



NOISE HAZARDS AND HEARING PROTECTION

HOSTA Task Sheet 3.2

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Farm equipment can generate high noise levels. High sound levels pose serious health risks to the people who work long hours around this equipment. Hearing damage seldom occurs with one loud noise. Hearing damage results from an exposure to loud noises over an extended period of time.

This task sheet will examine the problem of noise hazards and how to protect your hearing.

What Is Noise?

Sound is created by anything that causes pressure waves in the air. Different wave sizes, or frequencies, are formed by different levels of shock to the air. Unwanted sound is called “noise.”

All sound, including noise, is measured in *decibels*. The unit of measurement is shown by the designation dB(A). A decibel meter is a tool that measures the dB level. The “A” represents the sound scale used for the measurement.

Not all sound levels are a hazard. Knowing typical sound levels of various sources of sounds helps us understand if the sound level is unsafe. Consider the following decibel level information.

Decibel Level Chart

<u>dB(A) Level</u>	<u>Sound Source</u>
15	A whisper
50	Gentle breeze or babbling brook
60	Normal talk level
85	Tractor at idle engine speed
90	Chopping silage (no cab) or lawnmower at full throttle
100	Tractor at work or table saw in use
110	Stereo with headphones set at mid-volume
120	Bad muffler or rock concert
140	Shotgun blast or jet engine

Sound levels that cause hearing loss begin at about 85 dB(A). Hearing loss occurs more quickly with louder noise. See Table 3.2 for time exposure to various sound levels which can lead to hearing loss.

OSHA standards consider sound measured at 85 decibels or higher as damaging to the eardrum and therefore a risk to hearing.



Figure 3.2.a. A straight pipe used for the exhaust or a worn-out muffler will increase noise levels coming from the engine. Muffler condition should be part of a safety audit.

You don't adapt to loud noise; you lose your ability to hear loud noise.

Learning Goals

- To recognize when sound levels can become a threat to hearing
- To use correct hearing protection devices

Related Task Sheets:

The Work Environment	1.1
Personal Dress	2.7

Permissible Noise Exposures:

<u>Duration Per Day (hours)</u>	<u>Sound Level, dB(A)</u>
8	90
6	92
4	95
2	100
1	105
1/2	110
1/4	115

Table 3.2. Exposure time limits to sound levels decrease as the db(A) level increases. Use the chart on page 1 to answer the following questions. What is the sound level at your high school dance or at a rock concert? How long should you be exposed to that intensity of sound pressure level?

How Does Hearing Loss Occur?

Is loud music or farm equipment causing you to lose your hearing?

Sound waves have pressure. High frequency sound waves have greater pressure than lower frequency sound waves. This pressure pushes on the ear drum.

Hearing loss occurs over a period of time. Deafness and loss of hearing usually occur with the high frequency sounds and not the lower frequency sounds.

Hearing is lost as auditory nerve endings are exposed to the same frequency of sound for extended time periods. The nerves lose their ability to recover from that hostile frequency. The ability to hear that sound frequency is then decreased forever.

Sound levels may be nearing the danger point for hearing loss if you notice any of these:

- Ears ringing
- Noises in your head
- Your own speech sounds muffled
- You have to shout to be heard by someone working next to you

By the time you recognize any of these events, some hearing loss has occurred.

Hearing loss accumulates over time and cannot be reversed. Hearing aid assistance may be necessary. Many older farmers have developed hearing problems over time. Hearing loss in the young also occurs. With the knowledge gained from this task sheet, the younger farm worker should avoid unnecessary hearing loss.

Protection of Hearing

Reduction of excessive noise is the first step to hearing protection. Hearing protection starts in the farm shop by keeping the exhaust and muffler system of the tractor in good repair. Machine parts that are not well-lubricated or adjusted also cause loud noises.

What farm tasks have you encountered that require hearing protection?

Reduction of excess noise levels may require a sound proofing barrier between the ear and the source of the noise. Sound-proof tractor cabs are designed to reduce sound levels. Compressor rooms may need to be sound-proofed as well. Sound-insulating building materials can reduce noise levels.

Where on your farm is the highest noise level likely to be found?

Types of Ear Protection

Commercially available hearing protection devices are recommended. There are two devices to use. They are:

- Acoustical Muffs
- Ear Plugs

Acoustical Muffs

Acoustical muffs, or ear muffs, are effective in reducing sound level at the ear. They cover the ear and ear canal to provide a barrier to sound. They do not block out all sounds, therefore, conversation for information and safety purposes is readily heard.

Ear Plugs

Ear plugs are made to fit into the ear opening. A snug, tight fit is necessary for effective sound reduction. Ear plugs can be a source of ear infection; so they must be kept clean and sanitized. Do not share ear plugs with others as ear infection can be spread in this way.

There are two types of ear plugs:

- **Formable Plugs**
These plugs are compressed before inserting into the ear. They expand to fill the ear canal. One size fits all.
- **Preformed Plugs**
These plugs come in many sizes and must be fitted to the individual's ear. They usually have a cord attached between each plug making them more difficult to lose.

Ear-protection devices are ranked by their Noise Reduction Rating (NRR). An NRR31 rating signifies that noise will be reduced by as much as 31 decibels under ideal conditions. For example, in a 100 dB(A) work area, a device with a NRR of 31dB would reduce the effective sound level to 69dB.

Be sure that the hearing-protection device reduces sound to a safe level. Typical ratings are shown.

Device	dB NRR
Ear Muffs	21-31
Ear Plugs	26-33
Combined	Add 3-5 db



Figure 3.2.b. Acoustical ear muffs offer the greatest level of hearing protection because they cover the entire ear and ear canal.

Cotton stuffed into the ears does not offer hearing protection!



Figure 3.2.c. Ear plugs offer hearing protection, but not as much as full-ear coverage protection devices. *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses*, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.

Safety Activities

1. Obtain a decibel meter (available at electronics stores if your school or club does not have one), measure and record the decibel levels of the following farming operations:
 - A. Tractor being used to agitate liquid manure
 - B. Tractor being used to operate ensilage blower
 - C. Chain saw in use
 - D. Milk-cooling equipment compressor
2. Using a supply catalog, such as Gempler's or NASCO, make a list of the various ear-protection devices, their NRR, and their costs.
3. Call a hearing-protection salesperson and a hearing-aid dealer and request hearing-protection literature, or invite them to make a presentation to your group, family, or coworkers.
4. Have a hearing test done as a baseline test to compare your hearing results on an annual basis.
5. Make arrangements with the school nurse or a volunteer nurse to conduct hearing tests for local farmers.

References

1. Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.
2. www.gemplers.com/ Type in search box key word(s), hearing protection/Choose a site.
3. www.howstuffworks.com/Type in search box key word decibel/Choose a site.
4. www.osha.gov.

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