

# Facility Noise – The Potential To Have Long Term Hearing Affects

**Noise** (*noiz*) *n.* - a sound which is disagreeable or loud – unwanted or harmful sound - **Webster's**

**Noise Annoyance** - a feeling of displeasure evoked by noise – **World Health Organization**



Tougher Legislation in Ontario for workplace noise exposure came into affect under the Occupational Health and Safety Act in July of 2007. The changes affect almost every workplace. Workplace health experts agree that noise pollution is one of the most significant unrecognized workplace hazards! The recreation sector has a variety of areas that must be given consideration in regards to the protection of worker hearing. At times, workplace noise often becomes considered as normal and is not even recognized as noise until it stops.

Workers who stand in a machine room when it is deactivated for the summer months relish in the silence of the room, while operators of park cutting equipment associate the start of another cutting day with the hum of the cutting equipments motor, the whirl of a whipper snipper or in some areas the sound of a leaf blower - while the stillness of an electrical failure in any recreation facility is notable by all present.

There is also a variety of historical activities that take place in recreation facilities that may affect workers – concerts, air horns, fire works, ear buds and at times patron load levels must all be considered when assessing worker ear protection requirements. Evaluating the work environment for recognizable high risk noise areas as well as making hearing protection

part of a pre-event preparation check list must be the first step toward worker protection from hearing loss.

Another variable in recreation environments is facility design. Some structures are poorly constructed which results in a natural increase in noise levels due to the building construction materials. These environments may be safe one day, but a special event may significantly increase the dBA levels the next.

Hearing loss can be gradual, due to prolonged exposure to loud noise. Human ears are filled with sensitive cells that allow hearing to occur. Exposure to a single loud noise or exposure over a long period of time can cause damage to these cells.



## Definitions

**dB (Decibel)** - A measure of sound pressure level.

**Exchange rate** - The increase in dB that doubles the damage done by sound exposure.

**Hearing conservation program** - Any action that will result in lowering the potential for hearing damage. It may involve the reduction of sound levels or the use of personal hearing protection.

**Impulse sound** - Percussive sound such as gunshots or cymbal crashes. The sound is often very loud and may have peak dB levels over 115 dB.

**Leq** - Equivalent levels over a specified period of time

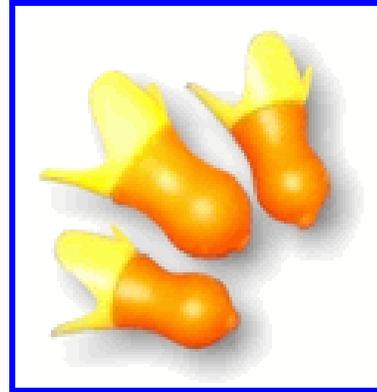
**Steady state sound** - Sound that does not involve the rapid rise and fall of levels as in impulse sound. The sound can be loud but has a more consistent level than impulse sound.

**Sound pressure level** - The correct term for “sound level”. The intensity of sound measured in decibels

Three specific areas that Ontario’s Noise Regulation will help ensure workers are protected from excessive noise include:

1. Workers daily exposure to noise will be reduced from 90 dBA to 80 dBA.
2. The “exchange rate” will be reduced from 5 dBA to 3 dBA – meaning that for every increase in sound level of 3 dBA above 80 dBA the exposure time for a worker is reduced.
3. The Regulations will make the employer responsible to implement engineered noise control measures where sound levels are above 85 dBA.

So what do these changes mean to a recreation worker? The ORFA wishes to first elevate the potential for hearing loss in a recreation environment. It further hopes to stimulate discussion on the importance of ongoing workplace assessment for noise levels, while strongly encouraging the use of hearing protection by facility staff when required.



The purchase of “noise level” monitoring equipment should not be considered a deterrent to a noise level control plan. Such equipment should be used on a regular basis to test areas that may be considered high risk. It is important to remember that as equipment ages it may increase in noise level. Such change may warrant an increase in hearing protection as well as being a clue to potential equipment malfunction.

Special events such as music concerts, monster truck shows, internal or external fire work displays, or other such events may be considered a high risk to recreation worker hearing loss and must be monitored and controlled.

#### **How Workplace Noise is Measured**

Before policy and procedure can be considered it must first be determined if there is a noise problem? Canadian Standard CSA Z107.56 will help guide most workplaces in determining how best to test their workplace.

A variety of measurement equipment for noise level is available in today’s marketplace. Which piece of equipment is best and what testing technique should be used will depend on each specific situation.

