

AUDIOMETRIC EVALUATION

Audiometric evaluation is crucial to the success of the HCP in that it is the only way to determine whether noise-induced hearing loss is being prevented. When the comparison of audiograms shows temporary threshold shift (a temporary hearing loss after noise exposure), early permanent threshold shift, or progressive noise-induced hearing loss, it is time to take swift action to halt the loss before additional deterioration occurs. Because noise-induced hearing loss occurs gradually and is not accompanied by pain, the affected employee will not notice the change until a large threshold shift has accumulated. However, the results of audiometric tests can trigger changes in the HCP more promptly, initiating protective measures and motivating employees to prevent further hearing loss.

The reader is encouraged to consult Appendix A, items no. 12-30 and 51-54, for a summary of OSHA's requirements for audiometric evaluations. The sections entitled "Monitoring Audiometry" and "Referrals" in Appendix B's checklists also should be helpful.

For maximum protection of the employees (and for that matter, the company), audiograms should be performed on the following five occasions:

1. Pre-employment.
2. Prior to initial assignment in a noisy work area.
3. Annually as long as the employee is assigned to a noisy job (a time-weighted average exposure level of 85 to 100 dBA), or twice a year for employees with time-weighted average exposures over 100 dBA.*
4. At the time of reassignment out of a noisy job.
5. At the termination of employment.

In addition, it is suggested that employees who are not noise-exposed be given periodic audiograms as part of the company's health care program. The audiograms of these employees can be compared to those of the noise-exposed employees whenever the overall effectiveness of the HCP is evaluated. In an optimally effective program, the two employee groups will show essentially the same amount of audiometric change.

Management Responsibilities

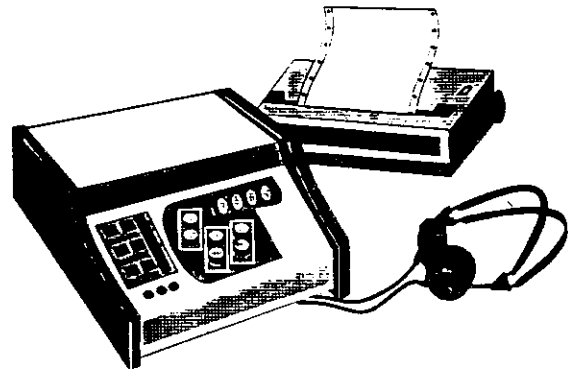
Managers should support the audiometric evaluation phase by allocating sufficient resources. Because the audiometric phase is sometimes the most expensive element of a HCP, it is prudent to set aside enough funds to provide for the performance of reliable hearing tests and the collection of accurate information.

Managers may opt to contract for audiometric services with an external source such as a mobile testing contractor or a local hearing clinic. Management may choose to

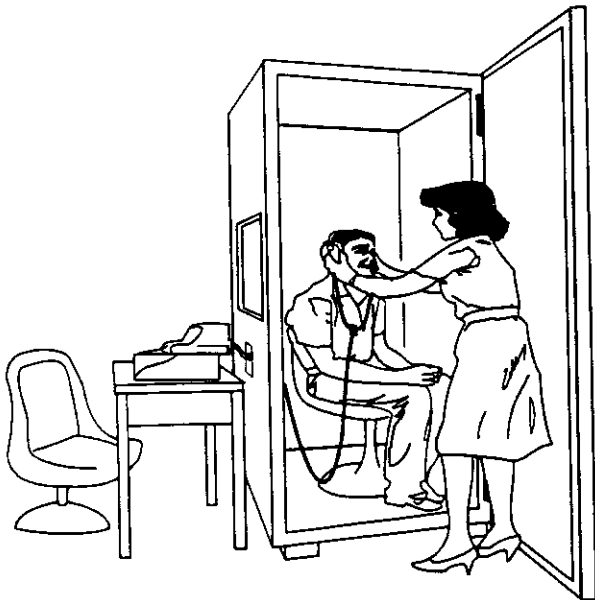
*Noise-induced hearing loss can develop rapidly in workers exposed to relatively high noise levels on a daily basis. For example, the most susceptible ten percent of a population exposed to daily average noise levels of 100 dBA could be expected to develop hearing threshold shifts in excess of OSHA's criterion for standard threshold shift before the end of one year. This prediction can be made using the international standard, "Determination of Noise Exposure and Estimation of Noise-Induced Hearing Impairment" (see ISO, in Appendix D).

Microprocessor audiometer with separate printer.

Audiometer System



Audiobooth



Placing earphones for an audiometric test (from Noise and Hearing Conservation by G. Sevelius, MD). Reprinted with permission.

purchase audiometric equipment and train a company employee to perform audiometric testing on-site under the supervision of an audiologist or a qualified physician. The third option is to combine internal and external resources. The choice depends upon economic considerations as well as the size, policies, and geographical location of the company. If contract services are used it is critically important that management still assign responsibility for overseeing the HCP to a key on-site individual. However, whether the audiometric testing is performed internally or externally, the company will not receive the benefit of quality audiometric evaluations unless the following practices are adhered to:

1. The audiograms must be administered using properly calibrated audiometers in a sound-treated room with acceptable background sound levels during testing. Circumaural earphone enclosures (earphones inside earmuffs), which are designed to reduce external noise, should not be substituted for a sound treated room, and generally should not be used because of inherent problems with calibration and earphone placement.
2. The same type of audiometer (and preferably the same instrument) should be used from year to year. This will prevent measurement variations caused by differences among machine models/types or by the type of responses required from the person being tested.
3. The training of audiometric technicians should meet as a minimum the current requirements of the Council for Accreditation in Occupational Hearing Conservation or a similar accrediting organization.
4. All audiometric technicians should use the same testing methods for all of the company's employees.
5. All testing should be done under the supervision of an audiologist or a physician with expertise in the area of hearing assessment and protection.

Management should provide the audiometric technician with sufficient time to perform the tests thoroughly and to give noise-exposed employees proper attention. Because the audiometric session provides an ideal opportunity to motivate employees' concern for hearing conservation, technicians should have time to inform employees about their hearing status immediately after completing the audiogram and to check their hearing protection devices. When the technician is too hurried to do more than a rapid screening audiogram because of other duties, the employee correctly perceives that the exercise is performed only in response to regulatory requirements, without a sincere interest in protecting anyone's hearing. In such a situation employees often lose their motivation to participate in the HCP.

Management should also make sure that the individual who reviews the audiograms is a qualified professional with specific training and experience in the area of occupational hearing conservation. All employees, not just those with threshold shifts, should receive prompt written summaries of their current hearing status from the professional reviewer. Employees also should receive summaries of their hearing trends over time, along with recommendations for further evaluation or any extra precautions needed, such as more careful use of hearing protectors.

Program Implementor Responsibilities

The program implementor has important responsibilities in the audiometric testing

phase of the HCP. This individual and the person conducting audiometric testing may be the same person, but if not, the program implementor must see that the person performing the audiometric testing is well-trained and carries out the necessary functions. The individual who performs the testing needs to demonstrate enthusiasm for the program and show sincere interest in each employee while carrying out his or her duties.

The program implementor should make sure that the records include the employee's auditory history, which is the history of diseases and disorders of hearing and balance, and related factors (such as diabetes and high blood pressure), and history of exposure to noise, both on and away from the job. This information provides the professional audiogram reviewer with insight concerning probable causes for threshold shifts and enhances specific recommendations for follow-up.

Annual audiometric examinations (but not baselines) should be scheduled well into the workshift so that comparisons with baseline audiograms will reveal any early indications of hearing loss or temporary threshold shifts due to hearing protector inadequacies. In the early stages of noise-induced hearing loss, noise exposure causes temporary shifts in hearing threshold level, which, if repeated on a regular basis, become permanent. By testing toward the end of the workday, rather than before or early into the workday, these temporary threshold shifts can be identified, and steps can be taken to counteract them. Interventions at this stage thus prevent subsequent, permanent hearing loss.

