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THE UNITED STATES AIR FORCE OCCUPATIONAL HEARING CONSERVATION PROGRAM

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The purpose of this paper is to provide an overview of the United States Air Force's (USAF) Hearing Conservation Program. Historically, the USAF published the first comprehensive regulation concerning occupational noise exposure in 1956. On 24 Oct 1974, the Occupational Safety and Health Administration, a division of the US Department of Labor, proposed an occupational noise requirement. From this proposal the United States Hearing Conservation Amendment was eventually approved and published on 21 August 1981.

To fully understand the consequences of noise-induced hearing loss, a basic understanding of the anatomy and physiology of the human auditory mechanism is necessary. The ear, consisting of outer, middle, and inner parts, is sensitive to frequencies of 20 to 20,000 Hz.

Routine exposure to high intensity noise, which often results in overall body fatigue, frequently produces a noise-induced hearing loss. This type of disorder usually results in a bilateral, sensorineural (nerve), predominantly high frequency, permanent, hearing loss. This disorder is slowly progressive and often does not result in subjective complaints by the individual until the more advanced stage. The person involved often complains of tinnitus (ringing in the ears) and an inability to understand speech even though spoken loudly. The hearing loss is most prominent at 4,000 Hz. Therefore, since ambient noise centers in the low frequencies, the inability to understand speech is particularly difficult when the affected person is in a noisy environment. Frequently, the degree of hearing loss on the audiogram (hearing test) is inconsistent with the degree of difficulty experienced by the hard-of-hearing person.

The employment of hard-of-hearing workers in areas characterized by high intensity noise has been discussed for decades. Individuals, military or civilian, can be disqualified for employment in hazardous noise areas if they are:

1. Found to be highly susceptible to noise-induced hearing loss.
2. Unable to wear hearing protection.
3. Found to have a severe/profound unilateral hearing loss.
4. Found to have a severe hearing loss and utilize a hearing aid.
5. Display extreme apprehension about working in hazardous noise.

Disposition of new, hard-of-hearing employees is made only after a thorough medical examination by a physician and an audiologist. A complete

history is taken at the time of examination to determine the individual's occupational safety habits. A chronic outer and/or middle ear infection characterized by a discharge, or a congenital or surgical deformity of the ear canal, may prevent the worker from successfully utilizing hearing protection. The requirement to use noise, to temporarily occupy the non-test ear in cases of unilateral hearing loss, can not be accomplished by a technician and must be administered carefully by an audiologist.

Extreme care must be taken with employees with severe hearing loss to insure that residual hearing sensitivity is not lost, thereby reducing the amount of benefit derived from a hearing aid.

The successful management of any occupational hearing conservation program depends greatly on the effectiveness of each member of the team. The team members consist of:

- Employee
- Supervisor
- Employer
- Program Manager
- Physician
- Safety Office
- Industrial Hygiene
- Lawyer
- Personnel
- Maintenance
- Union

The USAF Occupational Hearing Conservation Program consists of 9 elements:

1. Identify and Evaluate the Problem: To implement a successful program the noise must be adequately identified. The area, not just the noise source, must be evaluated by calibrated noise survey equipment (A-weighted scale). In addition to a sound level meter, a frequency analyzer, tape recorder, personal dosimeter, or impact noise recorder may be used. A recommendation to purchase new or relocate existing equipment may be made. A review of temporary and permanent hearing loss among the shop employees may also be accomplished.

2. Engineering/Administrative Controls: Once the problem has been defined, efforts should be undertaken to design out the noise in production then reduce or eliminate it at the source or pathway. Generally a high degree of costly expertise is required. Care must be taken not to compromise operation. Administrative controls can reduce risk by rotating shifts to limit the duration of exposure.

3. Post Areas, Label Equipment, Inform Employees: Standardized signs should be used. Employees must be informed in writing.

