

# CHAPTER 11

## NOISE AND HEARING CONSERVATION PROGRAM

### INTRODUCTION

This program contains information on the effects, evaluation, and control of noise. For assistance in evaluating a noise problem, contact the Responsible Safety Officer. This program was prepared in accordance with 29 CFR 1910.95, OSHA's Occupational Noise Exposure standard. It describes the elements of the hearing conservation program in use at HTS AmeriTek and responsibilities of personnel administering the program.

### DANGER OF NOISE

Exposing the ear to high levels of noise may cause hearing loss. This loss can be temporary or permanent. Temporary hearing loss or auditory fatigue occurs after a few minutes exposure to an intense noise but is recoverable following a period of time away from the noise. If the noise exposure is repeated, there may be only a partial hearing recovery and the loss becomes permanent. Typically, significant hearing losses occur first in the frequency ranges of 3,000 to 6,000 (Hz). Losses in this frequency range are not critical to speech perception, and the individual usually is completely unaware of this initial symptom. With longer exposure, the hearing loss spreads to lower frequencies, which will affect speech perception. Workers' Compensation laws regard hearing losses in the speech frequency range of 500 to 3,000 Hz as being compensable. The evaluation of hearing loss due to noise is complicated by the fact that hearing acuity normally decreases with increasing age. Further, the losses associated with age are quite similar to those caused by excessive noise since the hearing for high frequency sounds is most affected in both instances. Hearing impairment may also result from infections, tumors, and degenerative diseases.

### RECOGNITION OF THE NOISE HAZARD

Noise is a frequent physical hazard encountered in the industrial working environment. Workplace noises affect individuals in a variety of ways. These effects include:

- Hearing loss
- Communication interference
- Stress symptoms, including distraction, fatigue and nervousness
- Alterations to biological functions such as blood pressure and heart rate

Hearing loss is the most significant effect, but can be limited through proper control measures. Excessive noise levels can be identified by employee complaint about loudness, inability to communicate at normal speech levels and workplace noise measurements.

### IN A RIG

Employees can spend hours inside the control rooms of HTS AmeriTek heat treating rigs. Though most rigs have been refurbished with higher quality sound insulation, it is still required that all employees shall wear ear plug while inside of the control rooms and double hearing protection while inside the generator room if the generator is running.

### NOISE HAZARD EVALUATION

Noise measurement data obtained through sound surveys is used to determine the degree of employee exposure. This information is also used to determine ways to reduce employee noise levels below the Occupational Safety and Health Administration (OSHA) regulations of 85 dBA as an 8-hour time weighted average (TWA) action level and the permissible exposure limit (PEL) of 90 dBA. OSHA's PEL and action limit were established in 29CFR 1910.95. Figure I summarize the requirements of the regulation and OSHA's Hearing Conservation Amendment.

Different instruments and measurement methods may be used depending on the type of survey conducted. To evaluate the exposure of HTS AmeriTek employees any of the following three types of surveys may be conducted. These include:

1. A basic sound survey to identify work areas that do not have a noise problem and areas that potentially have a noise problem.
2. A detailed sound survey to estimate employee noise exposure during a workday.
3. Personal dosimeter to confirm estimated sound level readings and document employee exposure.

In a basic or detailed sound survey, sound levels are measured using a Type 2 sound level meter using the A-weighting scale and set to slow response. Type 2 personal noise dosimeters are worn by employees to determine noise exposure during their work shift. Dosimeters store and integrate measurements over a period of time, usually an 8-hour day. The noise threshold of the dosimeter must begin at 80 decibels for compliance with OSHA's hearing conservation amendment.

Both the sound level meter and personal dosimeters must be calibrated according to manufacturer recommendations prior to use. Calibration information must be recorded and maintained with results of the survey.

During data collection, the surveyor must record in detail the measurement locations and times and sound survey procedures followed. The sound level and dosimeter measurements must be recorded on the noise monitoring Data Sheet.

Monitoring shall be repeated whenever a change in production, process, equipment or controls increase noise exposures to additional employees at or above the action level. In addition, monitoring shall be repeated when noise level increases and the noise reduction capability provided by hearing protectors is inadequate to lower the noise level below the PEL or when appropriate, the action level.

The noise environment must be re-evaluated at least bi-annually. To date, personal noise dosimetry measurements taken on a representative sample of our workforce indicate HTS AmeriTek employees are not exposed to noise levels at or above the OSHA action level of 85 dBA.

### **ESTABLISHING NOISE LEVEL ZONES**

Even though the results of monitoring show that HTS AmeriTek employees are not exposed to high levels of noise, many areas of our customer's facilities have work areas that are identified as noise level zones. If an area is marked with signs identifying the area as "Hearing Protection Required" then HTS AmeriTek employees must wear hearing protection in order to work in that area. Signs will be posted in area where sound levels are equal to or higher than 85 dBA.

### **REDUCING NOISE EXPOSURE**

Noise exposure can be reduced by using engineering controls, administrative procedures, or personal protective devices.