Direct contact between the person performing the audiometric testing and the employee during the hearing test provides the chance to inspect the condition of the employee's hearing protector. The tester can observe whether the employee is using the device correctly, and re-evaluate the adequacy of hearing protector selection, fit, and condition. The employee should be asked whether the hearing protector is performing in a satisfactory manner. If necessary, a new protector of a different size or type can be issued and the employee instructed in the proper care and fitting of the device.

Daily calibration and listening checks of audiometer function are critical for audiogram accuracy, and the program implementor must ensure that these checks are properly documented. To measure thresholds accurately, the test room must be quiet enough to meet appropriate American National Standards Institute requirements (ANSI S3.1 1977), which is especially important for employees with normal hearing. Complete audiometer calibrations should be scheduled periodically, but the audiometer should not actually be adjusted unless it fails to meet standard tolerances. Too frequent adjustments add "see-saw" variability to the audiometric data, interfering with the interpretation of both individual and group hearing trends. To prevent another source of measurement variability, the same audiometers should be used consistently rather than switching between models, and especially between types of audiometers (manual, self-recording, and microprocessor). Failure to follow these practices jeopardizes the validity of the audiometric data and may reduce employee protection as a consequence.

Program implementors should see that the audiometric record indicates:

1. The specific purpose of the audiometric examination: for example, baseline, annual, retest, or other.
2. The specific equipment used and calibration dates.

3. The name of the tester.
4. The date and time of the test.
5. The auditory history information.
6. The hearing threshold values obtained.
7. The tester's judgment of the subject's response reliability.
8. The results of the hearing protector inspection and a record of any refitting, reissuing, or retraining.
9. The tester's comments, if any.

The program implementor must make sure that every audiogram is reviewed. The supervising professional may set up criteria for the person conducting the audiometric tests or for a computer program to bypass routine records and identify only the remaining noteworthy records for review. Routine records are those depicting normal hearing or no significant hearing decrements or improvements for a given employee. Only the professional is qualified to revise the reference "baseline" audiogram, either because of improvements in hearing or because of a persistent decline in hearing level. The reviewer should look for threshold shifts at any test frequency, not just "standard threshold shifts" as defined by OSHA*, and for audiometric patterns indicative of medical problems. If the audiometric data indicate a degeneration of hearing, the reviewer must alert both the employee and management about these findings.

OSHA requires follow-up referrals under certain conditions (see item number 23 in Appendix A, and section (g)(8)(ii) in the OSHA noise standard). The program implementor must be familiar with these provisions, and must see that they are carried out. Sometimes medical referrals are necessary to determine the cause of a hearing loss, and medical treatment can be an important next step. Not all hearing losses are caused by noise and sometimes medical intervention can be crucial to the worker's health.

Although OSHA regulations specify required follow-up actions when a standard threshold shift is identified, follow-up for smaller shifts in hearing is recommended for optimal protection. Studies of effective HCPs show that employees with "beginning" shifts (smaller than OSHA's standard shift) get a written notification or "alert" from the professional reviewer. They also receive face-to-face counseling from on-site program implementors and, based on the reviewer's suggestions, retesting, re-evaluation of hearing protector efficiency, and extra instruction in hearing protector use. Individuals with possible medical conditions of the ear should be counseled to seek evaluation and treatment from their own physicians, or they may be referred to a company physician or a health provider covered under the company medical program. They should sign a statement that they have been counseled and have received certain recommendations.

*OSHA's definition of a standard threshold shift is a change, relative to baseline, of 10 dB or more in the average hearing level at 2000, 3000, and 4000 Hz in either ear.

Audiometric and Identification Information

Name: _____
 Soc. Sec. #: _____
 Birth Date: _____
 Sex: Male Female
 Empl No: _____
 Job Code: _____
 Job Descript: _____
 Dept No: _____

Test Date: _____
 Test Type: _____

Time since last exposure:
 _____ hours

Hearing Protector Used
 Plugs _____ Muffs _____
 Both _____ None _____
 Unknown _____

Test Time: _____

Exposure Level _____ dBA

Hearing Protector Activity
 Yes _____ No _____
 Issue _____
 Reissue _____
 Training _____
 Retraining _____

Self-Reported Employee Histories

Medical History (Y/N)

Diabetes _____
 Ear Surgery _____
 Head Injury _____
 High Fever _____
 Measles _____
 Mumps _____
 High Blood Pressure _____
 Ringing in Ears _____
 Ear Infection _____
 Other _____

Hobby & Military History (Y/N)

Hunting _____
 Shooting _____
 Racing Cars _____
 Motorcycles _____
 Other Loud Vehicles _____
 Loud Music/Band _____
 Power Tools _____
 Military Service _____
 Branch _____
 Other _____

Additional Information (Y/N)

Noisy 2nd Job _____
 Noisy Past Job _____
 Difficulty Hearing Right Ear _____
 Difficulty Hearing Left Ear _____
 Hearing Aid Right Ear _____
 Hearing Aid Left Ear _____
 Recent Change in Hearing _____
 See Physician About Ears _____
 See Prior History _____
 Other _____

Audiogram

Test Frequency

Ear	500	1000	2000	3000	4000	6000	8000
Right							
Left							

Audiometer: _____
 Exhaustive Calibration Date: _____
 Tester Identification: _____
 Reviewer Identification: _____

Serial Number: _____
 Biological Calibration Date: _____
 Test Reliability (Good, Fair, Poor) _____
 Audiogram Classification Code _____

Comments: _____

Sample data sheet for audiogram and related employee histories.

Employee Responsibilities

To help the professional reviewer interpret the audiogram, employees need to disclose relevant details of their noise exposure histories (on past jobs, in the military, and in hobbies and non-occupational activities).

Employees should also provide histories of ear diseases, treatment, and current ear conditions, including signs of over-exposure to noise such as tinnitus (ringing in the ear). Employees who understand that audiometric findings will be used to help conserve their hearing, not to penalize them, will respond more effectively to the audiometric listening task. Employees should let the audiometric tester know if the instructions are unclear, if tinnitus is interfering with audiometric responses, or if the audiometer produces sounds other than those described in the instructions.

Once the audiometric results have been reviewed, employees should actively cooperate with the program to protect their own hearing by following the recommendations of the professional supervisor. They should follow the employer's policies concerning the use of hearing protectors on and off the job, and should obtain any recommended medical evaluation or care.

OSHA Requirements

Code of Federal Regulations, Title 29, Chapter XVII, Part 1910, Subpart G, 1910.95: sections (g), (h), Appendix C, Appendix D, Appendix E, and Appendix F.

See checklist in Appendix A of this guidebook, items no. 12-30, and 52-55.

Further Reading

Gasaway, D.C. Hearing Conservation: A Practical Manual and Guide. Englewood Cliffs, NJ: Prentice-Hall, Chapters 10, 12, and 13, 1985.

Lipscomb, D.M. Hearing testing and interpretation. Chapter 8 in D.M. Lipscomb (Ed.), Hearing Conservation in Industry, Schools, and the Military. Boston, MA: Little, Brown and Co., 1988.

Morrill, J.C. Hearing measurement. Chapter 8 in E.H. Berger, W.D. Ward, J.C. Morrill, and L.H. Royster (Eds.), Noise and Hearing Conservation Manual (4th Ed.). Akron, OH: American Industrial Hygiene Assoc., 1986.

Royster, J.D. Audiometric evaluation for industrial hearing conservation. Sound and Vibration, 19(5), pp. 24-29, 1985.

