

Hearing Conservation Manual



IOWA STATE UNIVERSITY

Environmental Health and Safety

2408 Wanda Daley Drive

Ames, Iowa 50011-3602

(515) 294-5359 | www.ehs.iastate.edu

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IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY**Protecting the Safety, Health, and Environment of the Iowa State Community**

Iowa State University strives to be a model for safety, health, and environmental excellence in teaching, research, extension, and the management of its facilities. In pursuit of this goal, appropriate policies and procedures have been developed and must be followed to ensure the Iowa State community operates in an environment free from recognized hazards. Faculty, staff, and students are responsible for following established policies and are encouraged to adopt practices that ensure safety, protect health, and minimize the institution's impact on the environment.

As an institution of higher learning, Iowa State University

- fosters an understanding of and a responsibility for the environment,
- encourages individuals to be knowledgeable about safety, health and environmental issues that affect their discipline, and
- shares examples of superior safety, health and environmental performance with peer institutions, the State of Iowa and the local community.

As a responsible steward of facilities and the environment, Iowa State University

- strives to provide and maintain safe working environments that minimize the risk of injury or illness to faculty, staff, students, and the public,
- continuously improves operations, with the goal of meeting or exceeding safety, health and environmental regulations, rules, policies, or consensus standards, and
- employs innovative strategies of waste minimization and pollution prevention to reduce the use of toxic substances, promote reuse, and encourage the purchase of renewable, recyclable and recycled materials.

The intent of this statement is to promote environmental stewardship, protect health, and encourage safe work practices within the Iowa State University community. The cooperative efforts of the campus community will ensure that Iowa State University continues to be a great place to live, work, and learn.



Wendy Wintersteen
President

Directory of Service and Emergency Providers

Services

Environmental Health and Safety

2408 Wanda Daley Drive | (515) 294-5359

Iowa State University Occupational Medicine Department

G11 Technical and Administrative Services Facility (TASF), 2408 Pammel Drive | (515) 294-2056

McFarland Clinic PC, Occupational Medicine

1018 Duff Avenue | (515) 239-4496

Thielen Student Health Center

2647 Union Drive | (515) 294-5801

Emergency

Emergency - Ambulance, Fire, Police

911

Department of Public Safety/ Iowa State University Police

Armory, 2519 Osborn Drive | (515) 294-4428

Mary Greeley Medical Center

1111 Duff Avenue | (515) 239-2011

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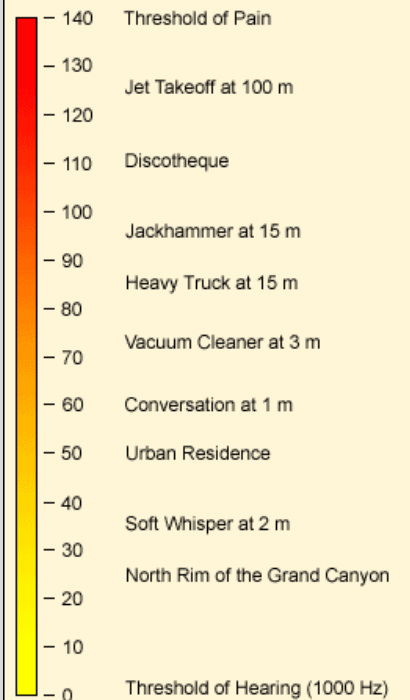
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A. Introduction

The Noise Standard requires employers to

1. Measure noise levels
2. Provide free hearing test for exposed employees
3. Inform and train employees
4. Reduce noise exposures through engineering or administrative controls and hearing protection

Typical A-Weighted Sound Levels (dB, re: 20 μ Pa)



Scale of noise sources taken from OSHA's Occupational Noise Exposure website

Noise, or unwanted sound, is one of the most pervasive occupational health problems in the workplace. Exposure to high levels of noise can cause hearing loss and may cause other harmful health effects as well.

Noise-induced hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after a period of non-exposure. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure.

