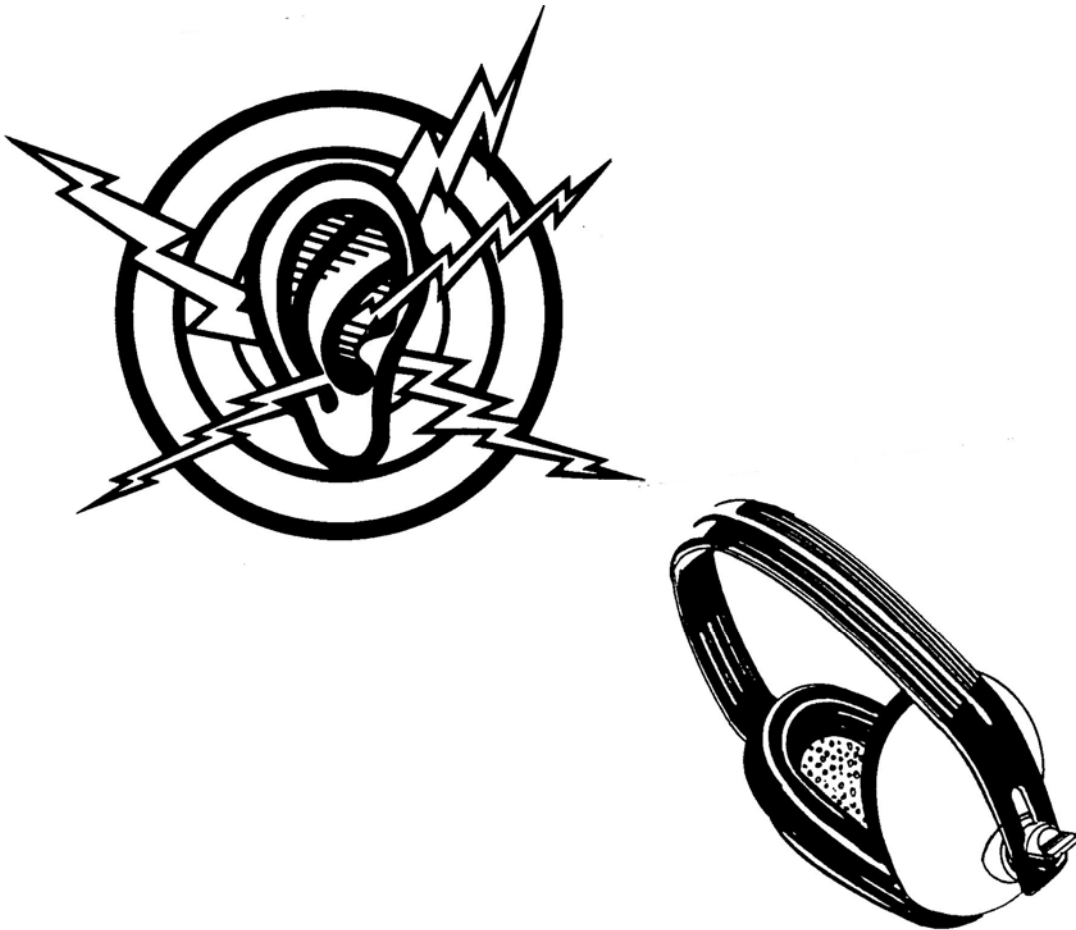


# HEARING CONSERVATION



This education program provides a guideline for developing and maintaining a hearing conservation program in your workplace.

This education program contains general information. For specific regulatory requirements, please consult the appropriate Workplace Safety Health Act & Regulation adopted under the Workplace Safety and Health Act and the Canadian Safety Association Standards (CSA).

