

Department of the Army  
Pamphlet 40-501

Medical Services

# Hearing Conservation Program

Headquarters  
Department of the Army  
Washington, DC  
10 December 1998

**UNCLASSIFIED**

# ***SUMMARY of CHANGE***

DA PAM 40-501  
Hearing Conservation Program

This revision --

- o Outlines procedures to meet the requirements of AR 40-5 and AR 385-10 (para 1-4).
- o Contains additional information about hearing loss and possible adverse affects on combat effectiveness and readiness (chap 2).
- o Requires consideration of ototoxic chemical (ear poison) exposures for program inclusion, particularly when in combination with marginal noise exposures (para 3-3).
- o Clarifies industrial hygiene roles to include providing a roster of names and social security numbers for noise-exposed individuals; providing the number of noise-exposed military and civilian personnel to the Hearing Conservation Program Manager; and maintaining a current inventory of all potentially hazardous noise areas and operations (chap 4).
- o Requires that the noise-exposed personnel roster be updated at least semiannually by the responsible authority who develops and/or has ready access to personnel rosters (chap 4).
- o Incorporates the requirement to use a 3-decibel time-intensity exchange rate for the 8-hour time-weighted average sound level (chaps 4 and 6).
- o Updates noise exposure criteria and time limits for using single- and double-hearing protection, based on the 3-decibel exchange rate (chap 6).
- o Requires that disposable earplugs or noise muffs be available at all noise-hazardous sites (chap 6).
- o Mandates the use of hearing protection attenuation data based on method B (subject fit) of American National Standards Institute Standard S12.6-1997 (para 6-2).
- o Mandates that all military personnel receive a reference audiogram at Basic Training prior to noise exposure (para 7-2).
- o Includes the implementation and use of the Defense Occupational Health Readiness System, formerly known as the Occupational Health Management Information System (chap 7).
- o Modifies acceptable background noise levels for hearing conservation audiometric test booths (table 7-1).
- o Eliminates the use of age corrections for all hearing test calculations (chap 7).

- o Includes the requirement to report Occupational Safety and Health Administration reportable hearing loss (para 7-7).
- o Requires that all Defense Occupational Health Readiness System-Hearing Conservation data be forwarded to the DOD-wide corporate database (para 7-8).
- o Enhances hearing conservation health education topics to also include the mandatory requirement to wear protective equipment; use of administrative actions for not wearing protective equipment; possible disqualification from duties if hearing loss occurs; and use of hearing protection during off-duty, noise-hazardous activities (para 8-1).
- o Expands command emphasis issues (para 9-1) and program effectiveness reporting requirements (para 10-3c).
- o Includes availability of forms prescribed by this pamphlet (app A, sec III).
- o Modifies significant threshold shift criteria with the addition of  $\pm 15$  decibels at 1000, 2000, 3000, or 4000 hertz, either ear. The 10 decibel average at 2000, 3000, and 4000 hertz, either ear, remains in effect (glossary, sec II).

---

Use of trademarked names does not imply endorsement by the U.S. Army, but is intended only to assist in identification of a specific product.

---

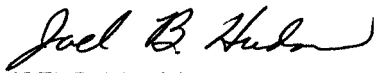
Medical Services

Hearing Conservation Program

By Order of the Secretary of the Army:

DENNIS J. REIMER  
General, United States Army  
Chief of Staff

Official:



JOEL B. HUDSON  
Administrative Assistant to the  
Secretary of the Army

**History.** This printing publishes a revision of this publication. Because the publication has

been extensively revised, the changed portions have not been highlighted.

**Summary.** This pamphlet updates the U.S. Army Hearing Conservation Program requirements prescribed by policy contained in Department of Defense Instruction 6055.12.

**Applicability.** This pamphlet applies to the Active Army, Army National Guard, and the U.S. Army Reserve.

**Proponent and exception authority.** The proponent for this pamphlet is The Surgeon General (TSG). TSG has the authority to approve exceptions to this pamphlet that are consistent with controlling law and regulation. TSG may delegate this authority in writing, to a division chief within the Office

of The Surgeon General in the grade of colonel or the civilian grade equivalent.

**Suggested Improvements.** Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to HQDA (DASG-HSZ), 5109 Leesburg Pike, Falls Church, VA 22041-3258.

**Distribution.** Distribution of this publication is made in accordance with the requirements on Initial Distribution Number (IDN) 095302, intended for command level C for the Active Army, the Army National Guard of the United States, and the U.S. Army Reserve.

**Contents** (Listed by paragraph and page number)

**Chapter 1**

**Introduction, page 1**

Purpose • 1-1, page 1

References • 1-2, page 1

Explanation of abbreviations and terms • 1-3, page 1

Implementing functions • 1-4, page 1

Technical assistance • 1-5, page 2

**Chapter 2**

**Hearing Loss, page 2**

Influencing factors • 2-1, page 2

Symptoms • 2-2, page 2

Ramifications • 2-3, page 3

Combat readiness effects • 2-4, page 3

**Chapter 3**

**Program Outline, page 3**

Conservation as a protective measure • 3-1, page 3

Elements • 3-2, page 3

Initiation • 3-3, page 3

Waiving requirements • 3-4, page 3

**Chapter 4**

**Noise Hazard Identification, page 4**

Survey frequency • 4-1, page 4

Survey equipment and calibration • 4-2, page 4

Noise survey personnel • 4-3, page 4

Determination of risk assessment codes • 4-4, page 4

Post-survey procedures • 4-5, page 4

Posting • 4-6, page 4

**Chapter 5**

**Engineering Controls, page 5**

Implementation • 5-1, page 5

Control measures for existing equipment and facilities • 5-2, page 5

Control measures for new equipment and facilities • 5-3, page 5

Follow-up • 5-4, page 5

**Chapter 6**

**Hearing Protectors, page 5**

Introduction • 6-1, page 5

Protector requirements • 6-2, page 5

Characteristics • 6-3, page 6

Requisition • 6-4, page 7

Special maintenance requirements • 6-5, page 7

**Chapter 7**

**Monitoring Audiometry, page 9**

Introduction • 7-1, page 9

Personnel testing requirements • 7-2, page 9

Testing equipment • 7-3, page 9

Testing method • 7-4, page 10

Diagnosis and referrals • 7-5, page 10

Notification procedures for significant threshold shift • 7-6, page 10

Reporting OSHA reportable hearing loss • 7-7, page 10

Recordkeeping • 7-8, page 10

**Chapter 8**

**Health Education, page 11**

Requirements • 8-1, page 11

Educational materials • 8-2, page 11

\*This pamphlet supersedes DA Pam 40-501, 27 August 1991.

## Contents—Continued

### Chapter 9

#### Enforcement, *page 11*

Command emphasis • 9-1, *page 11*

Performance standards • 9-2, *page 11*

Compliance measures • 9-3, *page 11*

Discipline • 9-4, *page 12*

### Chapter 10

#### Program Evaluation, *page 12*

Requirements • 10-1, *page 12*

External evaluations • 10-2, *page 12*

Internal evaluations • 10-3, *page 12*

#### Appendix A. References, *page 13*

#### Table List

Table 3-1: Airborne high-frequency or ultrasonic noise limits, *page 4*

Table 3-2: Potential ototoxic chemicals, *page 4*

Table 6-1: Hearing protectors<sup>1</sup>, *page 8*

Table 6-2: Daily steady-state noise exposure limits with earplugs and the Kevlar® helmet, *page 9*

Table 6-3: Daily steady-state noise exposure limits with double hearing protection, *page 9*

Table 6-4: Earcup seals and filler: Federal supply system replacement information, *page 9*

Table 6-5: Earcup seals—commercial replacement information for noise muffs and helmets, *page 9*

Table 7-1: Allowable background noise levels for hearing conservation audiometric test environments, *page 11*

#### Glossary

#### Index

## Chapter 1 Introduction

### 1-1. Purpose

This pamphlet provides guidance and requirements for implementing the U.S. Army Hearing Conservation Program (HCP) at all facilities controlled by the Department of the Army (DA), the U.S. Army National Guard, and the U.S. Army Reserve as established in AR 40-5, paragraph 5-16 and AR 385-10.

### 1-2. References

Required and related publications and prescribed and referenced forms used in this pamphlet are listed in appendix A.

### 1-3. Explanation of abbreviations and terms

Abbreviations and special terms used in this pamphlet are explained in the glossary.

### 1-4. Implementing functions

#### a. The installation commander—

(1) Meets the requirements of AR 40-5, paragraph 5-16, and AR 385-10.

(2) Issues a command emphasis letter (per AR 40-5, para 5-16) endorsing the installation's HCP.

(3) Includes hearing conservation (per AR 40-5, para 5-16) as an item of interest in the Command Inspection Program.

#### b. The installation medical authority (per AR 40-5, para 5-16)—

(1) Appoints an audiologist, where available, to act as the Hearing Conservation Program Manager (HCPM) and to be a member of the installation's Safety and Occupational Health Advisory Council. If an audiologist is unavailable, the installation medical authority designates an individual from the occupational medicine staff (see glossary) to act as the HCPM.

