Hearing Conservation Program

CITY OF BANGOR

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1. Purpose & Scope

The City of Bangor is committed to protecting employees from hazards associated with exposures to significant noise levels encountered in the work environment. Although it is the goal of the City to reduce noise exposures to a level below 85 dBA or equivalent over an eight-hour time weighted average through the implementation of engineering or administrative controls, we recognize that it may not always be feasible. In those particular cases, the City of Bangor has developed a Hearing Conservation Program in accordance with 29 CFR 1910.95 to ensure our employees' hearing remains protected from excessive noise levels in the workplace.

2. Definitions

Action Level: The level of sound at which employees are required to be included in the Hearing Conservation Program. An 8-hour, time-weighted average (TWA) of 85 decibels measured on the A-weighted scale or equivalent dose of 50%.

A-Weighted Sound Level (dBA): The weighting of sound levels that represents the function of the human ear.

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

Audiometric Testing: A hearing test that is conducted by a physician, otolaryngologist, audiologist or technician that monitors an employee's hearing over time by comparing a baseline test with subsequent test.

Baseline Audiogram: The initial audiogram which future audiograms are compared to in order to assess an employee's hearing loss.

Decibel: A unit of measurement of sound level.

Dose: A ratio of noise exposure relative to the noise criterion level of 90 decibels, expressed as a percentage. 90 decibels represents a dose of 100% over an 8-hour work shift. 85 decibels represents a dose of 50% over an 8-hour work shift.

Noise: Unwanted sound that is occurring in the employee's environment that is annoying, distracting, harmful or prohibits communication amongst employees.

Noise-induced Hearing Loss: Slow, progressive inner-ear hearing loss resulting from exposure to continuous noise over a long period of time, as contrasted to acoustic trauma or physical injury to the ear.

Noise Reduction Rating (NRR): Is the theoretical decibel value assigned to hearing protection that will reduce a noise exposure under optimal conditions.

Permissible Exposure Limit (PEL): The maximum allowable daily noise exposure for employees. The PEL is an 8-hour, time-weighted average of 90 decibels measured on the A-weighted scale or equivalent dose of 100%.

Standard Threshold Shift (STS): A change in an employee's hearing threshold relative to the baseline audiogram of an average of 10 decibels or more at 2000, 3000 & 4000 Hertz in either ear.

Time-weighted Average (TWA): A sound level, which if constant over a given time period, the exposure would result in the same noise level as is measured.

3. Exposure Limits

The following information details the exposure limits listed in 29 CFR 1910.95 and enforced by the Maine Department of Labor, Bureau of Labor Standards. Next to each noise level is an abbreviated explanation of the compliance requirements when employees are exposed to noise levels at or above those limits averaged over an 8-hour time period. The 8-hour, time-weighted average may be exceeded if the employee is exposed to a higher noise level for a shorter period of time (i.e. 95 dBA for 4 hours) as long as the equivalent dose is not exceeded.

- **Action Level** (85 dBA or 50% Dose): Employee is included in the Hearing Conservation Program, Annual Training & Audiogram, Noise Dosimetry & Hearing protection is offered.
- **Permissible Exposure Level** (90 dBA or 100% Dose): Employee is included in the Hearing Conservation Program, Annual Training & Audiogram, Noise Dosimetry & Hearing protection is required.

4. Program Administration and Responsibilities

4.1 Safety and Environmental Management (SEM)

- Develop, maintain, review and make available to all employees the City of Bangor Hearing Conservation Program (HCP);
- Assist departments in identifying and assessing noise-related hazards in the workplace;
- Provide departments with sound level measurements and personal noise dosimetry when assessing potential noise exposures;
    - Provide supervisors and employees that participated in the noise monitoring with a copy of the monitoring results;
- Provide supervisors guidance with identifying and selecting engineering controls, administrative controls and/or hearing protection to reduce employee's noise exposures;
- Organize annual audiometric testing for employees included in the Hearing Conservation Program;

- Conduct periodic audits of the Hearing Conservation Program and City Departments to ensure regulatory compliance;
- Provide annual training to employees included in the Hearing Conservation Program; and
- Notify the supervisor and employee of a standard threshold shift and record it on the applicable OSHA 300 Log.