# HEARING CONSERVATION

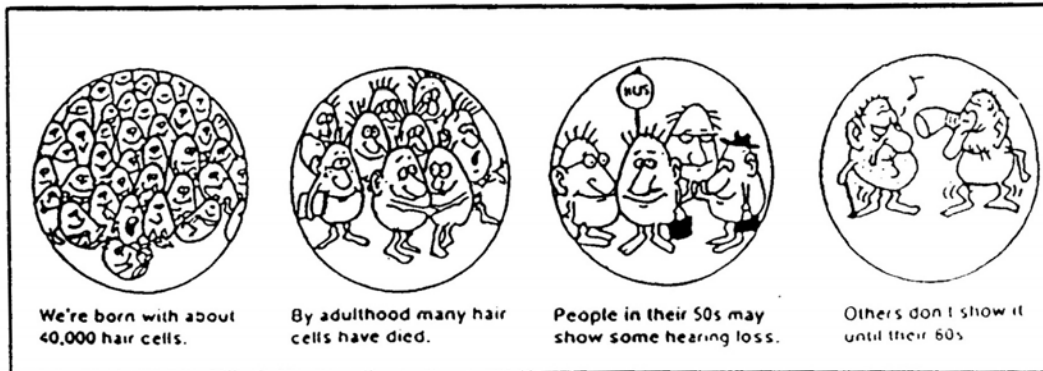
## Introduction

- It's a fact that the world we live in and work in today is quite a bit noisier than it was in previous decades.
- Exposure to high noise levels is the cause of noise induced hearing loss (NIHL). High noise levels can also affect a worker's ability to work safely.
- Noise – or shall we say undesirable sound bombards us continuously, hour after hour, day after day – year after year from the day we are born until the day we die. Noise is everywhere – at home, at work and at play. Therefore, even though you may not be at work all of the time your ears are and that's something which you probably haven't considered before.
- The ability to hear is something that most, if not all of us take for granted. After all we have ears and that's what they are designed for – right? Most of us have never really thought too much about how important our hearing really is.
- The ability to hear is our primary means of communication. It enables us to converse with co-workers, friends, and family. Enjoy a movie, heed the sound of a warning siren, and to regulate or adjust the tone and quality of our voices. Hearing also enables us to accurately judge the direction of a sound. In short, hearing keeps us in constant touch with the world around us.

- When hearing problems develop your world begins to shrink. Words sound soft, muffled and indistinct. Listening becomes hard work and attention spans decrease. The person with a hearing loss may begin to avoid crowded rooms, social events or family get-togethers. As hearing becomes more difficult, feelings of isolation and loneliness can set in.

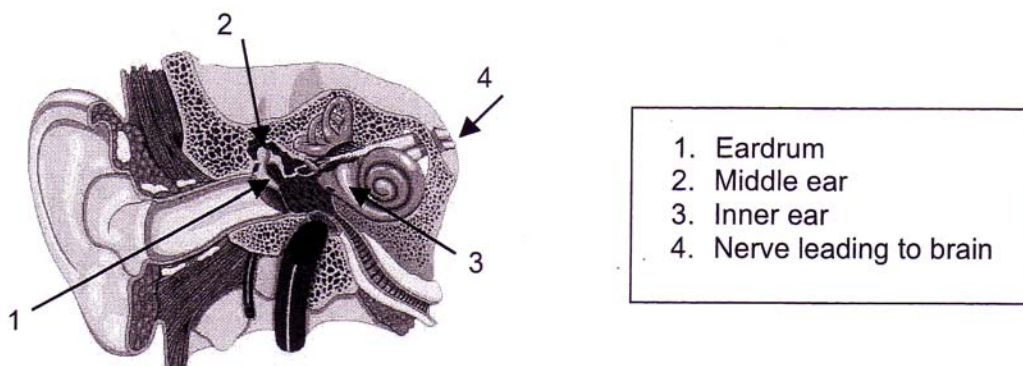


- Healthy hair cells are the key to good hearing because they are the organ which contains the auditory nerve endings. Loud noise overstrains these hair cells and over the course of time they suffer irreparable damage. Unlike most other human cells, the hearing cells are not regenerated; therefore, hearing loss caused by noise is permanent and irreversible.



- Most of us start life with a fixed number of hair cells – about 40,000 of them and as we age, they begin to die off naturally resulting in a type of hearing loss which is called Presbycusis (presby-kousis). Usually this isn't noticed until later in life, although it can run in families. Hair cells can also be damaged by head injuries, infections and some drugs.
- If you have difficulty hearing you're certainly not alone. Hearing loss is one of the nation's leading health handicaps. An on the job hearing conservation program is important in order to ensure you'll be able to continue hearing the good sounds in life, because it teaches you how to protect your hearing – now.
- The more you as a worker learn about hearing and hearing loss, the more likely you will be to make sensible decisions regarding the use of personal protective equipment and avoiding noisy places and activities to help preserve your hearing.

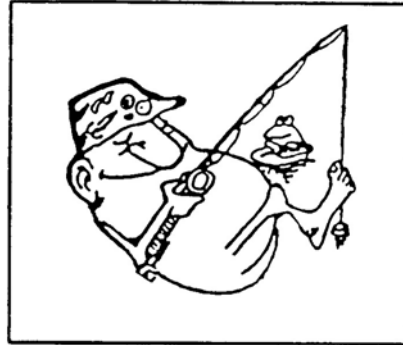
The diagram shows the basic anatomy of the ear and explains the human hearing process.