The chosen piece of testing equipment will measure the actual sound pressure in any given environment. The most common instrument used for measuring noise levels is a sound level meter [SLM], the integrating sound level meter [ISLM], and the noise dosimeter. As with any such testing device it will only be as good as the person who knows how to effectively use, calibrate and interrupt the readings. Each measuring device has a specific purpose and required testing technique. It is important to discuss your specific testing expectations with equipment professionals to be sure you are choosing the correct device. If internal testing is to be conducted then the user manual must be a key part of the training process. External expertise may offer a professional evaluation that will assist the long term inspection goals of the facility.  
*Note: Any tests should be logged for future comparison purposes.*

**Assessing Your Workplace**

Most facility workers could identify areas of concern while reading this document. A recreation work environment will include machinery rooms, specific pieces of equipment and identifiable special events that have been known to result in comments such as, “it sure was loud in here tonight”! In the majority of recreation facilities found across Canada, most have never conducted any type of noise testing. The high levels of noise have just been considered a regular part of day-to-day operations.



Occupational hygiene professionals identify several other quick tests to help identify if a more comprehensive testing protocol should be considered. Referred to as a “noise survey” they would include:

- Areas that workers may be exposed to harmful noise such as pieces of equipment or machines – when workers have to raise their voices to talk to persons who are less than 1-metre [3-feet] away in a noisy environment
- Noise levels might be considered higher than typical street traffic

**Signs of Personal Hearing Loss**

- Workers gradually begin to have trouble communicating in a crowd or in areas that have multiple sounds occurring at one time
- Electronic equipment such as music or videos are played at a level that are uncomfortable to others in the same room

All custom plugs require impressions of your ears. An ear mold lab technician uses your impressions to fabricate custom ear plugs made to fit just your ears, right down to every bump and curve for a perfect acoustic seal and maximum comfort.

Noise Comparison Chart (in dB SPL)	
Whisper	30 - 40 dB
Conversational Speech	60 dB
Motorcycle/lawn mower	90 dB
Diesel locomotive/ stereo headphones	110 - 120 dB
Rock Concert / Chain Saw	110 - 120 dB
Jet Engine	140 dB
Gun Shot	140 - 170 dB

### Personal Hearing Protection

If there is a positive side to this problem it would be that hearing loss can be prevented! The first step is awareness for the potential for hearing loss in any work environment. The second step is the previously stated workplace assessment to determine high risk areas where hearing protection should be worn, while the third step is the selection and wearing of the right type of hearing protection.

Hearing protection comes in a wide variety of equipment. Disposable ear plugs, custom ear plugs and the most visible protection of ear muffs are all designed for different noise environments and noise levels.

All hearing protection equipment will be rated by a system which is referred to as a **Noise Reduction Ratio** (NRR). The higher the number the greater amount of hearing protection is provided.

Selecting the right hearing protection should be conducted with the assistance of an Occupational Therapist and/or industry safety supplier.

**Remember:** Hearing protection will only work if it is worn!



### Cowbells, Whistles And Other Noise Annoyances

Human reactions are sensitive to many non-acoustic factors of a social, psychological, or economic nature and there are

considerable differences in individual reactions to the same noise.

Most Facility Managers would agree that there are desirable sounds that are inherent to a recreation facility. From the sound of the puck hitting the boards, to the spring off the diving boards, from splashing water to skates traversing the ice, to the squeaking stops and pivots along the hardwood floors. It sounds like a well used facility. However, noise annoyances introduced to the facility such as the inappropriate use of sirens and air horns, unruly behaviour or other amplified sounds should not be tolerated.

When noise becomes excessive it is up to facility managers to control the problem through facility policies and codes of conduct. Unwanted "noisemakers" not only ruin the enjoyment of other patrons but they can also become a health and safety issue for both the public and facility staff. Having set user policies or codes of conduct in place can help address these potential nuisances. There are many issues facilities may encounter. The following outlines two and their possible control measures. Policies should be reviewed and updated to reflect the ever changing nature of the facility user. It is also important that all parties (facility staff, user groups and patrons) are made aware of these policies so they can enforce or adhere to them.

### Air Horns

Restricting the use of air horns can be a challenging and unpopular task but these devices are often misused and should be policed. At issue are the portable devices brought in and used inappropriately. Facility provided air horns are typically restricted to certain sections of the spectator area. Some municipalities have implemented a noise control policy. Amplified sound systems and the use of air horns or other mechanical equipment are restricted in accordance with the "Any town Nuisance Abatement By-law ####" as it is deemed to be a health and safety consideration for the patrons of the facility.

Arenas that ban these devices simply include/add on to their existing Arena Rules or Codes of Conduct. It is helpful to establish a rationale for whatever policy you choose to enforce. This rationale will also serve to educate user groups and spectators (and staff) on the need or evolution of such a policy while still encouraging community spirit and enthusiasm. One of the following rule variations may work for you. If you have had successes or have been challenged on this issue, please let us know [library@orfa.com](mailto:library@orfa.com)

*Air horns with sounds produced by human lungs are allowed but may only be blown during key times such as big hits, saves or goals. Air horns operated with CO2 and laser pointers are prohibited and will be confiscated.*

*The following items should not be brought into the arena by patrons: food, beverages, alcohol, bottles, cans, coolers, illegal drugs, fireworks, weapons, aerosol cans, laser pointers, air horns, whistles, cymbals, cow bells, bugles.*

### **Ear Buds At Work**

Ear buds or “head phones” that distract workers from their environments should not be acceptable in any workplace during scheduled work hours. Workers should also be more aware of persons in their workspace who may be wearing ear devices as they may not be able to hear warnings or potential dangers.