4.2 Supervisors

- Be familiar with the Hearing Conservation Program and ensure personnel comply with the requirements described in the program.
- Ensure new employees that have the potential to be included in the Hearing Conservation Program receive a baseline audiogram within 6 months of an employee's first exposure at or above the action level;
- Assist Safety and Environmental Management in the identification of work practices generating noise levels at or above the action level;
- Work with Safety and Environmental Management to schedule personal noise dosimetry for work tasks that generate elevated levels of noise.
- Consult with Safety and Environmental Management to determine the feasibility of appropriate engineering or administrative controls to reduce an employee's noise exposure;
- Provide employees with a selection of appropriate hearing protection to reduce exposures below the permissible exposure limit;
- Provide personnel the opportunity to complete audiometric testing during normal working hours and at no cost to the employee;
- Ensure employees that are included in the Hearing Conservation Program receive annual training.

4.3 Employees Included in the Hearing Conservation Program

- Be familiar with the requirements of the Hearing Conservation Program;
- Assist the supervisor in identifying potentially hazardous noise locations or operations to which they may be exposed;
- Participate in personal noise dosimetry conducted by Safety and Environmental Management;
- Attend and participate in annual training;
- Follow the instructions for completing the annual audiometric testing; and
- Properly maintain and wear the hearing protection provided by your supervisor.

5. Noise Exposure Assessment

When information indicates that an employee's noise exposure may equal or exceed the action level, the City is required to develop and implement a monitoring program. This program is used to identify the employees that are included in the Hearing Conservation Program. The data collected will be used to recommend to supervisors feasible engineering and administrative controls or effective hearing protection. To determine occupational noise exposures throughout the City, SEM will use a sound level meter (SLM) and a personal noise dosimeter configured to have a 5-dBA exchange rate, a criteria level of 90 dBA, set at slow response, and use an 80 dBA threshold.

Initial monitoring will be conducted for noisy work sites or tasks to determine the noise exposure levels representative of all workers whose 8-hr TWA noise exposures may equal or exceed 85 dBA. For individuals remaining in essentially stationary, continuous noise levels, either a sound level meter or a dosimeter may be used. For employees who move around frequently or who perform different tasks with intermittent or varying noise exposure levels, a task-based monitoring strategy may be employed.

Re-evaluations of areas observed to be in excess of 85 dBA should be conducted periodically. Monitoring will be repeated sooner if a change in production, process, equipment or personnel might affect exposure levels. Re-evaluation may also be considered if individuals have experienced a standard threshold shift.

5.1 Sound Level Meter

Noise level measurements using a sound level meter will be conducted in the following circumstances:

- An initial assessment of a loud task or location;
- To determine if a hazard to an employee's hearing exist;
- To determine if a noise presents a safety hazard by interfering with communication or the recognition of audible warning devices; and
- Where noise levels are expected to be stationary, consistent and continuous.

5.2 Personal Noise Dosimeter

A personal noise dosimeter will be used to determine an employee's average noise level exposure over a period of time. The use of a dosimeter will be based upon the results of a previous noise level survey or other data indicating that employees are potentially exposed to noise levels at or greater than 85 dBA over an 8-hour, time-weighted average. In locations where multiple employees are performing similar tasks, several employees will be chosen at random as test subjects. Resultant data will be considered representative of the exposure of all individuals performing the same task unless there is a reason to believe otherwise. Dosimeter monitoring will occur during periods of work considered typical of the daily

exposure. For those times that do not represent typical exposure (e.g. special process or extended operational time), dosimetry will be performed to determine noise levels associated with those potential exposures.

5.3 Analysis and Employee Notification

Monitoring results will be evaluated by Safety and Environmental Management for the purpose of identifying employees to be included in the Hearing Conservation Program. The findings will be shared with the supervisor to be used to identify possible administrative or engineering controls to reduce the noise exposure below the action level. In addition, the monitoring results will be used to identify appropriate hearing protection that will effectively control the noise exposure when administrative or engineering controls are not feasible.