The Occupational Safety and Health Administration's [Occupational Noise Exposure Standard, 29 CFR 1910.95](#), requires the establishment of a Hearing Conservation Program when employees are exposed to high noise levels in the workplace. Iowa State University (ISU) Hearing Conservation Program is designed to protect employees from noise exposures that may cause hearing impairment. This program includes the following requirements for employees exposed to a time weighted, eight-hour average (TWA) "action level" of 85 decibels weighted (dBA):

- an ongoing program of monitoring, identification, and evaluation of noise hazards
- a medical surveillance program which includes annual employee hearing test (audiogram) and appropriate follow-up for individuals who experience work related hearing loss.
- employee training on the effects of noise on hearing and the proper use and care of hearing protection
- retention of noise monitoring, audiometric testing and training records

Participation in the Hearing Conservation Program will be determined based on a noise hazard assessment. Employees participating in the Hearing Conservation Program will be required to wear hearing protection devices, as needed, to reduce noise exposure levels below 90 dBA TWA. Employees who have experienced a standard threshold shift (STS) will have noise exposure levels attenuated below 85 dBA TWA. An STS is a permanent reduction in hearing at several hearing frequencies.

When is noise a problem?

Noise may be a problem in your workplace if you

- hear ringing or humming in your ears when you leave work
- have to shout to be heard by a coworker at arm's length away
- experience temporary hearing loss when leaving work

Decision Tree for Determining Hearing Conservation Program Participation

Noisy equipment or environment recognized and EH&S is notified by:

- Routine survey
- Request from employee / supervisor
- Noise marked on Hazard Inventory form
- Request from Occ Med Physician

EH&S evaluates noise source(s)

- Information about exposure risks gathered (including historical monitoring)
- Work site conditions evaluated
- Sound level meter and/or dosimetry data collected
- Documents assessment and notifies the employee and supervisor

Include in HCP?

No

Noise removed from employee's hazard list

Yes

Occupational Medicine

- Noise listed on employee's hazard list
- Annual medical surveillance – hearing test
 - Employee is trained
 - Hearing protection made available

Follow-up monitoring – if changes in noise sources or job duties

B. Responsibilities

At Iowa State University (ISU), employees, supervisors, Environmental Health and Safety (EH&S), and the Occupational Medicine Office (Occ Med) share the responsibility for ensuring workplace safety and meeting the requirements of the Hearing Conservation Program. These responsibilities are summarized below. Occ Med works in conjunction with the Health and Safety section of EH&S, to facilitate and maintain the Hearing Conservation Program.

Employees

Employees are responsible for completing a [Hazard Inventory](#) and ensuring that they wear hearing protection devices (HPD) when required.

Supervisors

Supervisors are responsible for implementing the Hearing Conservation Program requirements in their departments. A supervisor must report to EH&S any potential noise hazards and ensure that employees wear their hearing protection when required. Training employees on their workplace noise hazards and providing HPD to employees are two other areas of supervisory responsibility. Supervisor must also, ensure that noise hazard areas or equipment requiring hearing protection have signs or are labeled.

Environmental Health and Safety

EH&S is responsible for conducting exposure monitoring, notifying an employee and their supervisor of noise hazards, maintaining noise exposure records, and determining when ISU employees are included in the Hearing Conservation Program. EH&S will maintain Hazard Inventories.

Occupational Medicine Department

Occ Med is responsible for hearing examinations, training, and hearing-test record retention. Occ Med is also responsible for all aspects of audiometric testing and the medical surveillance program.



C. Program Elements

Hearing Conservation Program includes

1. Noise monitoring
2. Medical surveillance
3. Training
4. Recordkeeping



The program elements of the Hearing Conservation Program include exposure monitoring, medical surveillance, employee training, and recordkeeping. Specific details about each program element follows.

Exposure Monitoring

Monitoring employee exposure to potential noise hazards is conducted by Environmental Health and Safety (EH&S). Employee noise exposure monitoring will be initiated:

- through routine noise hazard awareness (general surveys, inquiries, etc.)
- when a change in an activity or process occurs that potentially increases the noise hazard to a level of 85 dBA or above
- when a potential “noise” source is indicated on a Hazard Inventory

A calibrated sound level meter or noise dosimeter will be used to measure noise levels. Noise levels are measured using an A-weighted scale and include levels from 80 dB to 130 dB. If a potential noise hazard is identified in the initial monitoring using a sound level meter, a more detailed investigation may follow, using a noise dosimeter. A noise dosimeter will monitor an employee’s noise exposure for an entire shift. Changes in a noise exposure time or noise producing equipment may require additional noise evaluation. Employees are allowed to observe noise monitoring performed and will be notified of the results of the monitoring.