(2) Appoints an individual (per TB MED 503) to act as the Industrial Hygiene Program Manager (IHPM).

(3) Ensures maximum use of the Military Occupational Health Vehicle, where available, to conduct monitoring audiometry per AR 40-5.

(4) Ensures that a physician determines the diagnosis of noise-induced hearing loss. (See para 7-5a.)

(5) Notifies the immediate supervisor and civilian personnel officer of an individual who has sustained a permanent hearing loss which may endanger that individual and others.

(6) Maintains audiometric testing and noise exposure records. (See para 7-8.)

(7) Provides audiometric test records and noise exposure information on request. (See para 7-8.)

(8) Notifies appropriate personnel (individual and supervisor) of a positive significant threshold shift (STS).

(9) Reports Occupational Safety and Health Administration (OSHA) reportable hearing loss (RHL) for civilian personnel to the safety manager and the Occupational Health Program Manager (OHPM).

(10) Provides health education materials on request. (See chap 8.)

(11) Analyses audiometric data, exposure data, and job classifications to identify work areas and classifications associated with threshold shifts regardless of statistical significance level, and notifies appropriate personnel (supervisor, safety manager, and IHPM).

#### c. The flight surgeon—

(1) Monitor the fit and use of the SPH-4B and the HGU-56/P aviator helmets and inspects helmet conditions per AR 95-1. (See para 6-5c(1).)

(2) Must provide or coordinate hearing conservation education. The safety manager (per AR 385-10)—

(1) Inspects worksites to identify potential noise hazards and refers these potential hazards to the installation IHPM for evaluation. (See para *h* below.)

(2) Includes noise-hazard abatement projects in the installation hazard abatement plan.

(3) Monitors wearing/use of hearing protective devices in identified noise hazard areas and notifies the IHPM and employee/soldier supervisor of non-compliance with hearing protection requirement.

(4) Records OSHA RHL as occupational illness (repetitive trauma) or as a one time acoustic trauma on the OSHA log of injury and illness.

#### e. The civilian personnel officer—

(1) Ensures that OH is included on in- and out-processing checklists for new, transferring, or terminating personnel. This alerts the installation medical authority of audiometric evaluations required for these personnel.

(2) Coordinates with the IHPM to properly identify noise-hazardous positions for annotation on job descriptions. Ensures that appropriate job descriptions include the requirement to wear personal protective equipment, for example, hearing protectors and noise dosimeters when requested, and to report for scheduled medical surveillance.

(3) Informs the installation medical authority and safety manager of all workers' compensation claims for hearing loss.

#### f. The Director of Engineering and Housing/Public Works/Engineering and Logistics Operations—

(1) Erects and maintains noise hazard danger and caution signs (per AR 420-70 and the Safety Color Code Markings, Signs and Tags Information Guide).

(2) Implements, whenever feasible (per AR 40-5), acoustical engineering control measures when exposures to noise exceed the criteria of paragraphs 3-3a(1), (2) or (3).

g. The HCPM manages and coordinates all aspects of the HCP outlined in this pamphlet (per AR 40-5). These responsibilities include—

(1) Drafting and staffing an installation memorandum of instruction (MOI) detailing the HCP.

(2) Ensuring that medically trained personnel fit individuals with preformed earplugs, and then examine individuals at least annually to ensure proper earplug condition and fit. (See para 6-3a.)

(3) Requisitioning and maintaining a supply of preformed earplugs. (See para 6-4.)

(4) Providing a pair of preformed earplugs and earplug carrying case to all noise-exposed personnel. (See para 6-1c.)

(5) Ensuring that monitoring audiometry is performed using guidance provided in chapter 7 and U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Technical Guide (TG) 167A (or latest approved manual).

(6) Providing health education annually according to chapter 8.

(7) Conducting unannounced inspections of noise-hazardous areas. (See para 9-3c.)

(8) Reporting program participation, quality assurance, and program effectiveness/readiness measures. (See para 10-3.)

(9) Training unit Hearing Conservation Officers (HCOs) in their assigned duties.

#### h. The IHPM (per AR 40-5 and TB MED 503)—

(1) Surveys all known and suspected noise-hazardous areas and equipment and ototoxic exposures at least once and within 30 days of any change in operation using approved and calibrated equipment. (See para 4-1.)

(2) Performs an initial evaluation within 30 days of notification of potential noise-hazardous or ototoxic work sites identified by the safety manager per paragraph *d*(1) above.

(3) Establishes an 8-hour time-weighted average sound level (TWA) for all civilians working in noise-hazardous areas and soldiers working in noise-hazardous industrial operations by using guidance provided in USACHPPM TG 181.

(4) Maintains a current inventory of all noise-hazardous areas using DD Form 2214 (Noise Survey), DD Form 2214C (Noise Survey (Continuation Sheet)), and/or the Defense Occupational Health Readiness System-Hearing Conservation (DOHRS-HC). (See para 4-5a.)

(5) Provides, in writing, the names and social security numbers of noise-exposed and ototoxic-exposed personnel and the magnitude of their noise exposure to—

(a) The HCPM. (See para 4-5b(1).)

(b) The unit commander or supervisor of the individual. (See para 4-5b(4).)

(c) The OHPM.

(6) Establishes risk assessment codes (RACs) (per AR 385-10) and forwards noise survey results that indicate a violation to the designated safety and OH officials for inclusion on the violation inventory log.

(7) Establishes noise contours where appropriate and feasible and advises unit commanders and supervisors on how to properly post these contours.

(8) Notifies the civilian personnel officer of noise-hazardous and ototoxic areas for inclusion in job descriptions.

i. Unit commanders or supervisors of noise-exposed personnel (per AR 40-5)—

(1) Appoint a unit HCO to—

(a) Inspect helmets and noise muffs. (See paras 6-5c(1)(b) and 6-5d.)

(b) Requisition and ensure an adequate supply of hearing protectors, including helmets, noise muffs, and hand formed earplugs. (See para 6-4a.)

(2) Prepare a unit standing operating procedure detailing the HCP.

(3) Purchase new equipment that generates the lowest noise levels and ototoxic exposures feasible. (See chap 5.)

(4) Notify the HCPM of any suspected hazardous noise levels or changes in hazardous noise levels in work areas.

(5) Endorse the command emphasis letter highlighting the importance of hearing conservation.

(6) Provide appropriate hearing protectors, free of charge, to noise-exposed personnel per AR 385-10.

(7) Ensure that noise-exposed and ototoxic-exposed personnel under their supervision—

(a) Receive appropriate reference, 90-day periodic (at least annually), and follow-up hearing tests.

(b) Attend annual hearing conservation health education briefings.

(c) Follow recommendations from audiometric (hearing) examinations, medical evaluations, and noise/ototoxic surveys.

(d) Wear hearing protectors.

(e) Report for scheduled medical examinations.

(f) Are notified of their noise and ototoxic chemical exposure levels.

(g) Are allowed to choose from appropriate, approved hearing protectors.

(h) Report for termination hearing tests no later than 2 weeks prior to termination of employment.

(i) Wear noise and ototoxic chemical dosimeters when requested.

(8) Ensure that all soldiers and noise-exposed civilians under their supervision retain a pair of preformed earplugs and an earplug carrying case as an item of individual equipment.

(9) Require noise-exposed soldiers (per AR 670-1) to wear the earplug carrying case with earplugs as part of the battle dress uniform, when appropriate.

(10) Provide copies of regulations, technical bulletins, and other hearing conservation documents to employees or their representatives on request.

(11) Ensure that noise-hazardous areas, vehicles, and equipment are marked with proper danger and caution signs and decals. (See para 4-6a.)

(12) Post section 95, part 1910, title 29, Code of Federal Regulations (CFR) (29 CFR 1910.95). (See para 4-6b.) The standard is available through normal publication channels as DA Poster 40-501A (Occupational Noise Exposure Standard and Hearing Conservation Amendment).

(13) Monitor the use of engineering controls. (See chap 5.)

(14) Refer any personnel under their supervision to the military treatment facility for any hearing problems or complaints associated with wearing hearing protectors.

(15) Initiate disciplinary action when appropriate.

(16) Ensure (per AR 385-10), when applicable, that the following

procedures are included in military and civilian supervisors' performance standards/support forms where applicable, to—

(a) Enforce the use of personal protective equipment.

(b) Ensure that employees report for scheduled medical examinations per paragraph 9-2.

j. Noise-exposed personnel (per AR 40-5)—

(1) Correctly wear approved and properly fitted hearing protectors when exposed to hazardous noise. (See para 6-2.)

(2) Report for all scheduled hearing conservation medical examinations and health education briefings.

(3) Report any hearing or hearing protector problems to their supervisor.

(4) Maintain hearing protectors in a sanitary and serviceable condition. (See para 6-5.)

(5) Wear noise and ototoxic chemical dosimeters to evaluate exposure, when requested.

(6) Keep hearing protection readily available at the job site.

## 1-5. Technical assistance

a. The USACHPPM's HCP provides technical assistance in the following areas:

(1) Noise abatement and acoustical engineering consultations.

(2) HCP support and consultations.