When the eardrum vibrates, it moves three tiny bones in your middle ear. This movement transmits the vibration to fluid in your inner ear. Movement of this fluid is picked up by tiny hair cells that transfer the movement to nerves. The nerves send signals to your brain, where they are recognized as sound.

Exposure to high-decibel sound for a long time can eventually damage the tiny hair cells. Consequently, fewer signals are sent to the brain and you don't hear as well. Because the hair cells cannot be replaced or restored, the damage is permanent. Hearing aids only amplify the sounds in your ear. They do not restore proper function to a damaged inner ear.

- However, in addition to the aforementioned causes, noise is responsible for the death of many hair cells in workers in noisy jobs. Hair cells don't like noise. They are just like people in some ways.



- When noise levels rise to those of city hustle and bustle the body subconsciously registers noise as a warning signal and the hairs tend to wake up and go on the alert.



- At 85 – 90 decibels the hair cells begin to show signs of distress, and other things such as the blood pressure and heart rate increase.

- If the noise levels exceed 100 decibels the hair cells face certain death within days, hours, or minutes depending upon the actual decibel level as shown below.



Although the sound may not have seemed uncomfortable, it was destroying your inner ear's hair cells and the damage cannot be reversed.

How much exposure is dangerous?

The higher the sound level, the less time it takes damage to occur. In Manitoba, hearing conservation measures must begin whenever workers are exposed to more than 80 dBA. In general, if you can't understand a loud voice from a distance of one metre (one yard) because of background sound, you're likely in a harmful noise environment.

	100 dBA	Severe	
	95 dBA	High	
	90 dBA	Moderate	
	85 dBA	Low	
Exposure	80 dBA	Very Low	Risk

- As you can see from these illustrations, the higher the sound level the more profound the effect. Some people may wish to argue that since there is only a 10 decibel difference between 80 and 90 dBA the risk of damage occurring is minimal. However, the dB sound scale is logarithmic not arithmetic, therefore it doesn't add or subtract in the normal way.
- An increase of 10 dBA means that 90 decibels is 10 times more hazardous than 80 and similarly a 20 dBA difference means that 100 dBA is 100 times more hazardous than 80 dBA.
- The higher the sound level, the less time it takes for damage to occur. The Manitoba Workplace Safety Health Act & Regulation requires hearing conservation measures must begin whenever workers are exposed or likely to be exposed to more than 80 decibels of noise at a workplace. In general, if the noise level is such that you have to raise your voice in order to communicate with someone at a distance of one meter because of background noise than the noise level is probably in the hazardous range.
- Depending on the actual exposure levels found in your workplace the Hearing Conservation Legislation may require different things to be done. If exposure levels in a workplace are 80 dBA or lower, no action is required. However, exposure should be checked periodically to ensure that they remain at safe levels.
- If the exposure level is above 80 dBA, programs to protect your hearing are required as shown.

## **WORKPLACE SAFETY & HEALTH REQUIREMENTS**

Part 12 of the Workplace Safety and Health Regulation (M.R. 217/2006), regarding Hearing Conservation and Noise Control, requires employers to ensure workers are not exposed to noise levels that may cause hearing loss.

This part of the regulation follows three principles:

1. It is more effective to reduce the noise levels in the workplace than to rely on hearing protection to protection workers.
2. Effective training and periodic hearing tests will provide workers with appropriate knowledge about the effects of high noise exposure levels.
3. When it is not possible to reduce noise levels, use of personal hearing protection is required.

### **Employer Responsibilities**

Every employer must understand that a safe and healthy workplace is a legal obligation and a practical necessity.

Part 12 of the Workplace Safety and Health Regulation, Hearing Conservation and Noise Control, requires the employer to assess the workplace for noise exposure. If the noise exposure levels are above 85 dBA (Lex), the employer must put a hearing conservation program into action. This includes applying sound control measures where possible or providing hearing protection (at no cost to the worker) that reduces the worker's exposure to below 85 dBA (Lex).

The employer is also responsible for providing audiometric testing (at no cost to the worker) for all workers exposed to noise levels above 85 dBA (Lex). When workers are exposed to noise levels above 80 dBA (Lex), the employer must provide hearing protection for workers who request it.