Wilber, L.A. Calibration of instruments used in occupational hearing conservation programs. Chapter 5 in M.H. Miller and C.A. Silverman (Eds.), Occupational Hearing Conservation. Englewood Cliffs, NJ: Prentice-Hall, 1984.

See checklist in Appendix B of this guidebook, sections entitled "Monitoring Audiometry and Record Keeping" and "Referrals."

HEARING PROTECTION DEVICES

A hearing protection device (or "hearing protector") is anything that can be worn to reduce the level of sound entering the ear. Ear muffs, "semi-aural" devices, and ear plugs are the three principal types of devices. Each employee reacts individually to the use of these devices, and a successful HCP should be able to respond to the needs of each employee. Making sure these devices protect hearing effectively requires the coordinated effort of management, the HCP operators, and the affected employees.

OSHA's requirements for hearing protectors are summarized as items no. 31-38 and 50 in Appendix A of this document. Useful guidance can also be found in Appendix B, in the section entitled "Hearing Protection Devices."

Management Responsibilities

Management has two roles in ensuring that hearing protection devices protect hearing effectively: facilitation and enforcement. Facilitation involves ensuring that program implementors obtain the types of devices they need. Management can do this by making sure the procurement department does not override the implementor's decisions. Management must demonstrate its commitment to a truly effective hearing protection program, not one that exists just to comply with OSHA regulations. Employee participation in the selection of hearing protectors should be encouraged. Rewards should go to employees who use them regularly and properly, and to supervisors who energetically support hearing protection policies. Management should extend its commitment to hearing protectors by requiring all personnel, including managers and visitors, to wear protectors in designated areas, and by encouraging employees to take them home to use whenever engaging in noisy activities.

Management should give program implementors the opportunity to pilot-test hearing protectors on a few employees. This will greatly facilitate decisions relating to the selection and ultimate effectiveness of these devices. HCP implementors should also be provided with resources and facilities to train employees in the use and care of hearing protectors.

Enforcing the use of hearing protectors is management's second vital role. If the use of personal safety equipment, such as hearing protectors, is clearly stated as a condition of employment, then management should be prepared to deal accordingly with those who violate the policy.

Program Implementor Responsibilities

It is essential to the success of the program to have someone responsible for the selection of hearing protection devices and the supervision of their use. They must be able to evaluate and select appropriate devices for each employee, based on proper fit, the employee's noise exposure, hearing ability, communication needs, and other constraints imposed by job tasks or work environment. Program implementors should make available a set of devices that have been pilot-tested for effectiveness and employee acceptance. When fitting hearing protectors, attention needs to be given to each ear. Ear canals should be inspected to assure that no physical problems, such as infections or excessive ear wax, will compromise or complicate the use of hearing protectors.

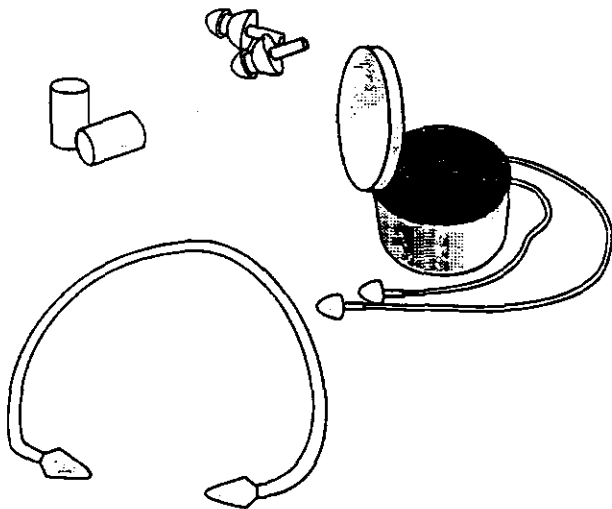
Helmet Mounted Ear Muffs



Ear Muffs



Ear Plug Types



Hearing protectors, including a variety of ear plugs and a "semi-aural" device (lower left). Ear Muffs may require less individual sizing and fitting, but are heavier than ear plugs. Helmet-mounted ear muffs solve the compatibility problem between the head-band and the hard hat.

Program implementors must be able to educate employees one-on-one about the proper use and care of hearing protectors. They must be sure that each employee can demonstrate competence in fitting and using the protector, and is familiar with replacement procedures. Program implementors should also encourage employees to ask questions and to seek help in resolving problems.

Another important aspect of a successful program is to perform on-site checks of the condition of the protectors, noting misuse or wearer "modification" that would diminish effectiveness of the protectors. Program implementors should have a ready supply of replacement protectors, and be prepared to work with those employees whose negative attitudes prevent them from using these devices properly and routinely. Peer pressure in favor of protector use can be effective in helping to resolve these problems.

Employee Responsibilities

Employees, of course, are the focus of the hearing protection program, and must make efforts to be fully informed, to obtain help when necessary, and to wear their hearing protectors correctly at all times. They need to check these devices regularly and to seek repair or replacement whenever necessary. They can also help each other by encouraging their co-workers to use hearing protectors and to seek help when they have problems.

OSHA Requirements

Code of Federal Regulations, Title 29, Chapter XVII, Part 1910, Subpart G, 1910.95: sections (a), (b), (i), (j), and Appendix B.

See checklist in Appendix A of this guidebook, items no. 31-38 and 51.

Further Reading

Berger, E.H. Hearing protection devices. Chapter 10 in E.H. Berger, W.D. Ward, J.C. Morrill, and L.H. Royster (Eds.), Noise and Hearing Conservation Manual (4th Ed.). Akron, OH: American Industrial Hygiene Assoc., 1986.

Lempert, B.L. Compendium of hearing protection devices. Sound and Vibration, 18(5), 1984, pp. 26-39.

Royster, L.H. and Royster, J.D. Hearing protection devices. Chapter 6 in A.S. Feldman and C.T. Grimes (Eds.), Hearing Conservation in Industry. Baltimore, MD: Williams and Wilkins, 1985.

See checklist in Appendix B of this guidebook, section entitled "Hearing Protection Devices."

EDUCATION AND MOTIVATION

To obtain active participation in the HCP by employees, and sincere and energetic support by management, it is necessary to educate and motivate both groups. Any HCP that overlooks this phase of the program will find other phases failing, because employees will not understand why it is in their best interest to cooperate, and management will fail to show the necessary commitment. Employees who understand the reasons for and the mechanics of the HCP will participate for their own benefit, rather than viewing the HCP as an imposition.

OSHA's requirements for training, education, and employee access to materials are summarized in items no. 39-44 in Appendix A, but it should be kept in mind that these are only minimal regulatory requirements. Readers should also consult the checklist in Appendix B, as well as the suggested readings at the end of this section and in Appendix D. A list of audio-visual materials is presented in Appendix C.

Management Responsibilities

Management must emphasize the importance of the educational phase of the HCP by setting a high priority on and requiring attendance at regular hearing conservation training sessions. Training sessions should be held not only for noise-exposed employees, but also for the supervisors and managers responsible for noisy production areas. A manager should participate in each session to outline company policies and to explain the company's commitment to the HCP. The program should consist of more than films or pamphlets. It should include live presentations by articulate and knowledgeable speakers, tailored to the company's particular HCP. These presentations should be updated regularly. In addition to holding these formal programs at least annually, management should also require the inclusion of hearing conservation in regularly-scheduled safety meetings. There should be recognition of departments with excellent HCP performance (i.e., consistent and effective use of hearing protectors and reductions in the incidence of hearing threshold shifts). These accomplishments should be acknowledged through bulletin board posters, articles in the company paper, and in interactions between supervisors and employees.

Management should make sure that the HCP's staff (audiometric technicians, noise assessors, noise control experts, those who fit and issue hearing protection devices, and supervisors) have received detailed instructions in hearing conservation so that they are qualified to lead employee training sessions and comfortable about answering employees' questions. Individuals who make the main presentations in formal educational programs must be carefully selected to project genuine interest in the employees' welfare, and they must be speakers capable of gaining the employees' attention and respect.