(3) DOHRS-HC support.

(4) Hearing conservation training.

(5) Program data profiles.

(6) Health hazard assessments of new materiel.

(7) Telephonic consultations.

(8) Health education materials.

(9) Marketing strategies.

(10) Professional committee representation.

b. Technical assistance may be obtained by—

(1) Writing through command channels to Commander, USACHPPM, 5158 Blackhawk Road, ATTN: MCHB-TS-CHC, Aberdeen Proving Ground, MD 21010-5403.

(2) Sending electronic mail to the following address: "#hearing.conservation.prog@amedd.army.mil".

## Chapter 2 Hearing Loss

### 2-1. Influencing factors

High-intensity noise PERMANENTLY injures the hearing mechanism. The effects of steady-state and impulse noise on hearing vary among individuals.

a. Steady-state noise effects depend on—

(1) Frequency and intensity.

(2) Intermittent or continuous exposure.

(3) Exposure duration.

(4) Individual susceptibility.

b. Impulse noise effects depend on—

(1) Peak pressure.

(2) Duration of individual impulses.

(3) Number of impulses per exposure period.

(4) Frequency content.

(5) Angle of incidence.

(6) Rise time of impulse.

(7) Individual susceptibility.

### 2-2. Symptoms

a. Individuals with a noise-induced hearing loss may be unaware of the loss and may not have any communication problems when in quiet listening situations. However, in noisy environments such as combat, hearing becomes significantly more difficult and can adversely impact communication and mission readiness. The early stage of noise-induced hearing loss is characterized by reduced hearing sensitivity at frequencies above 2000 Hertz (Hz). Other symptoms may include—

(1) Tinnitus (a ringing sensation).

- (2) Temporary muffling of sound after exposure to noise.
- (3) Sensation of fullness in the ear(s).
- (4) Increased stress and fatigue.

b. Continued, unprotected exposures to hazardous noise can produce a marked loss in the ability to communicate. This is caused by hearing loss that will progress into the middle and lower frequencies.

c. Individuals with a high-frequency noise-induced hearing loss may complain that although they hear people talk, they cannot always understand what is being said.

### 2-3. Ramifications

a. Noise is one of the most common health hazards soldiers and civilians face in the workplace and during training. The most dangerous occupational and recreational noise is from firing weapons.

b. Exposure to high-intensity noise may cause hearing loss that can adversely affect combat effectiveness and soldier readiness. Noise-induced hearing loss is—

- (1) Painless.
- (2) Progressive.
- (3) Permanent.
- (4) Preventable (in most instances).

(5) One of the most prevalent OH impairments for soldiers and civilians who work for the military.

(6) A compensable disability.

c. For military personnel, AR 40-501, AR 611-101, and AR 611-201 prescribe the relationship between hearing requirements and functional capability. For DA civilian employees, loss of hearing is not in and of itself a contraindication for assignment to noise-hazardous work provided they are protected against further hearing impairment.

### 2-4. Combat readiness effects

The following anecdotes demonstrate the importance of hearing in offensive and defensive missions.

a. In offensive operations, hearing is necessary to perform the following:

(1) *Localizing snipers.* Enemy snipers can be located by weapon report in the absence of observed muzzle flashes.

(2) *Locating patrol members as part of situational awareness.* When on night patrol, especially during a new moon, patrol members are often guided more by sound than by vision.

(3) *Determining the position, number, and type of friendly and enemy vehicles.* Soldiers are able to tell the difference between threat and friendly armor (mechanized vehicles). Additionally, determining the number and location of enemy vehicles is critical to the successful completion of the mission.

(4) *Determining types of booby traps.* There are different sounds generated from various types of trip wires. The sound generated from a trip wire pulling the pin from a grenade is different from the sound of a pressure-activated explosive. In the instance of the grenade, quick movement away from the area is required. In the case of the pressure-activated device, the soldier must maintain pressure on the trip wire, until the explosive is deactivated.

b. In defensive positions, the soldier may need to—

(1) Hear the activation of perimeter alarms where movement activates remote sensing devices and sounds an alarm.

(2) Hear enemy movement through leaves, grass, and twigs. Experts have long recognized that the high-frequency nature of these sounds requires relatively normal hearing to detect them.

c. For both offensive and defensive missions, good hearing is essential and required to—

(1) Determine enemy location from the sounds of wildlife, loading cartridges, removing safety locks, and clipping barbed wire. The proximity of the enemy can be determined by the cessation of bird calls in the upper canopy of the jungle. The presence of birds in the lower canopy may mean that human refuse from the enemy is nearby.

(2) Hear radio messages and verbal orders. Most military radios clip both high- and low-frequency sounds. A soldier with a hearing

loss has more difficulty communicating on the radio and can confuse similar sounding verbal orders, such as digits in a grid coordinate.

(3) Aid in small arms accuracy and weapon identification. Soldiers on pistol and rifle teams are aware of the advantage of wearing hearing protection while firing small arms. Wearing hearing protection increases accuracy by reducing the tendency to flinch at the impact of the weapon. Good hearing can help with successful weapon identification. (For example, soldiers need to be able to discriminate the difference in sound between the M16 and the AK47 rifle.)

## Chapter 3 Program Outline

### 3-1. Conservation as a protective measure

The U.S. Army HCP protects the employee from hearing loss due to occupational noise exposure.

### 3-2. Elements

The essential elements of an HCP include—

- a. Noise hazard identification (chap 4).
- b. Engineering controls (chap 5).
- c. Hearing protectors (chap 6).
- d. Monitoring audiometry (chap 7).
- e. Health education (chap 8).
- f. Enforcement (chap 9).
- g. Program evaluation (chap 10).

### 3-3. Initiation

a. Personnel will be enrolled in a comprehensive HCP when they are exposed to—

(1) Steady-state noise with a TWA of 85 A-weighted decibels (dBA) or greater. (This criterion applies only to energy in the audible range up to 16000 Hz).

(2) Impulse noise of 140 decibels, peak measurement (dBP) or greater.

(3) Airborne high-frequency or ultrasonic noise, regardless of duration, in any of the one-third octave bands exceeding the corresponding value listed in table 3-1.

(4) Known or suspected ototoxins.

b. Excessive exposures to a workplace ototoxin (ear poison) can on its own result in hearing loss. See table 3-2 for the potential ototoxic chemicals. In combination with noise exposure, even marginal noise exposures, ototoxins can have a synergetic impact on hearing, producing more damage than a higher exposure to either hazard. Activities where noise and ototoxins often combine include, but are not limited to—

- (1) Painting.
- (2) Printing.
- (3) Boat building.
- (4) Construction.
- (5) Furniture making.
- (6) Manufacturing of metal, leather, and petroleum products.

### 3-4. Waiving requirements

a. Implementation of all available hearing conservation measures is not necessary in certain circumstances. For example—

(1) Visitors in noise-hazardous areas must wear hearing protectors, but they do not need monitoring audiometry.

(2) In certain situations, noise levels rise infrequently and unpredictably to 85 dBA or greater for very short durations (for example, aircraft fly-overs). In this situation, hearing protectors may be impractical and unnecessary.

b. Before waiving any program requirements, the installation medical authority—

- (1) Performs a thorough noise-hazard evaluation of the area.



(2) Considers all factors that may potentially cause hearing impairment.

**Table 3-1**  
**Airborne high-frequency or ultrasonic noise limits**

One-third octave band center frequency, kilohertz (kHz)	One-third octave band level in decibels (dB)
10	80
12.5	80
16	80
20	105
25	110
31.5	115
40	115
50	115

**Table 3-2**  
**Potential ototoxic chemicals**

Arsenic  
Carbon disulfide  
Carbon monoxide\*  
Cyanide  
Lead and derivatives  
Manganese  
Mercury and derivatives  
N-hexane  
Stoddard solvent  
Styrene\*  
Trichlorethylene\*  
Toluene\*  
Xylene\*

Notes:

\*High-priority ototoxins

## Chapter 4 Noise Hazard Identification

### 4-1. Survey frequency

As part of the Industrial Hygiene (IH) Program, the IHPM—

*a.* Conducts noise surveys of all suspected noise-hazardous areas, vehicles, and equipment at least once and within 30 days of any change in operations.

*b.* Determines the TWA for all Department of Defense (DOD) civilian employees routinely working in hazardous noise areas and military personnel working in hazardous noise industrial-type operations at least once and within 30 days of any change in operations affecting noise levels.

*c.* Visits each potentially noise-hazardous area at least once a year to fulfill requirements of AR 385-10, chapter 4.

### 4-2. Survey equipment and calibration

*a.* To survey steady-state noise, use a sound level meter that meets or exceeds the requirements for a Type 2 sound level meter per American National Standards Institute (ANSI) Standard S1.4-1983 and S1.4A-1985 Amendment (or latest approved standard). (See app A for details on how to obtain copies of ANSI publications.)

*b.* Determine the TWA using guidance provided in USACHPPM TG 181. When measuring the TWA, use a noise dosimeter with the capability of measuring dBA slow response and of integrating all sound levels from 80 to 130 dB using a 3-dB time-intensity exchange rate. Dosimeters must meet or exceed specifications in the latest approved ANSI Standard S1.25-1991.