Sound level meter monitoring results will be posted or otherwise made available to all affected employees. Individual dosimetry measurements will be shared with the supervisor and the employee that participated in the monitoring. Dosimetry measurements for loud tasks, equipment, locations or processes that indicate that one or more employees are exposed to or potentially exposed to noise levels at or above the action level, all affected employees will be notified.

Safety and Environmental Management recommends supervisors post a notification on the entrance to each location that has been identified of having high-risk noise levels at or above 90 dBA over an 8-hr TWA. The sign should read "Warning, Hearing Protection is Required in this Area" or similar language.

6. Engineering and Administrative Controls

When employees are subjected to sound levels exceeding 85 dBA over an 8-hour time-weighted average or greater, SEM will work with the supervisor to identify practical and economically feasible administrative or engineering controls to be used to control or reduce noise levels at or below the action level. Successful implementation these controls into the work environment not only reduces the risk of a potential hearing loss, but it can also eliminate the regulatory requirements associated with the hearing conservation regulation.

6.1 Engineering Controls

Engineering controls should be the first order of protection from excessive noise levels in the work environment. These controls focus on the source of the noise or trying to control the path of noise. Examples of engineering controls are:

- Reducing noise at the source: Installing a muffler, lubricating parts, balancing equipment, controlling excessive vibration, etc…
- Interrupting the path of the noise: Installing acoustical barriers or enclosures, lining ductwork.

- Reducing reverberation: Installing acoustical absorptive material (i.e. panels or baffles), using buildings materials with better absorptive properties.

Engineering controls for noise reduction should be considered when planning new construction or renovating existing facilities. These controls can be functionally and economically more effective if they are incorporated into the original design and purchase of equipment.

6.2 Administrative Controls

Administrative controls are changes in a task or work schedule to reduce or eliminate the employee's exposure to a noise source. Administrative controls should be developed and implemented to reduce the noise exposure, not to increase the number of employees exposed to an exposure for smaller amounts of time. Examples of administrative controls are:

- Increasing the distance from the noise source.
- Reducing the amount of time an employee spends performing a noisy task
- Perform a noisy task outside normal work hours to eliminate the noise exposure for other employee.

7. Audiometric Testing

The City of Bangor will establish an audiometric testing program for all employees found to be exposed to 85 decibels or greater over an 8-hour time weighted average. Audiometric testing will be performed by a physician, otolaryngologist, audiologist or technician who is under the supervision of a physician, otolaryngologist or audiologist. The audiogram will consist of air conduction, pure-tone, hearing threshold measurements at no less than 500, 1000, 2000, 3000, 4000, and 6000 hertz (Hz). Right and left ears will be individually tested. All tests will be conducted in a room where ambient noise levels conform to all requirements of the ANSI Maximum Permissible Ambient Noise Levels for Audiometric Testing Rooms (ANSI S3.1-1991). The ambient noise levels will be tested annually. For mobile or transient testing facilities, ambient noise levels will be tested daily or each time the facility is moved, whichever is more frequent. Ambient noise measurements are to be taken under conditions representing the typical acoustical environment likely to be present when the audiograms are performed. These levels will be recorded.

7.1 Baseline Audiogram

A baseline audiogram will be obtained before employment or within 6 months of an employee's first exposure at or above the action level (i.e. 85 dBA over an 8-hour TWA or 50% Dose). The baseline audiogram will be compared to subsequent audiograms to identify if a standard threshold shift has occurred. Workers cannot be exposed to noise levels at or above 85 dBA for a minimum of 14 hours before receiving a baseline audiometric test. Hearing protectors may be used as a substitute for the required 14-hour quiet period.

