

# Workplace Health and Safety Bulletin



## Noise in the Workplace

Noise is one of the most common workplace hazards. Workers in many industries and occupations in Alberta are exposed to noise levels that are so high that their hearing can be damaged. Sometimes the noise may not even be considered to be noise — such as the very loud music to which entertainers and food and beverage servers are exposed in bars and nightclubs. If the sound is loud enough and workers are exposed to it for a long enough period of time their hearing will be damaged. Fortunately, work-related hearing loss is preventable.

Employers in Alberta are responsible for minimizing the noise hazard at their workplaces and must comply with the province's Occupational Health and Safety (OHS) Code. This Safety Bulletin describes what employers and workers can do to prevent work-related noise-induced hearing loss.

## Health effects

Ears ringing after a day at work? On the way home, does the volume on the car radio need to be turned up higher than it was on the way into work? These are two signs of hearing loss, the result of exposure to too much noise. At first, noise-induced hearing loss affects a person's ability to hear higher frequency sounds, but since normal speech does not use these high frequencies, little hearing change is noticed.



With continued exposure, hearing deteriorates and eventually the loss spreads into those lower frequencies involved in speech. Affected individuals tend to automatically compensate by getting clues from reading lips without realizing it. Significant hearing loss is often experienced before it is even noticed.

---

Hearing loss is often experienced before it is even noticed.

---

The body's reaction to noise is similar to its response when under stress. Blood pressure and heart rate can increase, and hormone and blood cholesterol levels can change. Exposure to too much noise can make a person feel tired. High noise levels can also interfere with being able to hear important messages in some jobs, causing potential safety problems unless alternative methods of communication are used.

Once hearing is lost, it cannot be replaced or repaired. It is vital, then, that work-related hearing loss be prevented.

## Occupational Exposure Limits

Occupational Exposure Limits (OELs) define a worker's maximum permitted daily exposure to noise without hearing protection. OELs take into consideration the loudness of the noise — measured in decibels (dBA) — and the duration of exposure to that noise — measured in hours per day. Employers are responsible for making sure that workers are not exposed to noise that exceeds the OELs and 85 dBA  $Le_x$ . The OELs appear in Schedule 3, Table 1 of the OHS Code.

---

OELs take into consideration the loudness of the noise — measured in decibels (dBA) — and the duration of exposure to that noise.

---

$Le_x$  is the worker's level of total exposure to noise in dBA, averaged over the entire work day and adjusted to an equivalent 8-hour exposure (based on a 3 dB exchange rate). In other words, a worker exposed to 88 dBA for 4 hours or 91 dBA for 2 hours would be exposed to 85 dBA  $Le_x$  (an exposure equivalent of 85 dBA for 8 hours).

Figure 1: Schedule 3, Table 1 of the OHS Code Occupational exposure limits for noise

Exposure level (dBA)	Exposure duration
82	16 hours
83	12 hours and 41 minutes
84	10 hours and 4 minutes
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 minutes
100	15 minutes
103	8 minutes
106	4 minutes
109	2 minutes
112	56 seconds
115 and greater	0

Note: Exposure levels and exposure durations to be prorated if not specified

## Noise management program

Where workers are exposed to “excess noise” (noise exceeding the OELs), the employer must develop and implement a noise management program. Such a program consists of the following elements:

*Educating workers* — this includes the basics of noise-induced hearing loss and how workers can protect themselves.

*Measuring and monitoring sound levels* — what needs to be done to protect workers depends on the level and type of noise at the workplace. Measuring sound levels identifies noise sources and those workers most likely to be exposed to noise exceeding the OELs.

*Posting of suitable signs* — where the noise level exceeds 85 dBA.

*Controlling noise exposure* — worker exposure to noise can be reduced through

- (a) engineering controls;
  - (b) administrative controls; or
  - (c) by providing workers with appropriate personal hearing protection.
- Each of these approaches are described more fully further on in this Bulletin.

*Hearing protection devices* — this includes selection, use and maintenance of the equipment.

*Conducting audiometric tests* — workers hearing needs to be tested to determine the extent of any existing hearing loss and to monitor for on-going changes in hearing ability.

*Evaluating the program* — verifying that the program is doing what it is intended to do – prevent work-related hearing loss. Verification must be done at least annually.

## Educating workers

All workers exposed to noise levels exceeding the OELs need instruction about the noise hazard, how it can affect their health, how to protect themselves, their responsibilities and their role in the noise management program. Worker compliance with the employer’s program should be a condition of employment.

Regular and on-going education for workers helps to increase their understanding of the importance of hearing conservation — both at work and when exposed to high noise levels at home and at sports and entertainment events.

Figure 2 summarizes some of the most frequently heard reasons why workers do not use their hearing protection.