*c.* To survey impulse noise, use a sound level meter that meets or

exceeds specifications in ANSI Standard S1.4-1983 and S1.4A-1985 Amendment (or latest approved standard) and has—

(1) A peak-hold circuit.

(2) A rise time not exceeding 35 microseconds.

(3) The capability of measuring peak sound pressure levels (SPLs) exceeding 140 dBP.

*d.* The equipment necessary to survey airborne high-frequency and ultrasonic noise is not usually available at installations. For this type of support, request technical assistance per paragraph 1-6.

*e.* To evaluate noise for engineering controls or for detailed hearing protector studies, use an octave band analyzer. For this type of measurement, request technical assistance per paragraph 1-6.

*f.* Use only the acoustic calibrator recommended by the noise dosimeter or sound level meter manufacturer to verify before-and-after calibrations (within plus or minus 1 dB) of the sound level meter or dosimeter on the day measurements are taken.

*g.* The sound level meter, noise dosimeter, and the acoustic calibrator must receive an annual comprehensive calibration including checks of frequency response, internal noise, meter circuits, microphone and amplifier sensitivity. Submit calibration requirements on a DA Form 3758-R (Calibration and Repair Requirements Worksheet) to the medical equipment calibration coordinator.

### 4-3. Noise survey personnel

Only personnel trained in the use of noise measurement equipment may perform noise surveys. Guidance for performing noise surveys is provided in USACHPPM TG 181.

### 4-4. Determination of risk assessment codes

*a.* Trained U.S. Army Medical Department (AMEDD) personnel shall assign a RAC to all potentially hazardous noise areas and operations.

*b.* The risk of each individual hazard in an operation, including noise, must be considered. USACHPPM TG 181 contains the procedures for assigning RACs to operations. The RACs are used as part of the installation hazard abatement plan.

### 4-5. Post-survey procedures

*a.* Evaluators must use the DOHRS-HC and/or the DD Form 2214 and DD Form 2214C to identify hazardous noise survey results.

*b.* The IHPM—

(1) Notifies the HCPM about survey results and provides a roster of individuals who are exposed to hazardous noise by name and complete social security number.

(2) Provides the HCPM with the number of noise-exposed military and civilian personnel for the specific calendar year at least once a year. This is required to determine HCP participation and is reported to the DOD.

(3) Provides information copies of IHPM survey results to the unit HCO and installation safety manager.

(4) Notifies the unit commander or supervisor, in writing, about the—

(*a.*) Magnitude of noise exposure based on a TWA for civilian employees working in noise-hazardous areas and for soldiers working in noise-hazardous industrial operations.

(*b.*) Results of noise hazard evaluations for subsequent notification to employees.

(*c.*) Compliance with hearing conservation requirements including use of hearing protection.

(5) Maintains a current inventory of all potentially hazardous noise areas and operations to include, minimally, noise levels, RACs, and the types of control measures used.

*c.* The responsible authority who develops and/or has ready access to personnel rosters (for example, the IHPM or supervisors and unit commanders) must update the noise-exposed personnel roster at least semiannually.

### 4-6. Posting

*a.* The unit commander or supervisor ensures that danger and caution signs and decals comply with the color-coding and size

specifications in the Safety Color Code Markings, Signs and Tags Information Guide. (See app A.)

(1) *Signs.* Although the Director of Engineering and Housing erects and maintains signs per AR 420–70, the unit commander or supervisor ensures that DANGER or CAUTION signs are positioned at entrances and on the periphery of potentially noise-hazardous areas, where they are most visible.

(2) *Decals.* The unit commander or supervisor ensures that decals are attached to potentially noise-hazardous equipment and vehicles according to the Safety Color Code Markings, Signs and Tags Information Guide.

*b.* The unit commander or supervisor posts 29 CFR 1910.95 in all industrial, noise-hazardous areas. The standard is available through normal publication channels as DA Poster 40–501A. Modification or local reproduction of DA Poster 40–501A is not allowed.

*c.* The IHPM ensures applicable 85 dBA and 140 dBP noise contours are established and advises the unit commander or supervisor where to locate contour signs.

## Chapter 5 Engineering Controls

### 5–1. Implementation

*a.* The most desirable hearing conservation measure is reducing noise levels at their source and eliminating harmful health effects. Implementation is generally feasible, if technologically and operationally practicable and cost effective.

*b.* In some instances, the implementation of engineering controls requires funding which is rank ordered on the installation hazard abatement plan per AR 385–10 and TB MED 503. In other instances, simple maintenance of the equipment, vehicles, or facilities will eliminate or control the hazard.

### 5–2. Control measures for existing equipment and facilities

Use engineering controls, whenever feasible, to reduce steady-state noise levels below 85 dBA and impulse noise levels below 140 dBP. If these levels cannot be met, then reduce noise to the maximum extent possible. The industrial hygienist, after consulting with an acoustical engineer (if appropriate), may recommend the following noise-control measures:

- a.* Maintain equipment by—
- (1) Replacing or adjusting worn, loose, or unbalanced machine parts.
  - (2) Correctly lubricating machine parts.
  - (3) Shaping and sharpening cutting tools.
- b.* Substitute machines by replacing—
- (1) Smaller, faster machines with larger, slower ones.
  - (2) Single operation dies with step dies.
  - (3) Hammers with presses.
  - (4) Square shears with rotating shears.
- c.* Substitute processes by replacing—
- (1) Impact riveting with compression riveting.
  - (2) Riveting with welding.
  - (3) Cold working with hot working.
  - (4) Rolling or forging with pressing.
- d.* Control vibration and impact by—
- (1) Using suitable vibration isolation.
  - (2) Avoiding resonant frequencies.
  - (3) Varying mass.
  - (4) Varying stiffness.
  - (5) Increasing damping.
  - (6) Reducing the driving force on vibrating surfaces.
  - (7) Reducing the area of the vibrating surface.
- e.* Reduce sound transmission through solids by using—
- (1) Flexible (vibration isolation) mountings.
  - (2) Flexible sections in pipe runs or ducts.
  - (3) Flexible shaft couplings.

(4) Resilient flooring.

*f.* Reduce sound produced by air or gas flow by—

- (1) Using intake and exhaust mufflers.
  - (2) Designing fan blades to reduce turbulence.
  - (3) Substituting smaller high-speed fans with larger low-speed fans.
- g.* Isolate noise sources by—
- (1) Enclosing individual machines.
  - (2) Using baffles.
  - (3) Confining high-noise machines to sound-treated rooms.
- h.* Isolate the operator by providing a sound-treated booth.
- i.* Use electronic noise cancellation technology.

### 5–3. Control measures for new equipment and facilities

*a.* Specifications for all new facilities, vehicles, equipment, substantial modification projects, weapon systems, and subsystems should include acoustics. The objective shall be to ensure, if possible, a steady-state level less than 85 dBA at all personnel locations during normal operations.

*b.* Procuring new equipment, vehicles, or facilities offers the ideal opportunity to implement noise controls. The tactically quiet generator (TQG) program represents one of the most successful applications of this approach. The TQG and detailed specifications can be ordered by accessing the world-wide web at <http://www.pmmep.org>. Safe noise limits can be inserted into both the mission need statement and into equipment specifications as a performance requirement. The following paragraph may be used in the procurement document. “The noise level at the operator’s head position shall not exceed 80 dBA when the equipment is operating in its noisiest operating mode. Noise measurements made to demonstrate compliance with this specification shall be made with the equipment installed on a hard, acoustically reflective surface. (*Note:* If known, specify the exact location of the operator’s head position.)”

*c.* Meeting the above noise limits may be beyond the state-of-the-art for the type of equipment or vehicle being procured, but this is usually not known until after contractors bid. In such cases, the lowest noise levels must be accepted, even if above 80 or 85 dBA. However, inserting noise limits in the procurement specifications increases the probability of receiving quieter equipment and vehicles.

### 5–4. Follow-up

The IHPM evaluates the results of the engineering controls.

## Chapter 6 Hearing Protectors

### 6–1. Introduction

*a.* All personnel working in, or visiting, potentially noise-hazardous areas must have hearing protectors with them at all times.

*b.* Hearing protectors consist of earplugs, noise muffs, ear canal caps, noise-attenuating helmets, or a combination of these. The Surgeon General (TSG) has approved the hearing protectors listed in table 6–1 for use by DA personnel. Personnel may select the type of protector they desire, unless their selection is medically contraindicated or inappropriate for a particular noise-hazardous environment.

*c.* Hearing protectors are issued at no charge to all personnel working in potentially noise-hazardous areas. An earplug carrying case (national stock number 6515–01–100–1674) must also be provided at no charge with each set of preformed earplugs. This case can also be used for hand-formed earplugs.

### 6–2. Protector requirements

*a.* *Civilians and soldiers working in or visiting industrial-type operations.*

(1) For steady-state noise levels of—

(a) 85 dBA, regardless of duration, to TWA of 103 dBA, personnel must wear single hearing protection. The requirement to wear hearing protectors may be waived only if the TWA is well below 85

dBa (for example, 82 dBA TWA) or the uniform requirement to wear single hearing protectors in an area does not enhance the HCP objectives. Refer to paragraph 3-4 for more detailed waiver considerations.