The sessions are best structured in small groups consisting of a supervisor and the employees in that production unit. Because these individuals will have common noise exposures, they will fall under a common hearing protector policy, and they should feel comfortable enough with each other to ask questions freely and make constructive comments. Management should ensure that the questions and concerns raised during educational sessions receive thoughtful and prompt follow-up. Special educational sessions should be held for supervisors and managers of noisy departments so that they can discuss their own concerns separately.

Program Implementor Responsibilities

Those who present the education and motivation sessions should limit the content to short, simple presentations of the most relevant facts. The focus should be on the real-life reasons for employees to protect their hearing: to preserve the ability to understand speech; to enjoy music and the sounds of nature; and to perceive sounds that may convey other critical information, such as danger or equipment malfunctions. One useful approach is to explain the audiometric results so employees can see how their own hearing threshold levels compare to those of individuals with normal hearing in their own age group. Once employees know the reasons why they need to conserve their hearing and how to monitor their audiogram results, the remainder of the program can focus on how to protect their hearing on and off the job through the effective use of hearing protection devices and good maintenance of engineering noise controls.

Presenters need to tailor education and motivation sessions to a particular group of employees and their foreman. It is important to describe the group's noise exposures, the group audiometric results, the options available to them with respect to hearing protection devices, and the engineering controls in place or planned for their department. In the separate sessions for supervisors and managers, it is appropriate to stress different points. Topics in the supervisors' sessions may include progress reports on the status of specific elements of the HCP, comparisons of group audiometric results, reports on the use of hearing protectors by department, and responses to questions or concerns expressed by employees. Materials should be updated every year. Films and pamphlets should be used only as supplementary reinforcements for the live presentations, never as the whole program.

Aside from formal educational presentations, program implementors should use every chance to remind employees and supervisors of the importance of the HCP and their active participation in it. The greatest opportunities to influence employees occur at the time of the audiometric test, when the program implementor or technician can compare the current thresholds to past results and check the fit and condition of hearing protection devices. Praise for employees with stable hearing and cautions for those with threshold shifts are effective if the comments come from a sincere and knowledgeable individual. However, in effective hearing conservation programs program implementors do not interact with employees just once a year. They ask questions and make comments on the HCP whether on the plant floor or in the halls and cafeteria - where ever contact is made. The goal is to make the HCP an ongoing concern.

Employee Responsibilities

Employees must contribute to their own education by voicing their concerns or questions about the HCP, informing program implementors when procedures are not practical, and suggesting alternatives that would be more workable for their departments. These concerns should not have to wait until the regularly scheduled safety meetings, but should be expressed as soon as they arise. If HCP personnel fail to provide adequate consideration or follow-up, employees need to appeal to higher management until their concerns are addressed.

OSHA Requirements

Code of Federal Regulations, Title 19, Chapter XVII, Part 1910, Subpart G, 1910.95: sections (k) and (l).

See checklist in Appendix A of this guidebook, items no. 39-41.

Further Reading

Gasaway, D.C. How to successfully educate, indoctrinate, and motivate workers. Chapter 6 in D.C. Gasaway, Hearing Conservation: A Practical Manual and Guide. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1985.

Royster, L.H. and Royster, J.D. Education and motivation. Chapter 11 in E.H. Berger, W.D. Ward, J.C. Morrill, and L.H. Royster (Eds.), Noise and Hearing Conservation Manual (4th Ed.). Akron, OH: American Industrial Hygiene Assoc., 1986.

Sevelius, G. "Noise and Hearing Conservation." Health and Safety Publications, 2265 Westwood Blvd., Los Angeles, CA, 1984.

See checklist in Appendix B of this guidebook, section entitled "Training and Education."

RECORD KEEPING

Records quite often get the least attention of any of the HCP's components. But audiometric comparisons, reports of hearing protector use, and the analysis of noise exposure measurements all involve the keeping of records. Unfortunately, records are often kept poorly because there is no organized system in place, and in many cases, those responsible for maintaining the records do not understand their value. People tend to assume that if they merely place records in a file or enter them into a computer, adequate record keeping procedures are being followed.

Many companies have found that their record keeping system was inadequate at the moment accurate information was most needed. This has often occurred during the processing of compensation claims. Problems can be avoided by implementing an effective record keeping system, in which: (1) management encourages that the system be kept active and accessible, (2) HCP implementors make sure that all of the information entered is accurate and complete, and (3) employees validate the information.

HCP records should include all items for each phase of the program: (1) noise exposure measurements, (2) plans for engineering and administrative controls, (3) audiometric evaluations, (4) provision for purchase of hearing protection devices, (5) employee education and motivation activities, and (6) program evaluations. Each phase generates its own form of records, and the information from the various records must be considered in order to evaluate the effectiveness of the HCP.

OSHA's record keeping requirements can be found in items no. 45-48 of Appendix A in this document. For more information on this subject, readers may consult the recommended readings at the end of this section, as well as the checklists in Appendix B.

Management Responsibilities

Management should make available the facilities to store records and should provide sufficient resources to process them quickly and accurately. The forms or computer format used to gather information are the foundation of a good record keeping system. These forms should be designed so that necessary actions are triggered and then documented. If a company does not have the available resources to design a hearing conservation record keeping system compatible with the general safety and health record system, the company should turn to consultants for assistance.

Because HCP records can be complex, management should see that program implementors are fully trained in the record keeping system and its function. There should be working copies of records as well as archived copies. If an outside contractor keeps the records, a method should be established to ensure that original records are returned and entered into the company's files in a timely fashion.

Hearing conservation records are medical records and, as such, deserve the same level of integrity and confidentiality as other medical records. The company needs to make sure that these records are accessible only to program implementors, affected employees or their designated representatives, and government inspectors. Increasingly, companies maintain all of their employee health and safety records in a computer system. The use of computers supports easy access and storage of data, provides for automatic triggering of actions based on the data contained in the

records, and generates hard copies to be maintained as archives. Prudent managers will see that original copies of records pertaining to individual audiometry and noise-exposure monitoring are retained in personal medical or industrial-hygiene folders.

Program Implementor Responsibilities

In most cases, HCP implementors will use a records system and associated forms that were developed by someone else, and must adapt their own procedures accordingly. The HCP implementor or operator must make sure that all information entered in the records is accurate, complete, legible, verifiable, and stated clearly so that the information does not need to be interpreted. If the operator discovers, while reviewing a record, that an employee's noise exposure level is not known, the measurements should be obtained and entered in the record. The same applies to other kinds of information. Also, there should be no blanks left in the form, since it is not possible to know whether a question did not apply or was overlooked. When blanks appear, they should be filled in or marked with NA for "not applicable" or INA for "information not available." Additional abbreviations should be avoided unless their meanings are clearly stated on the form in which they appear. Finally, original copies should always be available in an archive.

While management may provide the record keeping system and the necessary resources, the program implementors must ensure that the system works. The most important attributes of an effective record keeping system are standardization, maintenance, integration, and documentation. Standardization ensures commonality and consistency of data and format. Maintenance keeps records current and accurate. Integration of the recorded information allows the program implementor to assess the impact of hearing conservation on employees' hearing. Documentation of hearing conservation program elements permits analysis of long-range implications since cause-effect relationships associated with hazardous noise levels only become evident over time.

Employee Responsibilities

Employee hearing conservation records should be available and accessible, especially at the time of regularly scheduled hearing tests. This is the ideal time for employees to check on the status of their hearing, and to pass along their comments on the HCP. Workers have a vested interest in the accuracy, validity, and accessibility of their hearing conservation and other medical records. Once they have been properly counseled, they should sign each audiogram to identify it as their own, and to signify that they are aware of any changes in hearing. They should also verify the accuracy of their medical history, any non-occupational noise exposure history, and past and current personal or work-related information.