#### **Engineering Controls**

- Reduction of noise production at the source:
  - Proper design of new machines
  - Modification of present machines
  - Proper repair and upkeep of equipment
  - Use of appropriate mufflers
  - Use of vibration dampers on machines
- Reduction of noise transmission:
  - Increase distance between noise and personnel exposed
  - Construction of barriers between noise source and personnel
  - Sound treatment of ceilings and walls
- Administrative Procedures:
  - Job schedule changes
  - Personnel rotation
  - Personnel Protective Devices: Ear plugs/Earmuffs

Federal occupational safety and health regulations require that whenever employees are exposed to excessive noise levels, feasible engineering or administrative controls must be used to reduce these levels. When these control measures cannot be completely accomplished and/or while such controls are being initiated, personnel must be protected from the effects of excessive noise levels. Such protection can, in most cases, be provided by wearing suitable protective hearing devices. A supply of hearing protective devices is distributed by the operations office. Only approved plugs should be used. Reusable earplugs should be cleaned daily to prevent ear infections. Protection greater than that provided by a single device can be obtained by wearing both devices simultaneously is considerably less than the sum of the individual attenuation; it is still greater than when either device is worn separately.

### **AUDIOMETRIC TESTING PROGRAM**

All employees exposed to noise levels equal to or greater than 85 dBA as an 8-hour TWA must be included in an audiometric testing program. Audiometric testing is conducted to determine if an employee has suffered hearing loss. This loss is measured using an audiogram to detect temporary hearing threshold shift, early permanent threshold shift, or progressive noise-induced hearing loss.

An audiogram is a hearing test, which measures the ability of a person to detect various tones at different sound levels and frequencies. During the audiogram, an audiometric technician will test both ears using headphones and special sound producing equipment. Audiometric technicians must hold current certification as Occupational Hearing Conservationists from the Council for Accreditation in Occupational Hearing Conservation (CAOHC). It is critical for audiogram accuracy that the audiometric technicians perform and document daily calibration check and self-listening check so audiometric function. Documentation of calibration records must be maintained. The audiometric testing program shall consist of:

- Baseline audiogram within six months of the employee's first exposure at or above 85dBA. Baseline testing shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protection may be worn to accomplish this requirement.
- Annual audiogram, at least thereafter as long as the employees continue to be exposed at or above 85 dBA.
- Annual audiograms shall be compared to the baseline to determine if there has been a standard threshold shift. A qualified technician shall conduct evaluations of the audiograms. If the audiogram is an initial or baseline audiogram, compare the results with normal hearing. A standard threshold shift is a change in hearing more at the 2000, 3000 and 4000 Hertz (Hz) frequency at either ear. Re-testing within 30 days after the annual audiogram should be considered before further evaluation.

If the audiometric technician or physician determines that the annual audiogram compared to the baseline audiogram indicated a valid standard threshold shift (STS), the employee shall be notified of the fact within 21 days of the determination. Also, the employee shall be fitted or refitted with hearing protection offering greatest attenuation to the noise source. The employee shall be referred to a specialist (audiologist, otolaryngologist, or physician) if additional testing is necessary or if a medical pathology of the ear is caused or aggravated by wearing hearing protectors. Even if the medical pathology of the ear is not affected, the employee must be referred for further otological examination. However, this should be handled through normal medical care.

- If the specialist determines that the audiogram is valid and confirms that the hearing loss is work related and the program administrator concurs, the illness or injury shall be recorded in the OSHA 200 log.
- If the employee is no longer exposed to noise at or above 85 dBA decibels and the audiogram stabilizes or improves, the employer may discontinue using the hearing protectors. In addition, a valid new audiogram may be substituted as a baseline for comparison with the next audiogram.
- An evaluation procedure should exist for continuously correlating the noise data with audiometric data. This evaluation will help determine the effectiveness of the Hearing Conservation Program.

HTS AmeriTek employees do not currently participate in an audiometric testing program because their measured exposure to noise is less than 85 dBA.

### **EMPLOYEE NOTIFICATION**

The program administrator must make notification in writing to employees exposed to noise levels equal to or greater than 85 dBA as an 8 hour TWA. This notification includes:

- Noise monitoring results

- Details of the Hearing Conservation Program
- Engineering or administrative controls which are planned to reduce noise levels, if feasible.
- Types of hearing protectors available and the enforcement policy required by the noise standard.

If measured noise levels are above 85 dBA, a copy of the OSHA Occupational Noise Exposure Standard must be posted.

### **HEARING PROTECTOR SELECTION**

Hearing protection devices (HPD's) are the first line of defense against noise in environments where engineering and/or administrative controls have not reduced employees' exposures to below 85 dBA. Even though HTS AmeriTek employees are not exposed to an 8-hour TWA of 85 decibels or greater, there may be area or situations where employees are required to wear HPDs.

Hearing protection is required for no-routine operations in which the employee has a potential to be exposed briefly to high noise levels; for routine, but infrequent, operations where exposures would exceed 115 dBA; and for operations where exposure is impulsive or impact noise, which exceeds 140 decibels peak sound pressure level.