(b) Greater than 103 dBA TWA and up to and including 108 dBA TWA, personnel must wear double hearing protection. (See para 6-2c for further guidance.)

(c) Greater than 108 dBA TWA, exposure is not permitted. Administrative controls, such as limiting noise exposure time, must be used. Exception: The 108 dBA TWA limit may be increased if indicated through the calculation of the effectiveness of the specific hearing protector and the particular noise environment using OSHA-approved calculation methods. Attenuation data based on method B (subject fit) of ANSI S12.6-1997 will be used to evaluate the potential effectiveness of hearing protectors. Request technical assistance per paragraph 1-5.

(2) For impulse noise levels, follow the requirements of (1)(c) above.

*b. Military-unique equipment.*

(1) Through the DA health hazard assessment (HHA) program per AR 40-10, TSG evaluates military-unique equipment, such as tactical items and weapons entering the inventory.

(2) Hearing protection requirements for these items use a more precise and less conservative set of guidelines and are defined as part of the HHA for the item. The applicable user's documents, such as TGs, should contain these requirements and may differ from the requirements in this paragraph.

*c. Soldiers in training, noncombat or nonindustrial scenarios.*

(1) For steady-state noise levels, use the hearing protection recommendations defined as part of the HHA process discussed in *b* above, where available. If the HHA analyses are not available, use the hearing protection requirements of *a* above as general guidance. Since there is no requirement to perform noise dosimetry on soldiers engaged in military activities, TWA data will probably be unavailable. The following guidance, which is not time-weighted dBA noise levels, may be used.

(a) Greater than or equal to 85 dBA, but less than or equal to 103 dBA, personnel must wear single protection.

(b) Greater than 103 dBA, but less than or equal to 108 dBA, personnel must wear earplugs and noise muffs or noise attenuating helmets in combination (that is, double hearing protection). Exception: If the operation requires the Kevlar® infantryman's helmet and compatible noise muffs are not available, personnel must wear earplugs and comply with the time limits for daily noise exposure in table 6-2.

(c) Greater than 108 dBA, but less than or equal to 129 dBA, personnel must wear double hearing protection and comply with the time limits on daily exposure in table 6-3.

(d) Greater than 129 dBA, TSG must approve exposure.

(2) For impulse noise levels, the hearing protection requirements are weapon-specific and are established through the HHA process. The following guidelines should be used for situations where the weapon-specific evaluation has not been made or for non-weapon impulse noise:

(a) Less than 140 dBP, personnel may wear hearing protectors if desired.

(b) 140 to 165 dBP, personnel must wear hearing protection.

(c) Greater than 165 dBP, but less than or equal to curve Z per MIL-STD 1474D, requirement four, figure 4-1, personnel must wear earplugs in combination with noise muffs or a noise-attenuating helmet.

(d) Greater than curve Z, TSG must approve exposure.

*d. Combat scenarios.* In combat, soldiers—

(1) Should wear hearing protectors, especially when firing weapons or riding in noisy vehicles or aircraft. Hearing protectors improve readiness and prevent permanent and temporary threshold shifts which impair the ability to communicate and detect quiet or low level combat sounds.

(2) Should NOT wear hearing protectors when they impair necessary hearing, for example, with dismantled infantry operations.

### 6-3. Characteristics

*a. Earplugs.*

(1) Preformed earplugs are triple- or single-flange earplugs. Medically trained personnel must fit and examine these earplugs at least annually to ensure proper fit and condition.

(a) Triple-flange earplugs are usually the first type of earplug that medically trained personnel attempt to fit. If these do not fit properly, the individual must be fitted with another type of earplug.

(b) Single-flange earplugs take more time to fit but are useful for difficult-to-fit cases, such as crooked or exceptionally small or large ear canals.

(2) Approved hand-formed earplugs are made of polyvinyl foam. These earplugs do not require medical fitting and are disposable. If cleaned regularly, foam earplugs can be used until they become discolored or disfigured. DO NOT use foam earplugs if hazardous materials, such as solvents or grease, can be transferred from the hand to the ear via the earplug.

(3) Employees may use custom earplugs ONLY if they cannot be properly fitted with approved hearing protectors or if a custom device is required for special circumstances. Only audiologists, ear-nose-and-throat specialists, or AMEDD-credential personnel may take impressions of the ear. Medically trained personnel must examine the fit and condition of custom earplugs at least annually.

(4) The Army shall provide preformed or custom-molded musicians' earplugs to Army band members. Medically trained personnel must examine the fit and condition of the musician's earplugs at least annually. Band unit funds will be used to purchase musician's earplugs.

*b. Ear canal caps.* Ear canal caps are only appropriate for short or intermittent exposures where noise levels are 95 dBA or less. Ear canal caps are not as effective in attenuating noise as earplugs or noise muffs.

*c. Noise muffs.* In some situations, using noise muffs is impractical. Noise muffs are incompatible with certain types of required headgear and are unsatisfactory in warm temperatures or limited space areas where earplugs or ear canal caps are preferred. To be effective, noise muffs must be worn with—

(1) The headband adjusted for a snug fit.

(2) A crown strap, if provided with Type II noise muffs when the headband is worn in back of the head or under the chin.

(3) Earcup seals that fit snugly around eyeglass temples. Even small leaks will permit noise to enter the ear canal.

(4) The proper foam lining in place. (Do not remove or add foam or cotton to the linings of noise muffs, even when cleaning. This will change the attenuation characteristics of the noise muff.)

*d. Helmets.* Aviator helmets (SPH-4B or HGU-56/P and the combat vehicle crewman (CVC) helmet (DH-132 or the vehicular intercommunication system CVC) will provide head protection and maximum noise attenuation when—

(1) Fitted correctly.

(2) Worn with securely fastened chin straps.

(3) Worn with properly maintained earcup seals and chin straps.

*e. Earcup seals and acoustic filler.* Noise muffs, headsets, and noise-attenuating helmets in the Federal supply system may be equipped with an additional set of earcup seals. Replace earcup seals in hearing protectors when torn, punctured, or hardened (from age or perspiration) to maintain a comfortable fit and adequate noise attenuation. Some manufacturers also allow the acoustic filler in their noise muffs to be replaced once the filler starts to degrade. This is determined by visual and tactile observation. If the foam starts to crumble or tear when rubbed, it should be replaced. Replacing the acoustic filler is needed to maintain adequate noise attenuation. If the filler cannot be replaced, then new noise muffs are required. See tables 6-4 and 6-5 for replacement information.

*f. Other.* Do NOT use hearing aids (either vented or in the "on" mode) and noise muffs with built-in radios designed for recreational listening in place of, or with, approved hearing protectors. The potential for increased hearing loss exists under these conditions.

Sound levels from radio headphones pose potential auditory and safety hazards.

#### **6-4. Requisition**

*a. The unit HCO—*

(1) Requisitions hearing protectors from the HCPM within the installation using the information given in table 6-1. Requisition only those hearing protectors described in the publications listed in the footnotes to table 6-1.

(2) Must maintain an adequate supply of hand-formed (foam) earplugs for visitors not possessing preformed earplugs.

(3) May obtain noise muffs through commercial sources as well as through the Federal supply system.

*b. The installation HCPM must maintain a supply of all three sizes of triple-flange earplugs and all five sizes of single-flange earplugs at sites with personnel trained in their fit and use. All other facilities identified as noise hazardous shall requisition disposable earplugs and/or noise muffs.*

#### **6-5. Special maintenance requirements**

The following are specific requirements for the care and use of hearing protectors:

*a. Preformed earplugs.*

(1) Clean with a mild soap, rinse thoroughly, and dry before returning to the earplug carrying case.

(2) Do NOT alter the earplugs in any manner.

*b. Hand-formed earplugs.*

(1) Always wash hands with soap and water before inserting plugs in ears.

(2) Do NOT alter the earplugs. For example, cutting them in half decreases the amount of noise reduction provided to the wearer.

*c. Helmets.*

(1) SPH-4B and HGU-56/P aviator helmets:

(a) The flight surgeon monitors for fit and use according to AR 95-1.

(b) The unit HCO must inspect semiannually to determine whether the helmets, including earcup seals and chin straps, need to be serviced and must replace unserviceable seals.

(2) CVC helmets:

(a) The unit HCO must fit and inspect semiannually to determine whether the helmets, including earcup seals and chin straps, need to be serviced and must replace unserviceable seals.

(b) These helmets are items of individual issue.

*d. Noise muffs.* The unit HCO inspects the condition of noise muffs, including earcup seals and foam lining, semiannually to—

(1) Determine whether the noise muffs need to be serviced.

(2) Replace unserviceable seals.