OSHA Requirements

Code of Federal Regulations, Title 19, Chapter XVII, Part 1910, Subpart G, 1910.95: section (m).

See checklist in Appendix A of this guidebook, items no. 45-49.

Further Reading

Franks, J.R. Management of hearing conservation data with microcomputers. Chapter 9 in D.M. Lipscomb (Ed.), Hearing Conservation in Industry, Schools, and the Military. Boston, MA: Little, Brown and Co., 1988.

Gasaway, D.C. Using documentation to enhance monitoring efforts. Chapter 11 in D.C. Gasaway, Hearing Conservation: A Practical Manual and Guide. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1985.

See checklist in Appendix B of this guidebook, section entitled "Monitoring Audiometry and Record Keeping."

PROGRAM EVALUATION

The primary goal of any HCP must be to reduce, and eventually to eliminate, hearing loss due to workplace noise exposure. While management may have the best intentions of implementing this goal and a company's HCP may have the appearance of being complete and complying with OSHA's requirements, the program may not achieve this goal. A thorough evaluation of the effectiveness of all of the program's components is necessary to determine the extent to which the HCP is really working.

Management and program implementors should conduct periodic program evaluations to assess compliance with federal and state regulations and to make sure hearing is being conserved. There are two basic approaches to follow in program evaluation: (1) assess the completeness and quality of the program's components, and (2) evaluate the audiometric data. The first approach can be implemented using checklists, such as those found in Appendices A and B. Appendix A can be used to assess compliance with each provision of OSHA's noise standard, and Appendix B is useful for identifying gaps in the program which could limit the program's effectiveness. Checklists such as these can serve as important tools in the evaluation process.

The second approach is to evaluate the results of audiometric tests, both for individuals and for groups of noise-exposed employees. Each individual's current test should be compared to the baseline test to see if an OSHA standard threshold shift has occurred. Previous audiograms for that individual should be inspected also and compared to each other and to the current test results to identify hearing loss progressions that may not have reached the severity of the OSHA standard threshold shift.

Audiometric data for groups of noise-exposed employees should also be evaluated using criteria other than the OSHA standard threshold shift. This usually involves statistical procedures to assess variability in population hearing levels, and usually requires computerized audiometric data. A well protected noise-exposed population will show the same hearing levels as a non-noise-exposed population, when matched for age and other factors. Different manifestations of variability can provide information on the extent to which workers are losing their hearing, and can assist in pinpointing the trouble spots in the HCP. For further information on audiometric data base analysis, readers should consult the suggested readings at the end of this section. In addition, a working group of the American National Standards Institute (ANSI S12-12) has drafted guidelines for analyzing audiometric data to evaluate HCP effectiveness.

Management Responsibilities

Management needs to dedicate sufficient resources for a comprehensive program evaluation to the key individual (the program implementor) responsible for the HCP. Management should see that this individual is adequately trained in the conduct of HCPs and in the analysis of data, and should make sure that periodic evaluations actually take place.

Managers need to be committed to act on the outcome of the program evaluation. They must be willing to acknowledge and solve the problems which may require the

dedication of both financial resources and personnel. They must also be willing to institute and carry out disciplinary measures for non-compliance.

Another important responsibility of management is to be attentive to the comments and reactions of noise-exposed employees and to make use of their feedback during the program evaluation.

Program Implementor Responsibilities

Program implementors must be willing to commit the time and resources needed to conduct a thorough evaluation. They need to be able to perform the mechanics of audiometric data base analysis, or they must be willing to engage the assistance of an outside contractor or consultant. They should look for early threshold shifts, and not wait until the shift becomes as severe as an OSHA standard threshold shift.

Those who perform the program evaluation must be willing to ask questions, seek out elusive information, and interact with all members of the HCP team. For example, they may need to call for audiometric retests, make sure that recommendations for treatment or evaluation have been followed, and to assure that necessary changes in hearing protection have been implemented. They must communicate their findings to management and to the affected employees.

Employee Responsibilities

As with many other components of the HCP, the primary responsibility of employees is to provide feedback to the program implementor and to management. For effective program evaluation to take place employees need to communicate their hearing conservation problems, and explain why they are unwilling or unable to wear their hearing protectors. They need to make their needs known to higher management if they are unable to obtain replacement hearing protectors. Employees should notify the technician or audiologist if they have a problem understanding the instructions for taking the audiometric test, and report any medical problem that affects their hearing. Finally, they need to draw attention to changes in the noise levels produced by their equipment, or any malfunctioning noise control devices. Evaluation of the program, just like the conduct of the program, requires a team effort.

Further Reading

Melnick, W. Evaluation of industrial hearing conservation programs: A review and analysis. American Industrial Hygiene Assoc. Journal, 45, pp. 459-467, 1984.

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APPENDIX A

OSHA NOISE STANDARD COMPLIANCE CHECKLIST*

PURPOSE

This checklist summarizes the OSHA noise standard. It is intended to assist companies conducting hearing conservation program evaluations to assess compliance with OSHA requirements and to determine program effectiveness. It is not intended to be used as a substitute for the OSHA Standard.

REFERENCE

Refer to OSHA Standard 29 CFR 1910.95(a)-(p) with accompanying appendices A-I, Occupational Noise Exposure Standard for the standard's specific requirements: Code of Federal Regulations, Title 29, Chapter XVII, Part 1910, Subpart G. (See also 36 FR 10466 and 10518, May 29, 1971; Amended 46 FR 4078-4179, Jan. 16, 1981; Revised 48 FR 9776-9785, Mar. 8, 1983).

NO.	29 CFR 1910.95 REQUIREMENT	STD REF NO.	YES	NO	COMMENT
PROTECTION AGAINST NOISE					
1	Must be provided when sound levels exceed time-weighted average level (TWA) 90 dBA measured with slow response	(a)			
CONTROLS					
2	Feasible engineering or administrative controls for employees exceeding TWA 90 dBA	(b)(1)			
3	Impulse or impact noise should not exceed 140 dB peak sound pressure level	(b)(2)			
PROGRAM					
4	Include employees whose noise exposures equal or exceed 85 dBA, 8-hr TWA (action level)	(c)(1)and (c)(2)			
MONITORING					
5	Conduct noise monitoring when 85-dBA TWA equalled or exceeded	(d)(1)			
6	Use representative personal monitoring for highly mobile workers, significantly varying sound levels, and impulse noise exposure	(d)(1)(ii)			
7	Include all continuous, intermittent, and impulsive sound levels from 80-130 dBA in measurements	(d)(2)(i)			
8	Calibrate equipment	(d)(2)(ii)			
9	Repeat monitoring when noise exposure increases significantly	(d)(3)			
EMPLOYEE NOTIFICATION					
10	Notify employees of noise monitoring results when exposure is at or above 85 dBA TWA	(e)			

*Adapted from checklist supplied by ELB and Associates, Inc., Chapel Hill, NC.