All employees who are exposed to an action level of 85 dBA TWA or higher will be notified of the noise hazard and included in the Hearing Conservation Program. Hearing protection is required if the TWA noise level exceeds 90 dBA.

Noise exposure limits, as specified by the Occupational Safety and Health Administration (OSHA), are shown on the next page. The table shows the maximum time period allowable for the noise exposure level listed and when hearing protection is required. The acceptable sound level (limit) is a TWA value. Impulsive or impact noise exposures above 140 dBA are not permissible by OSHA and hearing protection must be worn when exposed to these levels.

OSHA Noise Exposure Limits

Time (Hours)	Acceptable Levels (dBA TWA)
16.00	85
8.00	90
4.00	95
2.00	100
1.00	105
0.50	110
0.25 or less	115

Employees exposed to >85 dBA TWA must

1. Be included in Hearing Conservation Program
2. Receive information on noise hazards in the workplace
3. Be trained on protection devices
4. Receive annual hearing tests and follow-up care when hearing loss occurs



Occupational Medicine is located in G11 TASF, 2408 Pammel Drive

Medical Surveillance

Medical surveillance will consist of audiometric testing (hearing tests) administered by the Occupational Medicine Office (Occ Med) located in G11 Technical and Administrative Services Facility (TASF), 2408 Pammel Drive. Audiometric testing is available at no cost to all employees in the Hearing Conservation Program. Hearing tests are performed by a licensed professional or certified technician (certified by the Council of Accreditation in Occupational Hearing Conservation).

Audiometric testing by a certified technician

A baseline audiogram must be provided within six months of initial employment and an annual audiogram is required thereafter. Employees will be notified of the need to avoid high noise levels (≥ 85 TWA) for at least 14 hours prior to the hearing examination (HPDs may be used).

An annual audiogram is evaluated to determine if an employee has experienced a standard threshold shift (STS). An STS is the reduction in hearing at several frequencies. If an STS is diagnosed, an employee will be notified of the hearing loss within 21 days and notified within 30 days if a retest is necessary (see [Appendices I and II](#)).

If further examination is necessary, hearing will be retested and pertinent information about noise exposures will be obtained from the employee. Occ Med will then determine if a Physician's Examiners Report or a referral for a clinical audiological evaluation is necessary. Employees with an STS will be refitted and trained again on the use of hearing protection. For employees with an STS, noise attenuation with a hearing protection device (HPD) must be <85 dBA TWA.



Audiometer and audiometric booth evaluations

Perform or secure daily, acoustic, and exhaustive calibrations as required.

Training

Annual training is required for all employees in the Hearing Conservation Program. This training will be administered by the Occ Med. More details are outlined in Appendices III and IV. Training shall include:

- effects of noise on hearing
- correct use and purpose of hearing protection (advantages, disadvantages, types, selection, fitting, use, and care)
- information on the purpose of audiometric testing and an explanation of the test procedures

Supervisors must provide site or job specific information and training to employees, in addition to the training provided by Occ Med. Site specific training must orient the worker to:

- noise hazard areas and operations
- availability and location of hearing protection devices
- presence of any warning signs or labels indicating the need to wear hearing protection
- location where hearing protection devices can be cleaned, if applicable

Recordkeeping

Recordkeeping is a required element of the Hearing Conservation Program. Records maintained by ISU include: hazard inventory, exposure measurements, training, audiometric tests, and measurements of background sound pressure levels in audiometric testing rooms. This information will be made available to the employee and/or their representatives upon request.

Records pertaining to the Hearing Conservation Program are categorized and are filed as follows:

Hazard Inventory

A [Hazard Inventory](#) must be completed for employees exposed to loud noise sources. Refer to the [Participation](#) web page for instructions on form completion.

Noise exposure records

All noise exposure records are filed and maintained by EH&S.

Noise exposure records must be retained for two years.