Figure 2 Hearing protection excuses and facts

Excuse	Fact
“I’m used to noise.”	The only way you can be “used to noise” is if your hearing is so damaged you’re literally deaf to it.
“Hearing protection is uncomfortable.”	Hearing protection takes a bit of getting used to, just like a pair of safety glasses or new safety boots. The hearing protection might feel odd at first, but after 2 weeks (at most) you’ll hardly notice you’re wearing it.
“My hearing’s already changed.” “I’m too old to start now.”	True, hearing protection can’t bring back the hearing you’ve lost. It can, however, save the hearing you have left. The risk of hearing damage doesn’t lessen as you get older.

Excuse	Fact
"I won't hear what people are saying to me."	Wearing hearing protection in a noisy environment often makes conversation easier to distinguish. Your ability to hear people may improve when using the hearing protection.
"I've never used hearing protection and my hearing is as good as ever."	The terrible thing about noise-induced deafness is that you don't notice it until it's too late. You have to be wise before the event. The fact that you haven't been affected so far doesn't mean that you're immune to noise damage.

## Measuring and monitoring sound levels

Part of a noise management program is to identify noise hazards in the workplace and those workers most likely to be exposed to noise exceeding the OELs. This is done by conducting a survey in which sound levels are measured and the duration of worker exposures in the various work areas are estimated. These results determine the need for a program and its scope.

The exposure assessment must be done in accordance with the Canadian Standards Association (CSA) Standard Z107.56-94 (R1999), *Procedures for the Measurement of Occupational Noise Exposure*. The person who conducts and interprets the exposure assessment must be competent as defined in the OHS Code. In addition, the equipment used to measure noise exposure must meet the requirements of one of the Standards listed in section 219(3) of the OHS Code.

An initial noise survey should be performed in any work area where workers must significantly raise their voices in order to be heard over the background noise. The survey should include work areas that are indoors, outdoors, and in mobile equipment. If the results of this initial survey indicate that no workers are exposed to noise levels exceeding the OELs, then periodic surveys will identify if conditions have changed over time. These periodic surveys should be performed annually and when

- (a) new noise-generating equipment or work processes are introduced;
- (b) old equipment seems to get louder over time;
- (c) work practices and/or work procedures change; and
- (d) workers complain of ringing in the ears, temporary changes in hearing, or increased levels of noise in their work area.

---

An initial noise survey should be performed in any work area where workers must significantly raise their voices in order to be heard over the background noise.

---

If the noise survey identifies workers exposed to noise that exceeds the OELs, then the OHS Code requires the employer to take action to reduce the noise exposure.

## Controlling noise exposure

Section 217 of the OHS Code requires that noise levels be no more than 85 dBA, or as low as reasonably practicable, when designing/constructing the following:

- a new work site
- significant alterations to an existing work area
- introduction of a work process
- introduction of significant equipment.

When reducing noise exposure, preference should be given to engineering controls, then administrative controls, and finally the use of appropriate personal hearing protection. Engineering controls minimize or eliminate exposure by altering or removing the source, administrative controls try to control exposure by modifying the circumstances of the worker's exposure, and personal hearing protection reduces exposures when the other approaches have not reduced the hazard to an acceptable level.

### (a) **Engineering controls**

Noise can be reduced or eliminated by using one or more of the following approaches:

#### (i) *Substitution*

- replace noisy equipment or machinery with quieter equipment or machinery
- replace noisy processes with quieter ones

#### (ii) *Modification*

- modify the way in which the equipment operates so that it generates less noise: e.g. operate the equipment at a slower speed, improve lubrication, balance rotating parts, reduce vibration through dampening or bracing

(iii) *Isolation*

- isolate workers from a noisy area by having them work in an enclosed room
- segregate noisy areas with sound barriers and partitions
- isolate noisy equipment in an enclosed room
- place sound absorbent material and covers around noisy equipment

(iv) *Maintenance*

- maintenance of equipment and the engineering controls that have been implemented is very important or the improvements in noise level will be lost

Dealing with noise at its source can significantly reduce the hazard or eliminate it altogether. With sufficient noise reduction, the need for administrative controls or personal hearing protection is eliminated.

---

Dealing with noise at its source can significantly reduce the hazard or eliminate it altogether.

---

Engineering controls must always be considered during the design stage of a new facility or the expansion of an existing facility. Reducing noise at source after start-up of a new or expanded facility is usually more costly than adding engineering controls initially. If equipment and machinery are quiet to begin with, steps to protect workers from workplace noise may be unnecessary.

**(b) Administrative controls**

Administrative controls include rotating work schedules or changing production schedules so that the amount of time that a worker is exposed to noise is within acceptable limits. When noise levels cannot be sufficiently reduced or eliminated through engineering controls, administrative controls can still be used to significantly reduce worker exposure.

**(c) Providing appropriate personal hearing protection**

If reductions in noise levels and exposure times have not reduced worker exposures below the stated OELs, then appropriate personal hearing protection must be provided to those workers. Hearing protectors must meet the requirements in CSA Standard Z94.2-02, *Hearing Protection Devices – Performance, Selection, Care and Use*. CSA classifies muffs and earplugs as Class A, B, or C or Grade 1, 2, 3, or 4 based on the level of protection they provide. Schedule 3, Table 2 of the OHS Code summarizes the minimum levels of protection required.