OSHA NOISE STANDARD COMPLIANCE CHECKLIST

NO.	29 CFR 1910.95 REQUIREMENT	STD REF NO.	YES	NO	COMMENT
OBSERVATION OF MONITORING					
11	Employees or their reps may observe noise monitoring	(f)			
AUDIOMETRIC TEST PROGRAM					
12	Audiometric testing available to employees exposed at or above 85 dBA TWA	(g)(1)			
13	Tests performed by professional or by competent technician (certification recommended)	(g)(3)			
14	Audiograms meet 1910.95 Appendix C requirements	(g)(4)			
BASELINE AUDIOGRAM					
15	Establish within 6 months or within 1 year if using mobile van	(g)(5)(i) and (ii)			
16	14 hour-period without workplace noise before baseline (hearing protection can be substituted)	(g)(5)(iii)			
17	Notify employees to avoid high non-occupational noise levels before baseline	(g)(5)(iv)			
ANNUAL AUDIOGRAM					
18	Provide for all employees exposed at or above 85 dBA TWA	(g)(6)			
AUDIOGRAM EVALUATION					
19	Compare each annual test to baseline for validity and to see if standard threshold shift (STS) exists	(g)(7)(i)			
20	If STS, retest within 30 days (optional)	(g)(7)(ii)			
21	Audiologist, otolaryngologist, or physician reviews problem audiograms and determines need for further evaluation.	(g)(7)(iii)			
FOLLOW-UP					
22	Notify employees with STS in writing within 21 days	(g)(8)(i)			
23	Actions to be taken (unless physician determines that STS is not work-related)	(g)(8)(ii)			
	o Provide employees with hearing protectors (if not already wearing), train in care and use, and require them to be worn				
	o Refit and retrain employees already using protectors				
	o Refer as necessary for clinical evaluations or additional testing				
	o Inform employees with non-work related ear problems of need for otologic exam				

OSHA NOISE STANDARD COMPLIANCE CHECKLIST

NO.	29 CFR 1910.95 REQUIREMENT	STD REF NO.	YES	NO	COMMENT
REVISION OF BASELINE					
24	Annual audiogram may become baseline as per OSHA criteria	(g)(9)			
STANDARD THRESHOLD SHIFT					
25	Definition - change relative to baseline of 10 dB or more in average hearing level at 2000, 3000, and 4000 Hz, either ear. Allowance for aging optional - Appendix F	(g)(10)			
AUDIOMETRIC TEST REQUIREMENTS					
26	Each ear tested at frequencies of 500, 1000, 2000, 3000, 4000, and 6000 Hz	(h)(1)			
27	Audiometers meet ANSI S3.6-1969	(h)(2)			
28	Pulsed-tone and self-recording audiometers meet Appendix C requirements	(h)(3)			
29	Test rooms meet Appendix D requirements	(h)(4)			
30	Audiometer calibration includes: <ul style="list-style-type: none">o Functional checks before each day's useo Acoustical check annually according to Appendix Eo Exhaustive calibration every 2 years	(h)(5)			
HEARING PROTECTORS					
31	Available to all employees exposed at or above 85 dBA TWA and replaced as necessary	(i)(1)			
32	Worn by employees when: <ul style="list-style-type: none">o Exposed to 90 dBA TWA or aboveo Exposed to 85 dBA TWA or above when<ul style="list-style-type: none">- no baseline after 6 months, or- STS occurs	(i)(2)			
33	Employees select from a variety of suitable hearing protectors	(i)(3)			
34	Employees trained in care and use	(i)(4)			
35	Employer ensures proper initial fitting and supervises correct use	(i)(5)			
HEARING PROTECTOR ATTENUATION					
36	Evaluate attenuation for specific noise environments according to Appendix B	(j)(1)			
37	Attenuate to at least 90 dBA, or 85 dBA if STS experienced	(j)(2) and (j)(3)			
38	Re-evaluate attenuation as necessary	(j)(4)			
TRAINING PROGRAM					
39	Provide training to employees exposed to 85 dBA TWA or above	(k)(1)			

OSHA NOISE STANDARD COMPLIANCE CHECKLIST

NO.	29 CFR 1910.95 REQUIREMENT	STD REF NO.	YES	NO	COMMENT
40	Repeat annually and update materials	(k)(2)			
41	Training includes:	(k)(3)			
	o Effects of noise on hearing				
	o Purpose of hearing protectors, advantages, disadvantages, attenuation; instructions on selection, fit, use, and care				
	o Purpose and procedures of audiometric testing				
ACCESS					
42	Copies of OSHA standard available to employees or their reps and posted in workplace	(1)(1)			
43	Information provided by OSHA available to employees	(1)(2)			
44	All records provided on request to employees, former employees, reps, and OSHA	(m)(4)			
RECORD KEEPING					
45	Maintain accurate records of noise exposure measurements	(m)(1)			
46	Maintain audiometric records with the following information:	(m)(2)			
	o Employee name and job classification				
	o Date of audiogram				
	o Examiner's name				
	o Date of last acoustic or exhaustive calibration				
	o Employee's most recent noise exposure assessment				
	o Background noise levels in audio test rooms				
47	Retain all noise exposure records for at least 2 years	(m)(3)(i)			
48	Retain all audiometric test records at least for duration of employment	(m)(3)(ii)			
49	Transfer all records to successor employer	(m)(5)			
MANDATORY OSHA APPENDICES					
50	Noise Exposure Computation	Appen. A			
51	Methods for Estimating the Adequacy of Hearing Protector Attenuation	Appen. B			
52	Audiometric Measuring Instruments	Appen. C			
53	Audiometric Test Rooms	Appen. D			
54	Acoustic Calibration of Audiometers	Appen. E			

OSHA NOISE STANDARD COMPLIANCE CHECKLIST

NO.	29 CFR 1910.95 REQUIREMENT	STD REF NO.	YES	NO	COMMENT
NON-MANDATORY OSHA APPENDICES					
55	Calculations and Application of Age Corrections to Audiograms	Appen. F			
56	Monitoring Noise Levels	Appen. G			
57	Availability of Referenced Documents	Appen. H			
58	Definitions	Appen. I			

APPENDIX B

PROGRAM EVALUATION CHECKLIST*

Training and Education

Failures or deficiencies in hearing conservation programs (HCPs) can often be traced to inadequacies in the training and education of noise exposed employees and those who conduct elements of the program.

1. Has training been conducted at least once a year?
2. Was the training provided by a qualified instructor?
3. Was the success of each training program evaluated?
4. Is the content revised periodically?
5. Are managers and supervisors directly involved?
6. Are posters, regulations, handouts, and employee newsletters used as supplements?
7. Are personal counseling sessions conducted for employees having problems with hearing protection devices or showing hearing threshold shifts?

Supervisor Involvement

Data indicate that employees who refuse to wear hearing protectors or who fail to show up for hearing tests frequently work for supervisors who are not totally committed to the HCP.

1. Have supervisors been provided with the knowledge required to supervise the use and care of hearing protectors by subordinates?
2. Do supervisors wear hearing protectors in appropriate areas?
3. Have supervisors been counseled when employees resist wearing protectors or fail to show up for hearing tests?
4. Are disciplinary actions enforced when employees repeatedly refuse to wear hearing protectors?

*Much of this material has been adapted from D.C. Gasaway, "Evaluating and Fine-Tuning the Elements that Comprise a Program," Chapter 15 in Hearing Conservation: A Practical Manual and Guide. Prentice-Hall Inc.: Englewood Cliffs, N.J., 1985.

Noise Measurement

For noise measurements to be useful, they need to be related to noise exposure risks or the prioritization of noise control efforts, rather than merely filed away. In addition, the results need to be communicated to the appropriate personnel, especially when follow-up actions are required.

1. Were the essential/critical noise studies performed?
2. Was the purpose of each noise study clearly stated? Have noise-exposed employees been notified of their exposures and apprised of auditory risks?
3. Are the results routinely transmitted to supervisors and other key individuals?
4. Are results entered into health/medical records of noise exposed employees?
5. Are results entered into shop folders?
6. If noise maps exist, are they used by the proper staff?
7. Are noise measurement results considered when contemplating procurement of new equipment? Modifying the facility? Relocating employees?
8. Have there been changes in areas, equipment, or processes that have altered noise exposure? Have follow-up noise measurements been conducted?
9. Are appropriate steps taken to include (or exclude) employees in the HCP whose exposures have changed significantly?