**Table 6-1  
Hearing protectors<sup>1</sup>**

Type of protector	Requisition publication <sup>2</sup>	Nomenclature	National stock number	Available sizes/models
Single-flange earplugs <sup>3</sup>	A and B	Earplug, hearing protection, single-flange, 24s	6515-00-442-4765 6515-00-467-0085 6515-00-467-0089 6515-00-442-4807 6515-00-442-4813	extra small (white) small (green) medium (orange) large (blue) extra large (red)
Triple-flange earplugs <sup>3</sup>	A and B	Earplug, hearing protection, triple-flange, 24s	6515-00-442-4821 6515-00-442-4818 6515-00-467-0092	small (green) medium (orange) large (blue)
Foam earplugs	A and B	Earplug, hearing protection, yellow/white, 400s	6515-00-137-6345	
Ear canal caps	A and B	Ear canal caps, hearing protection	6515-00-392-0726 6515-01-149-4133 6515-01-059-1821	Willson Model 10™ Aearo Co. Model™ Willson Model 20™ <sup>4</sup>
Noise muffs	A	Aural protector, sound Type II	4240-00-022-2946	
Headsets	A	Noise attenuating headset/microphone	5965-00-168-9624	
		Communications aural protective system (CAPS) with passive noise reduction (PNR)	5965-01-388-4139	
		CAPS without microphone, with PNR/active noise reduction	5965-01-385-7811	
		CAPS with microphone, with PNR	5965-01-385-7813	
		Artillery communications aural protective system (ACAPS) with PNR/active noise reduction	5965-01-388-4155	
		ACAPS, Type A, (no connection to intercom), PNR	5965-01-388-4136	
		ACAPS, Type B, PNR	5965-01-388-4181	
		Commercial grade headset	5965-01-387-1950	
Helmets	A	Helmet, flyer's, crash type (SPH-4B)	8415-01-308-5359 8415-01-308-5360	regular extra large
		Helmet, combat vehicle crewman's (CVC) (DH-132) helmet	8415-00-094-2679 8415-00-094-2691 8415-00-094-2684	small medium large
		CVC headset (Helmet liner for vehicular intercommunication system)	5965-01-397-7542 5965-01-398-1551 5965-01-397-7544	small medium large
		Flyer's crash type (HGU-56/P) helmet	8415-01-394-8032 8415-01-394-8033 8415-01-394-8036 8415-01-394-8034 8415-01-394-8035 8415-01-394-6474	extra, extra small extra small small medium large extra large
Earplug carrying case	A	Earplug carrying case	6515-01-100-1674	

™Willson Model 10 is a trademark of Willson, PO Box 622, Reading, PA 19603.

™Aearo Co. Model is a trademark of Aearo Company, 90 Mechanic St., Southbridge, MA 01550.

™Willson Model 20 is a trademark of Willson, PO Box 622, Reading, PA 19603.

Notes:

<sup>1</sup> AR 385-10, paragraph 6-2, gives the authority for purchase and issue.

<sup>2</sup> A = Federal Logistics Data on Compact Disk.  
B = CTA 8-100.

<sup>3</sup> Requisition requires approval of HCO.

<sup>4</sup> Can be worn under the chin and behind the head only.

**Table 6-2**  
Daily steady-state noise exposure limits with earplugs and the Kevlar® helmet

dBA	Time limit per day
106	4 hours
109	2 hours
112	1 hour
115	30 minutes
118	15 minutes
121	7.5 minutes
124	3.75 minutes

Notes:

Kevlar® is a registered trademark of E.I. du Pont de Nemours and Company, 1007 Market St., Wilmington, DE 19898.

**Table 6-3**  
Daily steady-state noise exposure limits with double hearing protection

dBA	Time limit per day
111	4 hours
114	2 hours
117	1 hour
120	30 minutes
123	15 minutes
126	7.5 minutes
129	3.75 minutes

**Table 6-4**  
Earcup seals and filler: Federal supply system replacement information

Helmet type	Designation	National stock number
SPH-4B Aviator	Seal, Plain	8415-00-143-8577
DH-132 CVC	Seal, Plain	5965-00-135-0505
HGU-56/P Aviator	Cushion, Ear	8415-01-074-1622
High Performance Navy, Type I Noise Muff	Seal, Dome	4240-00-979-4040
High Performance Navy, Type I Noise Muff	Filler, Dome	5965-00-674-5379

**Table 6-5**  
Earcup seals—commercial replacement information for noise muffs and helmets

Manufacturer/address/phone*	Noise muff model number	Earcup seal model/comments
Aearo Company (formerly American Optical and Cabot Safety Corporation) 90 Mechanic Street Southbridge, MA 01550 (508) 764-5500 or 1-800-678-4163	1720	Fits all types: 85622
David Clark Co., Inc. PO Box 15054 360 Franklin Street	E310 (Type II) 9AN-2 All communication	Fits all types 18316G-02 (pair) 18316G-03 (case)

**Table 6-5**  
Earcup seals—commercial replacement information for noise muffs and helmets—Continued

Manufacturer/address/phone*	Noise muff model number	Earcup seal model/comments
Worcester, MA 01615-0054 (508) 756-6216	headsets	
Daloz Safety (formerly Willson Safety and Bilsom) PO Box 622 ATTN: Government Sales Reading, PA 19603 (610) 376-6161	365 (Willson) 7308 (Bilsom)	EM 304 2310  10 pairs (box) 100 pairs (carton)

Notes:

\*Use of manufacturer names does not imply endorsement by the U.S. Army but is intended only to assist in identification of a specific product.

## Chapter 7 Monitoring Audiometry

### 7-1. Introduction

Monitoring audiometry detects changes in an individual's hearing sensitivity. This information identifies individuals who are highly susceptible to noise-induced hearing loss and evaluates the effectiveness of the HCP.

### 7-2. Personnel testing requirements

a. ALL soldiers, regardless of noise exposure, must receive reference and termination audiograms. All military personnel shall receive a reference audiogram at Basic Training, prior to noise exposure.

b. Reference audiograms for new civilian personnel with a potential for hazardous noise exposure must be performed as soon as possible, but not later than 30 days after initial exposure.

c. ALL noise-exposed and/or ototoxically exposed military and civilian personnel must receive reference, 90-day, annual, and termination audiograms. Follow-up hearing tests, 1 and 2, must also be provided, if required. Deaf civilians working in noise-hazardous areas must have reference and termination audiograms.

d. Termination audiograms must be conducted as part of out-processing or when a worker is going to stop working in a designated noise-hazardous area. If an STS should occur and to allow time for follow-up testing, all termination audiograms for military and civilian personnel should be conducted at least 2 weeks prior to departure from Government service. Personnel moving to other DOD jobs involving hazardous noise exposure do not require a termination audiogram, unless they change DOD and/or service components.

### 7-3. Testing equipment

a. The DOHRS audiometer is the only authorized audiometer for use within the HCP. The DOHRS (formerly known as the Occupational Health Management Information System), provides input to DOD-wide OH data bases. The DOHRS-HC module can complete up to eight hearing tests simultaneously and can also be used as a management tracking and reporting tool. The DOHRS audiometer—

(1) Automates hearing tests and the completion of test forms.

(2) Must have an annual, comprehensive electroacoustical calibration, as well as daily calibration and function checks to validate hearing test thresholds. USACHPPM TG 167A (or latest approved manual) provides the instructions for completing these requirements.

b. The noise levels within the hearing test environment must not exceed those shown in table 7-1. The HCO, industrial hygienist, or

personnel from the appropriate Army calibration facility must evaluate the test environment on an annual basis using equipment conforming to—

(1) At least the Type 1 requirements of the ANSI Standard S1.4–1983(R 1997) and S1.4A–1985 Amendment (or latest approved standard).

(2) The order three extended range requirements of the latest ANSI Standard S1.11–1986 (R 1993).

c. Ventilation systems in audiometric test booths must provide adequate air exchange for patient comfort and acceptable sound levels for valid audiometric testing.

d. Do not paint the interior of audiometric test booths. Painting the metal face covering will interfere with its noise-reducing effectiveness.

#### 7-4. Testing method

a. A physician, an audiologist, or an audiometric technician who is certified by the Council for Accreditation in Occupational Hearing Conservation or who has completed the equivalent military training must administer audiometric tests. In addition, audiometric technicians must administer audiometric tests under the supervision of a physician or an audiologist.

(1) For assistance in obtaining audiometric technician training, contact U.S. Army Medical Center (MEDCEN) or U.S. Army Medical Activity (MEDDAC) audiologists, or Commander, USACHPPM, 5158 Blackhawk Road, ATTN: MCHB–TS–CHC, Aberdeen Proving Ground, MD 21010–5403.

(2) For locally-sponsored training programs, the course director must obtain certification numbers through the Commander, USACHPPM, 5158 Blackhawk Road, ATTN: MCHB–TS–CHC, Aberdeen Proving Ground, MD 21010–5403, for those individuals satisfying all course requirements.

b. Medically trained personnel shall remove any examinee's hearing aids and comply with USACHPPM TG 167A (or latest approved manual) when administering all aspects of monitoring audiometry with the DOHRS-HC, including completion of—

(1) DD Form 2215 (Reference Audiogram).

(2) DD Form 2216 (Hearing Conservation Data).