### **Worker Responsibilities**

The more workers understand what hearing conservation is about, the more they will be able to help make the hearing conservation program effective. Make it your business to learn about sound hazards and hearing loss. You'll be able to make suggestions and avoid dangers if you understand the risks.

Workers must also ensure they follow the employer's hearing conservation program. This includes:

- Following procedures outlined by the employer
- Using control measures designed for reducing noise
- Wearing personal protective equipment where required.

Workers can also tell the employer what is working to reduce noise levels or offer suggestions on what might help reduce noise levels.

### **Regulatory Requirements**

Workplaces where noise exposure may be a problem must have the noise exposure levels assessed. If average noise exposure levels in a workplace are 80 dBA or lower, no action is required. However, noise exposure levels need periodic checking to ensure they remain at safe levels. If your workplace noise exposure level is above 80 dBA, programs to protect your hearing are required, as shown below.

#### **All Workplaces Above 80 dBA (Lex)**

- Periodic noise exposure measurements must be taken and workers informed of the results.
- All workers must receive training about the hazards of the level of noise they experience or are likely to experience.
- If requested by a worker, the employer must provide hearing protectors and instruct the worker in selection, use and maintenance of hearing protection.

#### **All Workplaces Above 85 dBA (Lex)**

- All measures taken for 80 dBA exposure must also be taken for 85 dBA exposure.
- Employers must determine the practicality of using sound control measures.
- If sound control measures are not practical, work practice controls must be considered.
- If sound control measures do not limit the exposure to 85 dBA (Lex) or less:
  - Hearing protection is mandatory.
  - Information on hearing protector limitations and instruction on their fitting and care must be provided to workers.
  - Periodic reassessment of the practicality of engineering and work practice controls to limit noise exposure is required.
  - Audiometric tests must be performed on workers no later than 70 days after workers are initially exposed to the workplace noise level and once every year after the initial test.
- Warning signs indicating that the area has a harmful noise level must be posted prominently at the entrance to all work areas where sound is above 85 dBA.

## **A SOUNDSENSE SUMMARY**

### **All Workplaces suspected to be above 80dBA**

Employer must conduct noise assessment at the workplace if:

- a) a worker is or is likely to be exposed to noise at a workplace in excess of 80 dBA;
- b) there is
  - i. an alteration, renovation or repair of the workplace,
  - ii. new equipment introduced in the workplace, or
  - iii. a modification done to a work process,

that may result in a significant change in a worker's exposure to noise; or

- c) a worker provides the employer with evidence of an occupationally induced hearing loss.

### **All Workplaces with noise exposure between 80 – 85 dBA**

If a worker is or is likely to be exposed to noise in a workplace that exceeds 80 dBA Lex but does not exceed 85 dBA Lex, the employer must:

- a) inform a worker about the hazards of the level of noise; and
- b) on the request of the worker, provide him or her with:
  - i. a hearing protector that complies with CAN/CSA Standard Z94.2-02, Hearing Protection Devices C Performance, Selection, Care, and Use, and
  - ii. information about the selection, use and care of the hearing protector.

### **All Workplaces above 85 dbA**

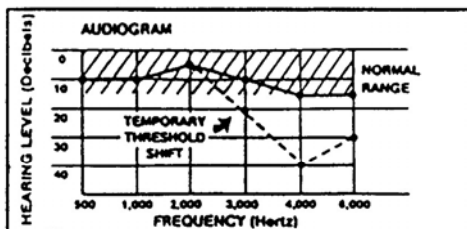
Employers must study the workplace to determine the practicality of taking measures to reduce exposure levels.

If these measures are not sufficient to limit exposure to 85 dBA or less, the employer must:

- a) inform the worker about the hazards of the level of noise;
- b) provide the worker with:

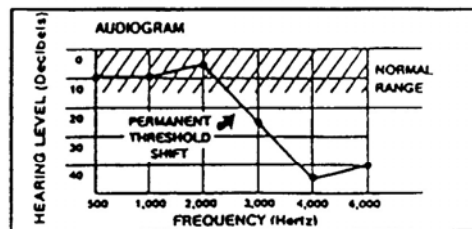
- i. a hearing protector that
      - 1. Complies with CAN/CSA Z94.2-02, Hearing Protection Devices C Performance, Selection, Care, and Use, and
      - 2. reduces the worker's noise exposure to 85 dBA Lex or less, and
    - ii. information about the selection, use and care of the hearing protector; and
- c) at the employer's expense, provide the worker with the following audiometric tests:
  - i. an initial baseline test as soon as is reasonably practicable but not later than 70 days after the worker is initially exposed to that noise level,
  - ii. a further test at least once every year after the initial baseline test.
- o Note that hearing testing and education are mandatory measures which must be implemented if exposure levels are above 85 dBA. The test must be conducted by a certified audiometric technician, physician or audiologist in accordance with standards and the Workplace Safety Health Act & Regulation which has strict guidelines concerning confidentiality of the test results.
- o Results themselves are documented on an audiogram which plots hearing level in decibels against sound frequency (pitch) in Hertz.
- o Hearing loss in the higher frequencies can be part of the ageing process called Presbycusis. As you age, hair cells die off and you lose some hearing as shown by the lines which drop off to the points labeled age 55 and age 70. A ringing, buzzing or humming sound referred to as Tinnitus may accompany shifts.