Audiometric test records

Audiometric test records are filed by the audiometric technician and stored at the Occ Med office. The file shall include the employee's name and job classification, date of examinations, examiner's name, date of acoustic or exhaustive calibrations and the background sound pressure level of the audiometric testing booth. Audiometric test records are retained for the duration of an affected employee's employment.

Employee training records

Noise training records are filed and maintained by the audiometric technician and stored at the Occ Med office. Site specific information and training is maintained by the department of the employee included in the Hearing Conservation Program.

The [OSHA Occupational Noise Exposure Standard, 29 CFR 1910.95](#) will be made available to employees and/or their representative(s) on the EH&S website.

D. Hearing Protection



The goal of the program is to protect employees from noise exposures that may cause hearing impairment. This is accomplished through employee orientation on:

- noise hazard areas and operations
- availability and location of hearing protection devices
- presence of any warning signs or labels indicating the need to wear hearing protection
- location where hearing protection devices can be cleaned, if applicable

Supervisors will provide this orientation, will make hearing protection devices (HPD) accessible to employees, and ensure that HPD are used as required. In addition, noise hazard areas and equipment will be posted or affixed with "Hearing Protection Required" signs or labels.

Hearing Protection Devices

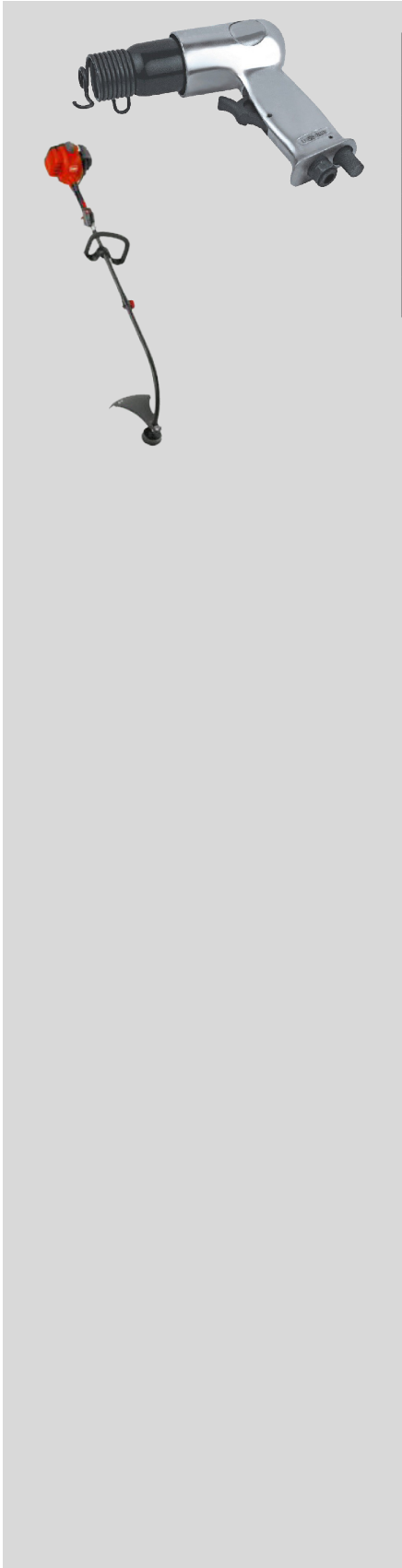
Hearing protection devices are designed to insulate the human ear from noise hazards. They come in two primary forms: muffs and plugs. Acoustic muffs cover the ear with an insulated cup held in place by a band or suspension. Ear plugs are inserted into the ear canal to block noise from the inner ear.

HPD are required when working with loud equipment or in noise hazard areas at or above 90 dBA TWA and are recommended when exposed to >85 dBA. HPD must attenuate or reduce an employee's noise exposure to <90 dBA TWA. For employees with an STS, noise attenuation with an HPD must be <85 dBA TWA.

Appropriate hearing protection must be provided to employees free of charge and made available when workplace exposure are at or > 85 dBA TWA. A wide range of types and styles of acceptable HPD are available at Central Stores in the General Services Building or through safety equipment suppliers. Contact Occ Med or EH&S for assistance with selection.