Engineering and Administrative Controls

Controlling noise by engineering and administrative methods is often the most effective means of reducing or eliminating the hazard. In some cases engineering controls will remove requirements for other components of the program, such as audiometric testing and the use of hearing protectors.

1. Have noise control needs been prioritized?
2. Has the cost-effectiveness of various options been addressed?
3. Are employees and supervisors apprised of plans for noise control measures? Consulted on various approaches?
4. Will in-house resources or outside consultants perform the work?
5. Have employees and supervisors been counseled on the operation and maintenance of noise control devices?
6. Are noise control projects monitored to ensure timely completion?
7. Has the full potential for administrative controls been evaluated? Are noisy processes conducted during shifts with fewer employees? Do employees have sound-treated lunch or break areas?

Monitoring Audiometry and Record Keeping

The skills of audiometric technicians, the status of the audiometer, and the quality of audiometric test records are crucial to HCP success. Useful information may be ascertained from the audiometric records as well as from those who actually administer the tests.

1. Has the audiometric technician been adequately trained, certified, and recertified as necessary?
2. Do on-the-job observations of the technicians indicate that they perform a thorough and valid audiometric test, instruct and consult the employee effectively, and keep appropriate records?
3. Are records complete?
4. Are follow-up actions documented?
5. Are hearing threshold levels reasonably consistent from test to test? If not, are the reasons for inconsistencies investigated promptly?
6. Are the annual test results compared to baseline to identify the presence of an OSHA standard threshold shift?
7. Is the annual incidence of standard threshold shift greater than a few percent? If so, are problem areas pinpointed and remedial steps taken?
8. Are audiometric trends (deteriorations) being identified, both in individuals and in groups of employees?
9. Do records show that appropriate audiometer calibration procedures have been followed?
10. Is there documentation showing that the background sound levels in the audiometer room were low enough to permit valid testing?
11. Are the results of audiometric tests being communicated to supervisors and managers as well as to employees?
12. Has corrective action been taken if the rate of no-shows for audiometric test appointments is more than about 5%?
13. Are employees incurring STS notified in writing within at least 21 days?

Referrals

Referrals to outside sources for consultation or treatment are sometimes in order, but they can be an expensive element of the HCP, and should not be undertaken unnecessarily.

1. Are referral procedures clearly specified?
2. Have letters of agreement between the company and consulting physicians or audiologists been executed?

3. Have mechanisms been established to ensure that employees needing evaluation or treatment actually receive the service (i.e., transportation, scheduling, reminders)?
4. Are records properly transmitted to the physician or audiologist, and back to the company?
5. If medical treatment is recommended, does the employee understand the condition requiring treatment, the recommendation, and methods of obtaining such treatment?
6. Are employees being referred unnecessarily?

Hearing Protection Devices

When noise control measures are infeasible, or until such time as they are installed, hearing protection devices are the only way to prevent hazardous levels of noise from damaging the sensitive inner ear. Making sure that these devices are worn effectively requires continuing attention on the part of supervisors and program implementors as well as noise-exposed employees.

1. Have hearing protectors been made available to all employees whose daily average noise exposures are 85 dBA or above?
2. Are employees given a variety of protectors from which to choose?
3. Are employees fitted carefully with special attention to comfort?
4. Are employees thoroughly trained, not only initially but at least once a year?
5. Are the protectors checked regularly for wear or defects, and replaced immediately if necessary?
6. If employees use disposable hearing protectors, are replacements readily available?
7. Do employees understand the appropriate hygiene requirements?
8. Have any employees developed ear infections or irritations associated with the use of hearing protectors? Are there any employees who are unable to wear these devices because of medical conditions? Have these conditions been treated promptly?
9. Have alternative types of hearing protectors been considered when problems with current devices are experienced?
10. Do employees who incur noise-induced hearing loss receive intensive counseling?
11. Are those who fit and supervise the wearing of hearing protectors competent to deal with the many problems that can occur?

12. Do workers complain that protectors interfere with their ability to do their jobs? Do they interfere with spoken instructions or warning signals? Are these complaints followed promptly with counseling, noise control, or other measures?
13. Are employees encouraged to take their hearing protectors home if they engage in noisy non-occupational activities?
14. Are new types of protectors considered as they become available?
15. Is the effectiveness of the hearing protector program evaluated regularly?

Administrative

Keeping organized and current on administrative matters will help the program run smoothly.

1. Have there been any changes in federal or state regulations? Have HCP policies been modified to reflect these changes?
2. Are copies of company policies and guidelines regarding the HCP available in the offices that support the various program elements? Are those who implement the program elements aware of these policies?
3. Are necessary materials and supplies being ordered with a minimum of delay?
4. Are procurement officers overriding the HCP implementor's requests for specific hearing protectors or other hearing conservation equipment? If so, have corrective steps been taken?
5. Is the performance of key personnel evaluated periodically? If such performance is found to be less than acceptable, are steps taken to correct the situation?
6. Safety: Has the failure to hear warning shouts or alarms been tied to any accidents or injuries? If so, have remedial steps been taken?

APPENDIX C

AUDIOVISUAL MATERIALS

The following list of films, computer software and videotapes concerned with occupational noise and hearing conservation is arranged in alphabetical order by producer or distributor. It is an updated summary of information from several sources, including E.H. Berger's Appendix II: "Annotated Listing of Noise and Hearing Conservation Films and Videotapes" in E.H. Berger, W.D. Ward, J.C. Morrill, and L.H. Royster (Eds.) Noise and Hearing Conservation Manual, 4th ed., American Industrial Hygiene Assoc., Akron, OH, 1986. This list is current as of September, 1990.

This list does not contain ratings or annotations, and the presence or absence of any film or videotape does not reflect the endorsement or judgement of the National Institute for Occupational Safety and Health.

Bilsom International, Inc. (703) 834-1070
109 Carpenter Dr.
Sterling, VA 22170

"Nice to Hear" film - 10 min., or slide cassettes
"SOS" film - 14 min., or slide cassettes
Hearing Conservation Starter Package: "SOS", posters, handouts, leader's
guide for 50 people

BNA Communications (301) 948-0540
9439 Key West Ave.
Rockville, MD 20850

"Can You Hear Me?" film - 14 min.

Colorado Hearing and Speech Center (303) 322-1871
Industrial Division
4280 Hale Parkway
Denver, CO 80220

"Stick It In Your Ear" film or VHS - 15 min.

Consulting Audiological Associates (312) 804-0550
1915 N. Harlem Ave.
Chicago, IL 60635

"Industrial Hearing Conservation
Employee Education Program" VHS - 22 min.

Creative Media Development, Inc.
710 S.W. Ninth Ave.
Portland, OR 97205

(503) 223-6794

"Hear For A Lifetime" VHS, Beta, or U-matic - 16 min.

CRM Films
2233 Faraday Ave.
Suite F
Carlsbad, CA 92008

(800) 421-0833

"Death Be Not Loud" film or VHS

E-A-R Division, Cabot Corporation
7911 Zionsville Rd.
Indianapolis, IN 46268

(317) 872-6666

"The National Hearing Quiz" film, VHS, or U-matic - 28 min.
"Listen Up with Norm Crosby" film, VHS, or U-matic - 17 min.
"It's Up To You" film, VHS, or U-matic - 12 min.
"Less Than A Minute" film, VHS, or U-matic - 6 min.
"How To Use Expandable
Foam Earplugs" film, VHS, or U-matic - 6 min.

Educational Resources Foundation
5534 Bush River Rd.
Columbia, SC 29212

(800) 845-8822

"Noise? You're In Control" film, VHS, Beta, or U-matic - 14 min.