Figure 3 Schedule 3, Table 2 of the OHS Code Selection of hearing protection devices

Maximum equivalent noise level (dBA $L_{ex}$ )	CSA Class of hearing protection	CSA Grade of hearing protection
$\leq 90$	C, B or A	1, 2, 3, or 4
$\leq 95$	B or A	2, 3, or 4
$\leq 100$	A	3 or 4
$\leq 105$	A	4
$\leq 110$	A earplug + A or B earmuff	3 or 4 earplug + 2, 3, or 4 earmuff
$> 110$	A plug + A or B earmuff and limited exposure time to keep sound reaching the worker's ear drum below 85 dBA $L_{ex}$	3 or 4 earplug + 2, 3, or 4 earmuff and limited exposure time to keep sound reaching the worker's ear drum below 85 dBA $L_{ex}$

To be of value, hearing protection must be used properly and when the worker is in the noisy area(s). For maximum protection, hearing protection must make a tight seal within the ear canal or against the side of the head. Modifying hearing protectors to reduce discomfort e.g. by drilling holes in earcups, by reducing headband tension of muffs, or by trimming or removing flanges on premoulded earplugs can seriously compromise effectiveness. Hearing protection must also be compatible with other equipment such as hardhats, safety eyewear, eyeglasses, and masks so that it provides the level of protection originally intended.

---

For maximum protection, hearing protection must make a tight seal within the ear canal or against the side of the head.

---

## Conducting audiometric tests

The OHS Code requires employers to have workers who are exposed to noise that exceeds the OELs undergo audiometric testing. The purpose of this testing is to have a baseline measurement of the worker's hearing and to then monitor their hearing at regular intervals afterwards to detect changes in hearing ability. The employer is responsible for the costs associated with this testing.



Audiometric tests must be performed by a qualified audiometric technician who has taken an approved course. The OHS Code describes how, when, with what equipment, and under what conditions the tests are to be performed. The OHS Code also stipulates for how long audiogram records must be kept on file. Workers' audiograms that show abnormalities must be reviewed by either a physician or audiologist. The employer is responsible for paying for these services.

---

Workers' audiograms that show abnormalities must be reviewed by either a physician or audiologist.

---

The audiometric testing component of the noise management program provides an excellent opportunity to educate workers. Standard procedures for audiometric testing include discussing the results of hearing tests with the worker tested. The importance of noise control and wearing hearing protection can also be reviewed. This provides the technician with an opportunity to check the worker's hearing protection to ensure good fit and an adequate level of protection. These sessions are often an opportunity to motivate workers to protect their hearing both on and off the job.

In addition to meeting regulatory requirements, there are advantages to employers in having audiometric tests performed. Baseline and periodic tests document whether or not a worker is losing hearing with a particular employer. This can be important in determining the impact of hearing loss in particular industries, and subsequently, in an employer's Workers' Compensation Board assessment rates.

From the worker's perspective, audiometric tests can alert the worker to changes in their hearing. Such changes point to the need to examine the hearing protection provided to make sure that it is adequate and being used properly. Once this has been verified, the worker should consider if the hearing loss is due to non-work-related activities.

## Evaluating the program

As with most health and safety programs, the noise management program must be evaluated annually to verify its effectiveness. The extent of the evaluation should be based on the sophistication and complexity of the program.

The key question to be asked is: “Is the Program preventing work-related noise-induced hearing loss?” Analysis of the results of the audiometric tests can provide a good indicator of the Program’s effectiveness. Results can be compared from year to year so that trends can be observed. These results can also show trends for specific occupations, for various processes, for different departments, or between different work sites. Specific problems can be identified when results are divided into these groupings.


All components of the Program should be evaluated for compliance with the employer’s policies and procedures, completeness and accuracy, and compliance with the OHS Code.


---

## Contact us:

---

### Province-Wide Contact Centre

 Edmonton  
(780) 415-8690

 Throughout Alberta  
1-866-415-8690  
(Toll Free)



Deaf or hearing impaired

- Edmonton (780) 427-9999
- Other locations 1-800-232-7215  
(Toll Free)

### Web Site



[www.worksafely.org](http://www.worksafely.org)

## Getting copies of OHS Act, Regulation & Code:

---

### Queen's Printer



[www.qp.gov.ab.ca](http://www.qp.gov.ab.ca)



Edmonton (780) 427-4952

### Workplace Health and Safety



<http://industry.alberta.ca/whs-ohs>

Call any Government of Alberta office toll-free  
Dial 310-0000, then the area code and telephone number you want to reach

© 2008-2009, Government of Alberta, Employment and Immigration

This material may be used, reproduced, stored or transmitted for non-commercial purposes. The source of this material must be acknowledged when publishing or issuing it to others. This material is not to be used, reproduced, stored or transmitted for commercial purposes without written permission from the Government of Alberta, Employment and Immigration. This material is to be used for information purposes only no warranty express or implied is given as to the accuracy or the timeliness of the material presented.