Warning Signs

Noise hazard areas > 90 dBA must be identified with area signage or equipment labels. Appropriate area warning signs and equipment stickers are available through EH&S. Any modification in wording must be approved by EH&S.

Examples of loud equipment

air chisels	air hammers
air nozzles	air wrenches
compressor pumps	vacuum systems
electric and power saws	high pressure washers
power lawn mowers	electric drills (hammer drills)
garden tractors	power weed trimmers
grinding and emery wheels	heavy equipment

Appendix I - Employee Notification - Hearing Retest

Occupational Medicine
G11 Technical and Administrative Services Building (TASF)
2408 Pammel Drive, Ames, Iowa 50011-1015
(515) 294-2056

Date:

To: ISU ID #

From: Occupational Medicine

Subject: Notification of Confirmed Standard Threshold Shift

The results of the retest you received at Occupational Medicine indicate your hearing ability has changed from your baseline. Hearing loss was noted in the: ☐ left, ☐ right, ☐ both ear(s). Your average hearing loss is ____ decibels (dBA) and represents what is known as a **Permanent Standard Threshold Shift (STS)**. This degree of hearing loss is categorized as: ☐ slight, ☐ moderate, ☐ high.

It is very important that you minimize your exposure to elevated noise levels.

You are required to wear hearing protection devices when measured noise levels exceed 85 dBA. Wearing hearing protection devices such as ear plugs or muffs will reduce on-the-job noise levels to within acceptable limits and should minimize further loss in your hearing ability. Hearing protection devices are available from your supervisor and Central Stores.

Please contact the Occupational Medicine Office (515) 294-2056 or the Department of Environmental Health and Safety (515) 294-5359 if you have any questions related to the Hearing Conservation Program.

Cc: Supervisor
Environmental Health and Safety
ISU Human Resources Workers Comp.

Appendix II - Employee Notification - Hearing Loss

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY



Occupational Medicine
G11 Technical and Administrative Services Building (TASF)
2408 Pammel Drive, Ames, Iowa 50011-1015
(515) 294-2056

Date:

To: ISU ID #

From: Occupational Medicine

Subject: Notification of Unconfirmed Standard Threshold Shift

The results of the recent hearing test you received at Occupational Medicine indicate your hearing ability has changed from your baseline. This hearing loss may have been caused by unusual noise exposure, medication, common cold or other conditions that affect hearing. Your hearing must be retested to determine whether your hearing change is persistent.

Your hearing retest has been scheduled for _____. Call Occupational Medicine at (515) 294-2056 if you cannot make this appointment. Your retest must be performed within 28 days of today.

It is important that you be in a quiet area for at least 14 hours prior to the hearing examination. If you must be in a noisy area (85 dBA*), it will be necessary for you to wear hearing protection. Your supervisor should tell you if you need to wear hearing protection at work.

*If you need to "raise your voice" in order to be heard by another person within three feet of you, the sound is probably above 85 dBA.

Signature

Date

Cc: Supervisor

Appendix III - Training Information

Training Information Hearing Conservation Program

- A. Reasons for wearing a hearing protection device (HPD)
 - 1. Compliance with standards – various locations and job assignments have been designated as “noise hazard” areas.
 - 2. Noise exposure in the work area may damage hearing over a given time.
 - 3. People with a known hearing loss may accentuate the loss rate if hearing protection is not worn.
 - 4. Many employees notice a reduction of anxiety and fatigue at the end of the work day.
- B. Ensure earplugs and/or muffs fit properly
 - 1. Different types are available.
 - 2. Comfort and effectiveness are important (but if the ear plugs or muffs are not effective, comfort means nothing).
 - 3. Your voice will sound “muffled” or “hollow” (similar to how voice sounds when talking into a hollow tube).
 - 4. Insertion technique
 - a. Allow time for rolled foam plugs to expand after insertion. See instructions on package.
 - b. The muff cushion should fit comfortably (make sure it is always flexible and forms a good seal around the ear).
- C. Proper cleaning and care of the hearing protection device (HPD).
 - 1. Expandable foam: dispose of when dirty.
 - 2. Preformed: wash with warm water and mild soap.
 - 3. Muffs: clean cushions with damp cloth rinsed in mild soapy water.
 - 4. Do not tamper with plugs or muffs – drilling or poking holes in them destroys their effectiveness.
- D. Who to contact when you have problems or need replacements.
 - 1. Immediate supervisor.
 - 2. Central Stores (replacement hearing protection devices).
 - 3. Occupational Medicine (hearing problems or discomfort/persistent ear pain, drainage, dizziness, or ringing in the ears).
 - 4. EH&S (changes in procedure, equipment or other noise related problems).
- E. Failure to wear HPDs as required.
 - 1. Disciplinary action will be taken as required (flagrant and purposeful violation may lead to termination).