7.2 Annual Audiogram

Employees covered by the Hearing Conservation Program will receive an annual audiogram that will be evaluated by a physician, otolaryngologist or audiologist to determine if an employee has a change in hearing relative to his or her baseline audiogram. If a change in hearing threshold level, in either ear, that equals or exceeds an average of 10 decibels at 2000, 3000 and 4000 Hz is observed (relative to his or her baseline audiogram) an optional re-test may be conducted within 30 days. The results of the re-test may be used as the annual audiogram.

If the comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift, the employee must be notified in writing within 21 days of the determination. The employee will be given an opportunity to discuss the results of the annual audiogram with the physician, otolaryngologist or audiologist. The employee will be informed of the potential risks of noise exposures at or above 85 dBA and methods of protecting themselves from these exposures. The annual audiogram will serve as the employee's new baseline audiogram and will be used to identify any subsequent standard threshold shift.

7.3 Exit Audiogram

The City of Bangor would like to obtain an exit audiogram from any employee included in the Hearing Conservation Program and who is leaving employment or whose job no longer involves an exposure to elevated noises.

8. Hearing Protection

City Departments are required to provide employees that are exposed to 85 dBA or greater over an 8-hour time weighted average a selection of hearing protection devices (ear plugs and/or muffs) at no cost. Employees that are exposed to noise at or above the permissible exposure level (i.e. 90 dBA over an 8-hour TWA or 100% dose) are required to use hearing protection. The selection of hearing protection devices will be based upon the measured noise levels an employee is exposed to, the duration of exposure, the individual wearing them, the need for compatible safety equipment and workplace conditions such as temperature and humidity.

Each hearing protector is assigned a Noise Reduction Rating (NRR) by the manufacturer. This number is typically found on the box or packaging. The NRR is the theoretical number of decibels that the hearing protection will reduce the noise exposure by if worn properly. This rating is determined by a testing laboratory and represents measurements under optimal conditions. Factors such as ear canal shape and size, type of physical activity, and installation technique all have an effect on the actual NRR. To determine the actual NRR of a particular hearing protection device, the following equations must be used:

$$\textit{Actual NRR} = \underline{\textit{(Manufacturer NRR} - 7\textit{)}}$$

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The actual NRR is then subtracted from the sound level measurement. The resulting difference is the noise level the employee will be exposed to. The hearing protection must attenuate the sound level at or below 90 dBA over an 8-hour time weighted average. For employees that have experienced a standard threshold shift, the hearing protection must decrease the sound level to 85 dBA over an 8-hour time weighted average or less. When using both ear plugs and muffs simultaneously, it is important to note that the NRR of both devices are not additive. Instead, one can add 5 decibels to the NRR of the most protective device and use that number in the above formula.

9. Training

The City of Bangor will provide initial and annual training to all employees that are included in the Hearing Conservation Program. The training will cover the following topics:

- The effects of noise on hearing;
- The purpose of hearing protection;
- The advantages, disadvantages and attenuation of various types of hearing protection;
- Instruction on proper selection, fitting, use and care of hearing protective devices; and
- The purpose of audiometric testing and an explanation of the test procedure

The training will also include a review of the Hearing Conservation Regulation (29 CFR 1910.95) and information instructing employees where they can obtain a copy of the regulation. Training will be documented and include the employee's name, his or her signature or initials, name of the trainer and date of the training. This information will be available for review upon request.

10. Recordkeeping

The City of Bangor will maintain the following Hearing Conservation records:

- Noise exposure measurements – will be kept by Safety and Environmental Management for a period of no less than two years. Copies of the noise exposure measurements will be distributed to affected departments.
- Audiometric testing records – will be kept by Safety and Environmental Management for the duration of employment plus 30 years.
- Hearing Conservation training records – will be kept by Safety and Environmental Management for the duration of employment.

Noise exposure measurements and audiometric testing records will be accessible to employees, former employees and representatives designated by individual employee upon request.

11. Program Review

Safety and Environmental Management will conduct a periodic review of the Hearing Conservation Program, including the training and audiometric testing programs to assess compliance with 29 CFR 1910.95. Periodic field audits will be conducted of departments that have employees included in the HCP ensure compliance at the departmental level.