposures and duration in hours. When these levels are exceeded, appropriate controls must be put in place to reduce the exposure.

6.1 Engineering & Administrative Controls

Prior to the implementation of personal protective equipment (PPE), such as hearing protection devices, Bryant will utilize applicable engineering and administrative controls to minimize risk and exposure to employees in work areas with hazardous noise. Below are some examples of possible controls that may help minimize noise exposure in the workplace:

Engineering Controls:

- Utilizing equipment, tools, and machinery with lower noise output
- Isolating or enclosing equipment with high noise output
- Insulating machinery
- Maintaining equipment to minimize noise
- Noise barriers, walls, cushioning

Administrative Controls:

- Limit time working around hazardous noise levels
- Keeping distance from areas or equipment with hazardous noise
- Signage of hazardous noise area(s)
- Run equipment, tools, and machinery with high noise output during times with less workers



6.1.1 Signs and Labels

All hazardous noise areas (those having documented sound levels >90 dB - 8 hr. TWA shall be clearly identified by signs located at their entrances or boundaries. Additionally, individual tools or pieces of equipment producing noise levels greater than 85 dBA, shall be marked to alert personnel of the potential hazard. Signs and decals that describe, through words or with other visual symbols, the potential hazard, and the protective measures to be taken will be used to designate hazardous noise areas.

6.2 Hearing Protection Devices (HPD)

Hearing protection must be made available to all employees exposed to the action level. The selected HPD must attenuate employee exposure to an 8-hour TWA of 90 dB or below. If a particular employee has experienced an STS, their HPD must attenuate to an 8-hour TWA of 85 dB or below. This may be accomplished by the use of multiple forms of hearing protection.

Proper use, maintenance, fit, and replacement of hearing protection devices is essential, and all affected employees will receive training on this. Bryant will ensure a variety of hearing protection devices are made available to employees who:

- Are required to wear PPE/HPD; and
- Any employee exposed to the action level, and:
 - Has not had a baseline audiogram; or
 - Has experienced a STS.

One provided, Bryant will ensure the proper fit and use of HPD in the workplace. HPD attenuation may require reevaluation if noise exposure increases. If the existing selection(s) do not provide adequate protection, more effective or additional HPD may be required.

6.2.1 Noise Reduction Rating

Hearing protection devices, carrying cases, or packaging are to be labeled with a Noise Reduction Rating (NRR) per EPA regulations (40 CFR Part 211 Subpart B). The NRR can be used to calculate attenuation of hearing protection for a given user utilizing methods developed by the National Institute for Occupational Safety and Health (NIOSH). Since the NRR is measured in a lab under controlled environments which do not accurately reflect the workers environment, the following calculations are recommended to calculate attenuation of HPD with a correction factor of fifty (50) percent:



The following calculation is used to calculate attenuation of HPD for **C-weighted** noise measurements:

$$\text{Estimated Protected Exposure (dBA)} = \text{TWA (dBC)} - (\text{NRR}/2)$$

The following calculation is used to calculate attenuation of HPD for **A-weighted** noise measurements with an additional correction factor of seven (7):

$$\text{Estimated Protected Exposure (dBA)} = \text{TWA (dBA)} - [(\text{NRR}-7)/2]$$

When wearing multiple forms of HPD in combination, such as earplugs with earmuffs, the attenuation is determined by using whichever HPD has the higher NRR and adding 5. The following calculations would be used to calculate attenuation of dual hearing protection, for C-weighted and A-weighted noise measurements, respectively:

$$\text{Estimated Protected Exposure (dBA)} = \text{TWA (dBC)} - [(\text{NRR}/2) + 5]$$

$$\text{Estimated Protected Exposure (dBA)} = \text{TWA (dBA)} - \{[(\text{NRR} - 7)/2] + 5\}$$

7.0 Training

All affected employees exposed to the action level will be trained to the contents of Bryant hearing conservation program. That program must include the following information, at a minimum:

- The effects of noise on hearing
- Hearing protection
 - Purpose of hearing protection
 - Advantages & disadvantages
 - Attenuation
 - Types of HPD
 - Instruction on selection, fit, use, and care
- Audiometric testing
 - Purpose



- Test procedures

This training will occur annually for all affected employees covered by the hearing conservation program. Copies of training records and other materials related to this training program will be made available to authorized representatives of OSHA, upon request.

8.0 Recordkeeping

Copies of OSHA's hearing conservation standard, training materials, and copies of this Program will be made available to affected employees, or their designated representatives, upon request. Copies of this Program and this standard will be kept on file in the shared drive, and a copy of the standard will be posted in the workplace.

8.1 Noise Exposure Records

Records of noise exposure measurements must be kept on file for a minimum of two (2) years.

8.2 Audiometric Test Records

Audiometric test records must be kept on file for the duration of a given affected employee's employment with Bryant. These files must include:

- Name & job classification of affected employee;
- Date of audiogram;
- Name of examiner;
- Date of last calibration of audiometer used (acoustic or exhaustive); and
- Affected employee's most recent noise exposure assessment.

Additionally, Bryant must maintain accurate records of background sound pressure level measurements in the audiometric test rooms.



8.3 Access and Transfer of Records

All records must be made available to employees, former employees, their representatives, and OSHA inspectors. Additionally, any records required to be maintained will be transferred to successive employers if ownership of Bryant changes or ceases business.

8.4 OSHA 300 Log

If an employee experiences hearing loss that is work-related, it must be documented in the annual OSHA 300 log.



Appendix A: Permissible Noise Exposure

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 ½	102
1	105
½	110
¼ or less	115

When the daily noise exposure is composed of two or more periods of noise exposure at different levels, their combined effect should be considered, rather than the individual effect of each. In such cases, actual employee exposure will be determined in one of the following ways:

- Personal noise monitoring will be performed with an instrument capable of calculating an 8-hour average exposure; or
- The fractions of exposure times divided by permissible exposures will be used such that: $C(1)/T(1) + C(2)/T(2) + C(n)/T(n)$ must be equal to or less than 1, where $C(n)$ = the total time of exposure at a specified noise level, and $T(n)$ = the total time of exposure permitted at that level.