Encyclopedia Britannica Education Corp.
310 S. Michigan Ave.
Chicago, IL 60604

(312) 347-7000

"Ears and Hearing" film, VHS, Beta, or U-matic - 22 min.
"Noise Pollution,
the Environment" film, VHS, Beta, or U-matic - 16 min
"Protecting Your Ears" film, VHS, Beta, or U-matic - 12 min

Film Fair Communications
10621 Magnolia Blvd.
North Hollywood, CA 91601

(213) 877-3191

"Noise and Its Effects
on Health" film or VHS - 16 min.

Industrial Training Systems Corp.
9 East Stow Rd.
Marlton, NJ 08053

(609) 983-7300

"Noise Destroys" VHS - 12 min.
"Sound Advice" VHS - 17 min.
"Hear Today, Gone Tomorrow" VHS - 12 min.
"Mentor/Computer Assisted
Training" IBM-PC, 5-1/4" or 3-1/2" disks

International Film Bureau, Inc.
332 S. Michigan Ave.
Chicago, IL 60604

(312) 427-4545

"Listen While You Can" film - 21 min.
"Hearing Conservation" film - 22 min.
"Noise" film - 22 min.
"The Noise Was Deafening" film - 21 min.
"Protecting Your Hearing in
a Noisy World" VHS - 14 min.

International Medifilms
6720 N. Coldwater Canyon Ave.
North Hollywood, CA 91606

(818) 762-6220

"Hearing, The Forgotten Sense" film - 18 min.
"Hear: It Takes Two" film - 20 min.
"Ear Protection and Noise" film - 12 min.

Mine Safety Appliances Co.
P.O. Box 426
Pittsburgh, PA 15230

(412) 967-3000

"Now Hear This! How Hearing Conservation
Programs Can Work" VHS - 15 minutes

OSHA Office of Information
U.S. Department of Labor
Room N-3647
Washington, DC 20210

(202) 523-8345

"Industrial Noise" VHS or U-matic - 10 min.

TWA Video Productions
11500 Ambassador Dr.
Kansas City, MO 64153

(816) 464-6880

"Sound Thinking" VHS, Beta, or U-matic - 18 min.

University of Hartford
College of Engineering
200 Bloomfield Ave.
West Hartford, CT 06117
Attn: Dr. Robert Celmer

(203) 243-4446

"Quiet Please" film - 20 min.

University of Toronto
IMS Creative Communications
Faculty of Medicine
1 Kings College Circle
Toronto, Ontario, CANADA M5S 1A8

(416) 978-6302

"Let's Hear It" film, VHS, or U-matic - 28 min.

Willson Safety Products
P.O. Box 622
Reading, PA 19603

(215) 376-6161

"For Good Sound Reasons" film - 15 min.

Worker's Compensation Board of British Columbia
Hearing Conservation Unit
Box 5350
Vancouver, BC, CANADA V6B 5L5

(604) 276-3136

"Hearing Protection" VHS - 8 min.

APPENDIX D

SUGGESTED READING

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NIOSH. Compendium of Materials for Noise Control, NTIS Stock No. PB 298307. Pub. No. 80-116. National Institute for Occupational Safety and Health, Cincinnati, OH, 1980.

NIOSH. Industrial Noise Control Manual, Revised Ed., Pub. No. 79-117, NTIS Stock No. PB 297534. National Institute for Occupational Safety and Health, Cincinnati, OH, 1978.

Noise Control Engineering Journal, Institute of Noise Control Engineering, Poughkeepsie, NY, Bi-monthly.

OSHA. Noise Control, A Guide for Workers and Employers, Pub. No. 3048. U.S. Department of Labor/OSHA, Washington, D.C., 1980.

OSHA Noise Standard. Code of Federal Regulations, Title 29, Chapter XVII, Part 1910, Subpart G.

OSHA. "Occupational Noise Exposure; Hearing Conservation Amendment." Fed. Reg. 46:4078-4179, Jan. 16, 1981. (For explanatory preamble)

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APPENDIX E

RESOURCES

Government Agencies

NIOSH

Division of Standards Development and
Technology Transfer
National Institute for Occupational
Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226-1998
1-800-35-NIOSH
(356-4674)

Information about a wide range
of occupational health and safety
problems, and requests for health
hazard evaluations

OSHA

Office of Information and
Consumer Affairs
Occupational Safety and
Health Administration
U.S. Department of Labor
200 Constitution Ave. N.W.
Washington, DC 20210
(202)523-8151

Technical assistance with
occupational health and safety
problems, and for information
about complying with OSHA
regulations

Current lists of the On-Site
Consultation Project Directory
may be requested to obtain free
consultations.

OSHA Regional Offices

Region I - Boston (Connecticut, Maine, Massachusetts, New Hampshire,
Rhode Island, and Vermont)

U.S. Dept. Labor - OSHA
133 Portland St., 1st Floor
Boston, MA 02114
(617) 565-7164

Region II - New York City (New Jersey, New York, and Puerto Rico)

U.S. Dept. Labor - OSHA
201 Varick St., Room 670
New York, NY 10014
(212) 337-2325

Region III - Philadelphia (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia)

U.S. Dept. Labor - OSHA
Gateway Building, Suite 2100
3535 Market St.
Philadelphia, PA 19104
(215) 596-1201

Region IV - Atlanta (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee)

U.S. Dept. Labor - OSHA
1375 Peachtree St. N.E., Suite 587
Atlanta, GA 30367
(404) 347-3573

Region V - Chicago (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin)

U.S. Dept. Labor - OSHA
32nd Floor, Room 3244
230 So. Dearborn St.
Chicago, IL 60604
(312) 353-2220

Region VI - Dallas (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas)

U.S. Dept. Labor - OSHA
525 Griffin St., Room 602
Dallas, TX 75202
(214) 767-4731

Region VII - Kansas City (Iowa, Kansas, Missouri, and Nebraska)

U.S. Dept. Labor - OSHA
911 Walnut St., Room 406
Kansas City, MO 64106
(816) 426-5861

Region VIII - Denver (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming)

U.S. Dept. Labor - OSHA
Federal Bldg., Room 1576
1961 Stout St.
Denver, CO 80204
(303) 844-3061

Region IX - San Francisco (American Samoa, Arizona, California, Guam, Hawaii, Nevada, Trust Territory of the Pacific Islands)

U.S. Dept. Labor - OSHA
71 Stevenson St., 4th Floor
San Francisco, CA 94105
(415) 995-5672

Region X - Seattle (Alaska, Idaho, Oregon, and Washington)

U.S. Dept. Labor - OSHA
Federal Office Bldg., Room 6003
909 1st Ave.
Seattle, WA 98174
(206) 442-5930

Professional Associations

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| o American Industrial Hygiene Assoc.
475 Wolf Ledges Parkway
Akron, OH 44311-1087
(216)762-7294 | Books and manuals on occupational subjects, list of consultants in all areas of industrial hygiene, including noise |
| o American Speech-Language-Hearing Assoc.
10801 Rockville Pike
Rockville, MD 20852
(301)897-0135 | Information on the availability of audiologists who provide industrial audiology services |
| o Council for Accreditation in Occupational Hearing Conservation
66 Morris Avenue
Springfield, NJ 07081
(201)379-1100 | Information on certification programs for occupational hearing conservationists (technicians), and the availability of accredited training courses |
| o National Council of Acoustical Consultants
66 Morris Ave.
Springfield, NJ 07081
(201)379-1100 | Directory of acoustical consultants including specialists in noise control engineering |
| o National Hearing Conservation Association
900 Des Moines St., Suite 200
Des Moines, IA 50309
(515)266-2189 | Directory of hearing conservation service providers located throughout the nation |
| o National Safety Council
444 N. Michigan Ave.
Chicago, IL 60611
(312)527-4800 | Films and publications relating to noise control and hearing conservation, and for general safety and industrial hygiene information |