4. Provide Hearing Protection: Stringent inspections for the proper and routine use of hearing protection must be strictly enforced. The different types of hearing protection are: earplugs, earmuff, combination earplug/earmuff, custom earplugs, helmet, wax cotton, and headband. Each employee is given an opportunity to select the type of device he/she would prefer to use. The difficulties encountered in the use of hearing protection can be related to temperature, sabotage, cost, earmuff cushions and tension,

size, use with respirators, and most important comfort. Stereo radio or cassette headsets are not authorized for use in noise hazardous areas. Visitors to hazardous areas are provided earmuffs.

5. Occupational Health Education: By far the most important element in the USAF Hearing Conservation Program. Each required annual training session consists of information on:

- Identification of hazardous noise
- Noise in the workplace
- How the ear works
- How noise damages the ear
- The USAF Hearing Conservation Program
- Hearing protection
- Off duty noise exposure

6. Audiometric Monitoring: All hearing tests are administered by certified technicians following a case history and otoscopic examination. Referral to a USAF Audiology Diagnostic Center is made when significant threshold shifts are observed or the test results suggest the presence of non-organic behavior (faking a hearing loss). Standard Department of Defense forms are used. Following each examination, the employee is provided counseling and a pamphlet about the program. The following types of hearing tests are administered in support of the program:

- Reference Hearing Test: The employee must not have any active ear disease and have worked in a noise-free environment for at least 155 hours prior to the test. This test will be used as a baseline for subsequent examinations.
- 90 Day Follow-up: Is administered within three months of the reference hearing test and validates the reference. More importantly, it is used to identify hypersensitivity. During this test the examiner can insure that the hearing protection device is adequate and hopefully educate and motivate the worker.
- Annual Hearing Test: There is no noise-free period required before this examination. A temporary threshold shift would indicate a need for additional follow-up.
- 15 and 40 Hour Noise-Free Follow-up Examinations: When a threshold shift is observed on the annual examination, the worker is then scheduled for these additional hearing tests to validate and confirm the presence of permanent hearing loss.
- Detailed Follow-up Examinations: Occasionally a threshold shift is observed whereby a referral to an Audiology Diagnostic Center is not indicated. Therefore, the worker is scheduled for detailed follow-up examinations at three-month intervals. If a decrease in hearing is observed on any of these examinations a referral is made.
- Stringent Monitoring: The exposure levels of all workers can not always be determined. Therefore, workers considered to be hazardously exposed are monitored more frequently, especially when

individuals in their job specialty show a high incidence of hearing loss.
Termination Hearing Test: To set the legal bounds of liability, a hearing test is administered when an employee leaves the military or separates from Federal service.

7. Follow-up and Disposition: Following referral to one of the USAF Auditory Diagnostic Centers, an employee may be recommended for removal from further exposure to hazardous noise. Every attempt is then made to find suitable employment for this individual in a non-hazardous noise area.

8. Inspect for Compliance: Second only to education, this element of the program is most important. Frequent unannounced inspections of workers,, supervisors, signs, records, and hearing protection devices must be accomplished. Disciplinary actions for violations must be clearly defined.

9. Record Keeping and Reports: The following reports and test results are kept for 30 years beyond separation:

- Audometric findings
  - Test results, date and conditions, name, social security number, job location, examiner's name, certification number, audiometer serial number.
- Noise surveys
- Audiometer calibration (biologic and physical)
- Sound levels inside test booth
- ENT evaluations
- Administrative correspondence (removal from job)
- Group data (shop or job specialty)

In summary, although occupational hearing loss is one of the most common injuries in the workplace, the benefits of an effective hearing conservation program are significant. In addition to the obvious, the prevention of hearing loss, studies have shown a decrease in on-the-job injuries, emotional stress, and an improvement in worker-employer relationship. In successful hearing conservation programs, there is typically a reduction in the loss of trained, experienced employees and the cost of job related injury compensation. Furthermore, there is generally a decrease in absenteeism and an increase in productivity.