### Temporary Hearing Loss



When the audiogram shows a dip that returns to normal after a few hours, the loss is temporary. It is called a **temporary threshold shift**. It is often signalled by tinnitus. Repeated exposures frequently result in permanent hearing loss.

### Permanent Hearing Loss



When the audiogram shows a dip that doesn't return to normal, the loss is permanent. It is referred to as a **permanent threshold shift**. Tinnitus often accompanies permanent hearing loss.

- Another measure included in the Workplace Safety Health Act & Regulation calls for the use of hearing protection devices such as muffs or plugs. If the exposure levels are above 80dBA, they must be supplied to the workers if they request them.
- If the exposure levels are above 85dBA, then supplying and wearing the devices becomes a mandatory requirement of the law, enforceable against both workers and employers.
- Bear in mind that the Workplace Safety Health Act & Regulation are minimum requirements and an employer's hearing conservation program may require mandatory use of hearing protection at a lower exposure level.

### **Hearing Protectors**

There are two types of hearing protectors available:

- Ear muffs consisting of a headband and ear cup with a soft outer ring or cushion fitting tightly against the ear or sides of the head around the ear
- Ear plugs worn in the external ear canal or in the entrance to the external ear canal.

The type of hearing protection selected depends on the noise exposure levels. There are three classes of hearing protectors:

- Class A – used when noise exposure levels are between 95 dBA (Lex) and 105 dBA (Lex). Generally, hearing protectors with a noise reduction rating (NRR) of 24 will fit into this category. The noise reduction rating lists the amount of decibels that the protectors will reduce the noise levels.
- Class B – used when noise levels are between 90 dBA (Lex) and 95 dBA (Lex). Generally, hearing protectors with NRR between 17 and 24 will fit into this category.
- Class C – used when noise levels are less than 90 dBA (Lex). Generally, hearing protectors with NRR of less than 17 will fit into this category.


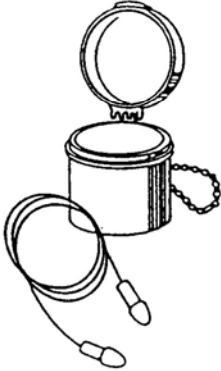

At noise levels above 105 dBA (Lex), using earplugs and earmuffs together is recommended.

Select fit hearing protectors carefully to make sure they give effective protection and cause minimum discomfort to the user. Repair or replace any worn out seals promptly. Let workers choose from several effective types of hearing protectors.

They are more likely to use equipment that is comfortable for them. Instruct workers to replace disposable earplugs every day and clean reusable ones regularly.

Hearing protectors must be worn – and worn correctly – at all times when working in harmful noise environments. Property selected and worn protectors can provide effective protection from high exposures, but their continued use can be very inconvenient.

- The primary factor to be considered in selecting any of the devices above is the attenuation rating or N.R.R. In general, the higher the N.R.R. the better the sound reduction.

	DISPOSABLE EARPLUGS	PERMANENT EARPLUGS	EARMUFFS
			
STYLE and COMFORT	Consist of mineral down or plastic foam. Come in many shapes. Often described as "one size fits all". Elasticity lets them adapt easily to changes in ear canal.	Made of plastic or silicone rubber. Come in many shapes and sizes to suit different ear canals. Must be fitted to provide good seal.	Consist of two insulated plastic cups attached to metal or plastic band. Cups equipped with soft cushions for seal and comfort. Head band tension ensures good seal.
INTENDED USE	To be used only once. When removed from ear, discard.	To be used more than once.	To be used regularly. Can be worn with or without plugs. Easily attached to hard hats.
HYGIENE PRACTICES	Clean hands required each time fresh plugs inserted.	Clean hands required for insertion. Plugs must be cleaned regularly with warm soapy water, preferably after each removal from ear.	General maintenance required. Head band must be maintained. Cushions must be replaced when soiled or brittle.
ADVANTAGES	Low risk of irritation. Porous material lets air and moisture escape from ear canal.	Reusable.	Less likely to cause irritation. When attached to hard hat, always available for use.
DISADVANTAGES	Use requires clean hands. Not reusable. Large supply required for frequent removals and usage.	Use requires clean hands. Plugs must be kept clean to prevent irritation. May produce some discomfort with pressure. Non-porous. Generally do not let moisture escape from ear canal.	Bands may wear out and tension decrease. Eyewear and hair may interfere with fit and reduce protection.