Appendix IV - Training Handout

Training Handout Hearing Conservation Program

The following points of review are included in employee training for the Iowa State University Hearing Conservation Program. Keep this form stored where you can review it.

A. The effects of noise on hearing

Hearing can be damaged by loud noise. Noise can destroy tiny “hair cells” inside your inner ear, which cannot be replaced. The noise does not have to be a constant to damage hearing; short loud bursts are damaging too. Your supervisor should tell you which work areas may cause hearing damage. If you are uncertain, ask. You can protect your hearing by wearing ear plugs or muffs in noisy areas.

B. Hearing Protection Devices (HPD)

1. Advantages and disadvantages of the different types

Ear muffs are simple to wear and are fairly comfortable. They are easy to clean. However, eyeglass temples, hair, and other obstructions reduce protection by breaking the seal between head and muff. Ear plugs also provide good protection. However, they must be inserted correctly. For some, slight wearing discomfort may be expected until the person becomes accustomed to ear plug fit.

2. Hearing protection provided by different types

HPD attenuation or the ability to reduce noise from entering the ear is defined as a noise reduction rating (NRR). The higher the NRR, the better the HPD attenuation. Ear plugs and ear muffs are available at Central Stores and have different NRRs, (depending on the brand). Check with your supervisor or Environmental Health and Safety (515) 294-5359 if you have any questions about the appropriate HPD needed in your workplace.

3. Selection and fitting of hearing protection devices

HPDs are available through your supervisor or at Central Stores. Follow the manufacturer's specific instructions to ensure a proper fit. If you experience difficulty in fitting or wearing an HPD, contact Occupational Medicine at (515) 294-2056 or EH&S at (515) 294-5359.

4. Proper use and care of HPDs

Clean your hands prior to inserting plugs into the ear canal. Reusable plugs should be washed after each use. Mildly warm, soapy water will do. Rinse with clean water. Disposable plugs must be discarded if they become dirty. Do not tamper with the design of a plug or muff.

Store plugs and muffs in the original container or a clean plastic bag. Contact Occupational Medicine (515) 294-2056 if you experience continued difficulty in HPD use and/or care.

Proper Use of HPD:

MUFFS

Ear muffs should be placed over the ear so a good seal is formed between the head and the muff cushion.

PLUGS

To insert ear plugs, reach over the head with your opposite hand and pull the ear up and outward to open the ear canal. Holding the plug between thumb and forefinger of the hand, insert the plug into the ear with finger pressure and a slight turning motion until a seal is made. (Expandable “foam” plugs will need to be “rolled” prior to insertion into the ear canal and held in place for about 30 seconds while the foam expands).

Check out the EH&S videos Hearing Protection: Disposable Ear Plugs, Hearing Protection: Reusable Ear Plugs, and Hearing Protection: Earmuffs at www.ehs.iastate.edu/video.

C. Audiometric testing

1. Purpose of hearing test

The test is conducted to determine if your ability to hear has changed since your last examination. In other words, it's a way to ensure adequate steps are being taken to protect your hearing. Report any hearing related problems to Occupational Medicine.

2. Explanation of testing procedures

During the test, the Occupational Medicine nurse uses an “audiometer” to produce different sound frequencies. The sound that you hear in the earphones will vary in loudness and “pitch.” The machine records when an employee indicates that they “hear” the sound. A record (audiogram) is made of the lowest level (threshold) of hearing. A comparison of this record is made with an average person's hearing. All test records for an employee are kept and compared to see if a change in hearing has occurred from year to year. You will be notified if any significant changes occur in your hearing ability.

Non-discrimination Statement

“Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3350 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515 294-7612, email eooffice@iastate.edu”