HPD selection is the responsibility of the Responsible Safety Officer. The selection process is based on the Noise Reduction Rating (NRR) method as described in Appendix B of the Occupation Noise Exposure Standard 29 CFR 1910.95. A NRR is used to determine whether a particular hearing protector provides adequate protection with a given exposure environment by one of the following methods:

- Convert C-weighted dosimeter measurements to an 8-hour TWA. Subtract the NRR from the C-weighted TWA to obtain the A-weighted TWA under the ear protector.
- Convert an A-weighted does to an 8-hour TWA. Subtract 7 dB from the NRR. Subtract the remainder from the A-weighted TWA to obtain an estimated A-weighted TWA under the ear protector.
- When using a sound level meter with an A-weighting, obtain the employee's A weighted TWA. Subtract 7 dB from the NRR and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

HTS AmeriTek employees will be given the opportunity to select their preferred hearing protector, either earmuffs or ear plugs from a variety of manufacturers and provided at no cost to the employee. Their selection, however, is limited to the ability of the HPD's NRR and individual noise exposures. Each employee will be fitted for the HPD and given instruction on the use and care of HPDs and the proper fitting. The Responsible Safety Officer will evaluate the hearing protector attenuation for the specific noise environment in which the protector will be used. Hearing protectors must:

- Attenuate employee exposure at least 85 dBA as an 8-hour TWA
- Attenuate employee exposure to an 8-hour TWA of 80 decibels or below for employee who have experienced a standard threshold shift.
- Be re-evaluated whenever employee's noise exposure increases to an extent that the hearing protection provided no longer provides adequate attenuation.

### **EMPLOYEE TRAINING**

All employees exposed to noise at or above an 8-hour TWA of 85 decibels must be included in a Hearing Conservation Training program. This training will include:

- Effects of noise on hearing
- Purpose of HPDs, advantages and disadvantages and attenuation of various types of instructions on selection, fitting and care.
- Purpose of audiometric testing and an explanation of the test procedures.

Annual training sessions will be conducted to provide employees with updated information. Attendance sheets will be taken at each session.

## RECORD KEEPING PROCEDURE

Accurate records must be maintained to document compliance with the Hearing Conservation Program. The following records, when and if required, will be maintained at the administrative office:

- Employee noise exposure measurements. Information regarding calibration of the instruments used, date and time of the measurements, TWA calculations and methods used by the surveyor should be kept with the noise exposure records.
- Audiometric test records – information will include: name, age, job classification and TWA exposure; date of audiogram, name of audiometric technician, audiometer model/SN and date of its last calibration, and technician’s certification credentials.
- Employee training records including content of course and attendance.
- Documentation of engineering/administrative controls including: results of engineering sound surveys, installations completed and noise reduction achieved and regular maintenance of machinery and controls.
- Documentation of hearing protection devices including: date of initial HPD fitting of each employee, brand and size of HPD fitted, employees signature for training in HPD use and care, documentation of administrators supervision of correct and consistent HPD use, and NRR/TWA calculations showing HPD adequacy.
- Documentation of audiogram review and follow-up actions including: review of each audiogram, credentials of specialists and their recommendations, and documentation that follow-up was recommended by program administrator. Access to these records shall follow the applicable provisions of OSHA standard 29CFR 1910.20.

## HEARING CONSERVATION PROGRAM EVALUATION

Evaluation of the program is necessary to determine its effectiveness in limiting noise induced hearing loss in the workplace. The only objective indication of whether the HCP is successful in preventing occupational hearing loss is to analyze audiometric test results. Audiometric Data Base Analysis (ADBA) looks at the total variability in employee’s hearing threshold measurements. (*Royster and Royster*)

Two variability procedures are commonly used. They are based on counting the percentage of employees whose hearing shows changes of 15 dB or more between two sequential (consecutive) annual audiograms. Threshold changes are counted both toward better hearing and toward worse hearing to yield values of these two ADBA procedures:

- Percent Worse Sequential (%Ws): the percentage of employees who show a worsening of 15 dB or more in thresholds for at least one test frequency (500 Hz through 600 Hz) in either ear between 2 sequential audiograms.
- Percent Better or Worse Sequential (%BWs): the percentage of employees who show either an improvement or worsening of 15 dB or more in thresholds for at least one test frequency in either ear between two sequential audiograms.

Note that before either procedure is applied, the population must be restricted to a group of workers who all have a specified number of audiograms. Table 1 defines ranges of that which indicates the HCPs, quality as acceptance, marginal or unacceptable.

**TABLE 1**

HCP Rating	Over First Four Test Comparisons	Over Later Test Comparisons	
	%Ws	5Ws	%BWs
Acceptable	<20	<17	<26
Marginal	20 to 30	17 to 27	26 to 40
Unacceptable	>30	>27	>40

HCP Effectiveness Classification and Corresponding Recommended Value Ranges for TWO ADBA Procedures Applied to Sequential Test Comparisons With No Age Corrections: Percent Worse (%Ws) and Percent Better or Worse (%BWs).