(3) DD Form 2217 (Biological Audiometer Calibration Check).

(4) Dispositions/referrals.

(5) Non-hearing conservation hearing tests.

c. The DOHRS software will automatically determine whether an STS is present and will print this information on the DD Form 2216. If an STS is noted, the software and corresponding applicable documentation will provide further instructions. *Note:* Age corrections no longer apply to this calculation.

d. The DOHRS software will automatically determine if an OSHA RHL is present and will provide disposition instructions. Age corrections do not apply to this calculation.

e. Upon completion of the audiogram—

(1) The examiner will explain the results of the hearing test to the individual.

(2) The individual must sign the DD Form 2216 to acknowledge that the test results were explained in the case of an STS.

(3) A physician, audiologist, or audiometric technician who is certified by the Council for Accreditation in Occupational Hearing Conservation or who has completed the equivalent military training will review the audiogram for validity and proper patient disposition.

#### 7-5. Diagnosis and referrals

a. *Diagnosis.* Only physicians may diagnose noise-induced hearing loss. They should use all reasonable methods of differential diagnosis. These methods include, but are not limited to—

(1) An investigation of the individual's medical history with particular attention given to auditory history including any previous hearing tests.

(2) Pure-tone air conduction results.

(3) Pure-tone bone conduction results.

(4) Speech reception thresholds.

(5) Speech discrimination results.

(6) Acoustic-immittance testing, including acoustic reflex measurements.

(7) Masking, when indicated.

(8) Otoacoustic emissions, if applicable.

b. *Funding for referral services.*

(1) Military and civilian personnel receive required diagnostic referrals from in-house military treatment facilities, other Service's military treatment facilities, or civilian health care providers. Funding responsibility rests with the MEDDAC or MEDCEN per AR 40–3.

(2) In compensation claims—

(a) If a civilian employee receives referral services from a non-AMEDD source to determine compensation, AND a compensation claim is awarded, the Army's medical authority is responsible for the cost of the diagnostic evaluation.

(b) If a compensation claim is NOT awarded, the individual is responsible for the cost of the evaluation.

#### 7-6. Notification procedures for significant threshold shift

a. When a positive STS is discovered on a periodic test, the individual and his or her supervisor will be notified immediately, in writing, that a possible change has occurred in his or her hearing and that follow-up testing is required.

b. When a positive STS is confirmed on the second follow-up hearing test, the HCPM or designee notifies—

(1) The employee, in writing, within 21 days after completion of the audiogram.

(2) The employee's immediate supervisor and the unit HCO.

(3) The OH nurse for inclusion in any OH reports.

(4) The Safety and Occupational Health Advisory Council. (See AR 385–10.)

#### 7-7. Reporting OSHA reportable hearing loss

AR 385–40 requires separate logs be maintained for recording military and civilian personnel occupational illnesses and injuries.

a. The Log of Federal Occupational Injuries and Illnesses or an equivalent log at the installation level is used for civilian employees.

b. DA Form 285 (U.S. Army Accident Report) is used for military personnel.

c. When an OSHA RHL occurs, the HCPM must notify both the employee and the employee's immediate supervisor, in writing, within 21 days after completion of the hearing test identifying the OSHA RHL.

d. Within 6 workdays of this written notification—

(1) The civilian employee and the employee's supervisor must complete either of the following forms:

(a) A Department of Labor (DOL) Form CA–1 (Federal Employee's Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation). This is only used in cases of acoustic trauma, that is, a one-time accident.

(b) A DOL Form CA–2 (Notice of Occupational Disease and Claim for Compensation).

(2) Military personnel and their unit commander must complete the DA Form 285.

e. Completing the DOL Form CA–1 or 2 does not require that a claim for compensation be filed unless the employee desires.

f. When completed, all forms (DOL Form CA–1, DOL Form CA–2, and DA Form 285) must be sent to the safety and/or OH offices. If illness logs are maintained by the OH office and injury logs are maintained by the safety office, copies of both logs will be available at either location for employee review.

g. Any civilian hearing loss claims that are controverted or otherwise challenged shall be logged. Claims denied by the Office of Workers' Compensation Programs may be deleted from a log.

#### 7-8. Recordkeeping

a. All DOHRS-HC data will be forwarded to the DOHRS DOD-wide corporate database semi-annually, for each calendar year, as follows:

(1) 1 January through 15 July—due by 1 August.

(2) 1 July through 31 December—due by 1 February.

b. On request, the installation medical authority—

(1) Provides copies of an employee's audiometric test and noise exposure records to the employee, former employee, people designated in writing by the employee to receive the records, and representatives designated by the Assistant Secretary of Labor for Occupational Safety and Health per 29 CFR 1910.95(m)(4).

(2) Ensures that all DD Forms 2215, DD Forms 2216, hearing tests, and dispositions/referrals are included in the individual's medical record per AR 40-66. In addition, all noise exposure documentation shall also be a permanent part of the individual's medical record.

(3) Ensures that audiometric and noise exposure records are retained for the duration of the individual's enlistment or employment and an additional 30 years per AR 25-400-2.

**Table 7-1**  
**Allowable background noise levels for hearing conservation audiometric test environments**

Octave band center frequencies	Octave band levels in dB re: 20 micropascals ( $\mu\text{Pa}$ )
500	27
1000	29
2000	34
4000	39
8000	41

## Chapter 8 Health Education

### 8-1. Requirements

The HCPM or designee must provide hearing conservation health education at least annually to ALL noise-exposed personnel. Instruction will cover—

- a. The effects of noise on hearing.
- b. The purpose, advantages, disadvantages, and attenuation of various types of hearing protectors.
- c. The selection, fit, care, and use of hearing protectors.
- d. The purpose and procedures of audiometric evaluations.
- e. The structure and elements of the HCP.
- f. The mandatory requirement to wear assigned protective equipment and the administrative actions which may follow for failure to do so.
- g. The use of hearing protection during noise-hazardous, off-duty activities.

### 8-2. Educational materials

On request, the installation medical authority provides hearing conservation health education materials such as—

a. Posters, films, pamphlets, recordings, and slides available through commercial sources.

b. Films and videotapes from local audiovisual support centers. Complete DA Form 4103-R (Visual Information (VI) Product Loan Order) to order the following:

(1) "Prevention of Hearing Loss" (TF 8-4602), also available in videotape and applicable to military personnel (22 minutes in length).

(2) "The Sound of Sound" (MF 8-5810), also available in videotape (16.4 minutes in length).

(3) "Stick It in Your Ear" (MF 8-13077), also available in videotape and applicable to civilian personnel.

(4) "Hear Here! Hearing Conservation for the Good Life" (TVT 20-632, PIN No. 706017DA), a videotape aimed at civilian employees.

(5) "Sounds of Combat" (TVT 8-170, PIN No. 707370DA), a videotape oriented to soldiers (8 minutes in length).

(6) "Hearing Protection" (TVT 20-878, PIN No. 708562DA), a videotape applicable to both civilian and military personnel (10.35 minutes in length).

c. "The Prevention of Hearing Loss" pamphlet and USACHPPM TG 175 are available in quantities of 20 or less by writing to the address in appendix A. Additional copies may be reproduced locally.

d. DA Posters 40-501A through 40-501M covering topics such as earplugs, ear canal caps, noise muffs, graphic representations of hearing loss from occupational noise exposure and aging, and audiometric instructions for hearing tests. They are available through normal publication channels. Modification or local reproduction is not permitted.

e. Requests for additional hearing conservation health education materials should be made to Commander, USACHPPM, 5158 Blackhawk Road, ATTN: MCHB-TS-CHC, Aberdeen Proving Ground, MD 21010-5403. (See para 1-5b.)

## Chapter 9 Enforcement

### 9-1. Command emphasis

The unit commander or supervisor of personnel working in noise-hazardous areas should endorse—

- a. The installation commander's command emphasis letter explaining the importance of the HCP.
- b. The installation HCP MOI.
- c. Wearing of the earplug carrying case as part of the battle dress uniform.

### 9-2. Performance standards

a. Supervisors or unit commanders must ensure that the following responsibilities are included in first-line civilian supervisor's performance standards per AR 385-10—

(1) Enforce the use of hearing protectors. (These are listed under a generic designation of personal protective devices.)

(2) Ensure that employees report for scheduled medical examinations.

b. The military supervisor's officer evaluation report or enlisted evaluation report, when applicable, should also include these responsibilities.

c. Supervisors or unit commanders must ensure that the following responsibilities are included in the noise-exposed military or civilian employee's performance standards—

(1) Use of hearing protection, as required.

(2) Attends medical surveillance, as required.

### 9-3. Compliance measures

a. Supervisors of noise-hazardous areas must—

(1) Enforce the mandatory use of hearing protectors. Take disciplinary action as appropriate for non-compliance.

(2) Ensure that employees report for scheduled medical examinations.

b. The safety manager will—

(1) Conduct unannounced inspections of noise-hazardous areas to ensure compliance with and enforcement of hearing protector requirements.

(2) Report results to the HCPM, IHPM, and the employees' supervisor.

c. The HCPM will—

(1) Conduct unannounced inspections of noise-hazardous areas to ensure compliance with both HCP and hearing protector requirements.