- However, even the highest rated hearing protector in the world will not provide one decibel worth of protection if it is worn around your neck, parked on your hard hat, or left in your truck, lunchbox, or toolbox. In order for the device to be effective it must be worn **ALL THE TIME THE USER IS EXPOSED TO NOISE**. The time-worn factor is crucial: so much so that it is better to opt for a comfortable protector that people will wear than one with a better theoretical performance that they will be tempted to remove because it irritates them.

<b>Equipment</b>	<b>APPROPRIATE NOISE LEVEL (Dba) AT OPERATOR'S POSITION</b>
Cranes	78-103
Backhoes	85-104
Loaders	77-106
Dozers	86-106
Scrapers	97-112
Trenchers	95-99
+Pile Drivers	119-125
Compactors	90-112
+Explosive-actuated tools	120-140
Grinders	106-110
Chainsaws	100-115
Concrete Saw	97-103
Sand Blasting Nozzle	111-117
Jackhammers	100-115
Compressors	85-104
○ Generally newer equipment is quieter than older equipment	
+ Pile drivers and explosive-actuated tools generate intermittent or impulse sound	

- The table above lists some typical noise level measurements for equipment on construction sites. This list is intended as a guide to assist you with assessing the degree of hazard and the need to wear a hearing protector, not to replace an actual noise level assessment as required by the Workplace Safety Health Act & Regulation.
- Although Workers Compensation Boards across Canada recognize hearing loss as an occupational injury, the majority of those whose claims are accepted do not receive any money as a part of their settlement.

- Some WCB Claimants end up receiving one or perhaps two hearing aids such as the one shown below. These electronic devices fit in or around the ear in much the same manner as hearing protectors.

**To keep the best possible hearing for the rest of your life, take good care of your ears. Follow these hearing conservation tips:**

- Co-operate with your employer by faithfully wearing hearing protection when required.
- Use protection at home when you do carpentry, work with power saws or cut wood for the fireplace.
- Avoid loud music (live or recorded) and try to accustom yourself to lower volumes. Do not blast your ears with music through earphones.
- Escape! Rest your ears in a quiet environment from time to time. A quiet break gives your jangled hair cells a chance to recover.

## HEARING CONSERVATION

### REVIEW QUESTIONS

NAME \_\_\_\_\_

DATE \_\_\_\_\_

#### PART 1 FILL IN THE BLANKS WITH THE CORRECT ANSWERS:

1. Two types of hearing protectors are \_\_\_\_\_ and \_\_\_\_\_.
2. The term "NRR" is an abbreviation for \_\_\_\_\_ .
3. The Manitoba, Workplace Safety Health Act & Regulation requires hearing conservation measures to begin whenever workers are exposed to more than \_\_\_\_\_ decibels.
4. Two of the requirements of the Manitoba hearing conservation Workplace Safety Health Act & Regulation which must be implemented if exposure levels are above 85 dBA are \_\_\_\_\_ and \_\_\_\_\_.

#### PART II ANSWER TRUE OR FALSE TO EACH OF THE FOLLOWING:

- T / F 1. Presbycusis is a type of hearing loss which occurs due to the fact that some hair cells will die off naturally as people age.
- T / F 2. Hair cells are not affected by things such as head injuries, infections or some prescription drugs.
- T / F 3. Tinnitus, which is ringing, buzzing or humming sound in the ears, is often an indication of a temporary hearing loss due to a short exposure to dangerous noise levels.
- T / F 4. Repeated exposures to dangerous noise levels frequently result in permanent hearing loss.
- T / F 5. If exposure levels are above 85 dBA, the Workplace Safety Health Act & Regulation requires hearing protection devices to be supplied to the workers if they request them.
- T / F 6. Any hearing protection device must work all the time that the user is exposed to the hazardous noise in order to be effective.