Be clear that ear buds isolate you from your work environment and workplace hazards. In general, it is a good work safety rule for all industries including recreation to ban wearing these devices.

<http://www.orfa.com/library/orfarelease/POSARelease-CellPhonesPersonalEntertainmentDevicesInTheWorkplace.htm>

### **Facilities That Offer Live Performances**

It is a unique characteristic of the live performance industry that performers and support staff are critically dependent on their hearing.

Acceptable sound levels have recently been the subject of re-assessment in Canada and the United States. The Occupational Safety and Health Administration in the U.S. recommends lowering the present limits. The Advisory Committee agrees that the present regulations for noise exposure limits and hearing protection (Regulations for Industrial Establishments, section 139) are not adequate for workers in live performance, and is recommending that the Ministry of Labour develop a new regulation to address this concern.

### **General Guidelines**

1. Sound pressure level issues should be identified, addressed and resolved during the rehearsal period and before the first performance.
2. The exchange rate should be 3 dB.
3. Workers should not be exposed to impulse sound pressure levels in excess of 100 dB. Where sound levels above 100 dB cannot be avoided, a hearing conservation program shall be established to reduce the exposure to 100 dB or less.
4. Workers should not be exposed to steady state sound pressure levels in excess of 85 dB. Above this threshold, a hearing conservation program should be implemented to

5. reduce the exposure to less than 85 dB.
  6. Sound pressure level readings should be taken with a Type 2 sound meter that meets the CSA Standard Z107.2 rating. The meter should be set for the “A weighted network” with a slow meter response when measuring. Steady state sound pressure levels should be measured for a period of one minute to establish an leq.
  7. Sound pressure levels should be measured at the ear of the worker most exposed to the sound source. All measurements should be taken at performance levels.
  8. Hearing conservation programs are the mutual responsibility of workers and management and shall have the agreement of all parties involved. Both workers and management should understand the importance of annual hearing assessments.
  9. Where a hearing conservation program is in place, an assessment log should be kept as proof of maintenance and “signed off” by both management and workers.
  10. In hearing conservation programs for long-running productions (in excess of six months), all workers in the program should have periodic hearing assessments.
2. **Speakers:** Speakers and monitors should have minimal floor contact since low frequencies tend to travel through solid surfaces rather than through air. Reducing the surface contact of speakers and monitors will increase the low end frequencies received by audience and performers, so the overall sound level need not be as high. Workers should not be exposed to the backs of open speaker enclosures. Baffles between the worker and the speakers should also be used.
  3. **Risers:** Raising the sound source 30-60 cm (1-2 ft.) above the ear of the affected worker greatly reduces high frequency sound exposure. Because high frequency sounds, typically those produced by a speaker horn or a belled musical instrument, are directional, sound pressure levels above, below or to the side of the source are significantly lower than those in front of it.
  4. **Spacing:** Wherever possible, 2-3 m (6-8 ft.) of reflective floor surface should be left unoccupied in front of a performance group. This generates additional reflections, which raise the sound level in the audience but not on stage, so the overall level need not be as high.
  5. **Isolation of impulse sound:** Workers should not be within 2 m (6 ft.) of an impulse sound. Wherever possible, shields and baffles should be used and reflective surfaces around the sound source should be acoustically treated to reduce the impulse effect. Where it is not possible to isolate the worker, additional hearing conservation should be used.
  6. **Sound baffles and acoustical shields:** Baffles and Plexiglas shields may give protection if used with other strategies to reduce the overall sound exposure. However, acoustical baffles afford minimal

### Sound Level Reduction Guidelines

The best way to reduce sound impact is to put a distance between source and worker. Even in a limited space, repositioning or re-angling the sound source can make a useful difference.

1. **Hearing protection:** Uniform attenuator ear plugs are available in custom and non-custom forms. Other types of hearing protection are available for specific situations. An audiologist or other hearing health care professional should be consulted before choosing.

7. effect unless they are within 18 cm (7 in.) of the worker's head. In addition, the maximum high frequency attenuation is only about 15-17 dB.

**Source:** MOL Safety Guidelines for the Live Performance Industry in Ontario

### **Conclusion**

The ORFA strongly recommends that all facility workers take the potential of permanent hearing loss seriously. Working with your Joint Health and Safety Committee will help ensure that all ORFA members continue to remain healthy long after their last day at work!

### **Sources:**

Ontario Ministry of Labour – Safety Guidelines for Live Performance Industry in Ontario

Canadian National Occupational Health and Safety Resource – Noise Measurement of Workplace Noise

HGC Engineering News – Tougher Legislation in Ontario Workplace Noise Exposure

Health and Safety Executive – Worried About Your Hearing

Adobe Hearing Centre – We Give Sound Advice

ORFA - COWBELLS, WHISTLES AND OTHER NOISE ANNOYANCES – Facility Forum 2005

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