(2) Report inspection results through command channels to the installation commander, the unit commander, the unit HCO, the safety manager, and the IHPM.



d. The IHPM will inspect noise-hazardous areas to ensure compliance with HCP and hearing protector requirements during both announced and unannounced IH surveys.

#### **9-4. Discipline**

a. If a civilian employee violates hearing protector requirements or fails to comply with audiometric evaluation procedures, the supervisor will discuss disciplinary actions with appropriate members of the civilian personnel office staff. The provisions of AR 690-700, outlining penalties for various offenses, may apply. Additionally, major Army command or activity regulations and policies or collective bargaining agreements may apply.

b. If military personnel violate hearing protector requirements or fail to comply with audiometric evaluation procedures, the chain of command will apply the appropriate disciplinary action.

installation medical authority to the installation commander, at least annually. These figures include—

- (a) Positive STS on annual hearing tests for military personnel.
  - (b) Positive STS on the second follow-up hearing tests for military personnel.
  - (c) Positive STS on annual hearing tests for civilians.
  - (d) Positive STS on the second follow-up hearing tests for civilians.
  - (e) Positive STS on annual hearing tests by unit.
  - (f) Positive STS on the second follow-up hearing tests by unit.
  - (g) Potential or assigned military hearing profiles (a primary readiness indicator).
  - (h) Potential civilian hearing loss compensation costs.
- d. *Assistance.* Program evaluation assistance is available in USACHPPM TG 167B (or latest approved manual).

## **Chapter 10 Program Evaluation**

### **10-1. Requirements**

Each installation's HCP is evaluated by both external and internal sources to assess program effectiveness.

### **10-2. External evaluations**

The HCP at USACHPPM—

a. Conducts installation hearing conservation management consultations. These management consultations provide on-site assistance to the installation HCPM. The consultation includes—

- (1) Reviewing the current program status.
- (2) Providing on-site assistance.
- (3) Discussing recommendations for the seven elements of an HCP listed in paragraph 3-2.

b. Conducts DOHRS-HC consultation visits. These visits concentrate on the function and local use of the DOHRS. Installation DOHRS-HC data base records are reviewed, and assistance is provided to enhance program support, effectiveness, and participation.

### **10-3. Internal evaluations**

The DOHRS-HC module allows the HCO to evaluate program participation, quality assurance, and program effectiveness. The 29 CFR 1960.78, Subpart J requires that an annual self-assessment be performed. Program evaluation requirements are as follows:

a. *Program participation.*

(1) Preparing program participation reports by using the DOHRS-HC.

(2) Reporting the following through the installation medical authority to the installation commander—

(a) The number of employees who are referred to the program, but who do not participate in monitoring audiometry, at least quarterly.

(b) The number of employees who comply with the program, at least annually.

b. *Quality assurance.*

(1) Generating quality assurance reports using the DOHRS-HC.

(2) Reporting quality assurance measures to the installation medical authority at least twice a year. These measures include—

(a) Performed earplug sizing distributions, including different earplug sizes for each ear. These reports help monitor earplug fitting procedures.

(b) Distributions of the types of hearing protectors issued and used. This information helps monitor the appropriate variety of available protectors.

(c) The prevalence of negative STS. This helps monitor the quality of reference audiograms.

c. *Program effectiveness/readiness indicators.*

(1) Generating program effectiveness reports using the DOHRS-HC.

(2) Reporting local hearing loss prevalence figures through the

## Appendix A References

### Section I Required Publications

#### ANSI S1.4-1983

Specification for Sound Level Meters. (Cited in paras 4-2a, 4-2c, and 7-3b(1).) (Note: Copies of ANSI publications are available from the American National Standards Institute Incorporated, 120 Wall Street, 32nd Floor, New York, NY 10005-3993.)

#### ANSI S1.4A-1985

Amendment to ANSI S1.4-1983. (Cited in paras 4-2a, 4-2c, and 7-3b(1).)

#### ANSI S1.11-1986 (Reaffirmed 1993)

Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters. (Cited in para 7-3b(2).)

#### ANSI S3.6-1989

Specification for Audiometers. (Cited in glossary.)

#### ANSI S12.6-1997

Methods for Measuring the Real-Ear Attenuation of Hearing Protectors. (Cited in para 6-2a(1)(c).)

#### AR 40-5

Preventive Medicine. (Cited in paras 1-1, 1-4a(1), 1-4a(2), 1-4a(3), 1-4b, 1-4b(3), 1-4f(2), 1-4g, 1-4h, 1-4i, and 1-4j.)

#### AR 95-1

Flight Regulations. (Cited in paras 1-4c(1) and 6-5c(1)(a).)

#### AR 385-10

The Army Safety Program. (Cited in paras 1-1, 1-4a(1), 1-4d, 1-4h(6), 1-4i(6), 1-4i(16), 4-1c, 5-1b, 7-6b(4), 9-2a, and table 6-1.)

#### AR 420-70

Buildings and Structures. (Cited in paras 1-4f(1) and 4-6a(1).)

#### AR 690-700

Personnel Relations and Services (General). (Cited in para 9-4a.)

#### TB MED 503

The Army Industrial Hygiene Program. (Cited in paras 1-4b(2), 1-4h, and 5-1b.)

#### Unnumbered Publication

Safety Color Code Markings, Signs and Tags Information Guide. (Cited in paras 1-4f(1), 4-6a, and 4-6a(2).) (Copies are available from the U.S. Army Safety Center, ATTN: CSSC-SM, Fort Rucker, AL 36362-5363.)

### Section II Related Publications

A related publication is merely a source of additional information. The user does not have to read it to understand this pamphlet.

#### 29 CFR 1910.95

OSHA Occupational Noise Exposure Standard and Hearing Conservation Amendment.

#### 29 CFR 1960.78, Subpart J

Evaluation of Federal Occupational Safety and Health Programs.

#### ANSI S1.25-1991

Specification for Personal Noise Dosimeters.

#### AR 25-400-2

The Modern Army Recordkeeping System (MARKS).

#### AR 40-3

Medical, Dental, and Veterinary Care.

#### AR 40-10

Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process.

#### AR 40-66

Medical Record Administration.

#### AR 40-501

Standards of Medical Fitness.

#### AR 385-40

Accident Reporting and Records.

#### AR 611-101

Commissioned Officer Classification System.

#### AR 611-201

Enlisted Career Management Fields and Military Occupational Specialties.

#### AR 670-1

Wear and Appearance of Army Uniforms and Insignia.

#### CTA 8-100

Army Medical Department Expendable/Durable Items.

#### DA Poster 40-501A

Occupational Noise Exposure Standard and Hearing Conservation Amendment.

#### DA Poster 40-501B

Foam Earplugs.

#### DA Poster 40-501C

For Maximum Protection and Comfort, Insert Single-Flange Earplugs as Follows:

#### DA Poster 40-501D

For Maximum Protection and Comfort, Insert Triple-Flange Earplugs as Follows:

#### DA Poster 40-501E

Earplug Seating Device and Carrying Case.

#### DA Poster 40-501F

Ear Muffs: General Information.

#### DA Poster 40-501G

Ear Canal Caps: General Information.

#### DA Poster 40-501H

Earplugs: General Information.

#### DA Poster 40-501I

Audiometric Instructions.

#### DA Poster 40-501J

Noise-Induced Hearing Loss and Its Effects.

#### DA Poster 40-501K

How Tough Are Your Ears? (Hearing Loss from Occupational Noise Exposure).

#### DA Poster 40-501L

How Old Are Your Ears? (Hearing Loss from Aging).

**DA Poster 40-501M**

Well-Fitted and Properly Inserted Earplugs.

**DODI 6055.12**

DOD Hearing Conservation Program (HCP).

**MIL-STD 1474D**

Department of Defense Design Criteria, Noise Limits.

**Unnumbered Publication**

Prevention of Hearing Loss Pamphlet. (Copies of this publication are available from the Commander, USACHPPM, 5158 Blackhawk Road, ATTN: MCHB-TS-CHC, Aberdeen Proving Ground, MD 21010-5403.)

**USACHPPM TG 167A**

Hearing Evaluation Automated Registry System (HEARS) Audiometer Operation Manual. (USACHPPM Technical Guides are available from the Commander, USACHPPM, 5158 Blackhawk Road, ATTN: MCHB-CS-IDD, Aberdeen Proving Ground, MD 21010-5403.)

**USACHPPM TG 167B**

HEARS Manager's Module Manual.

**USACHPPM TG 175**

Guide to Hearing Conservation for Unit Commanders and Supervisors.

**USACHPPM TG 181**

Noise Dosimetry and Risk Assessment.

**Section III****Prescribed Forms**

The forms in this section are available on the Army Electronic Library CD-ROM and the USAPA website.

**DD Form 2214**

Noise Survey. (Prescribed in paras 1-4h(4) and 4-5a.)

**DD Form 2214C**

Noise Survey (Continuation Sheet). (Prescribed in paras 1-4h(4) and 4-5a.)

**DD Form 2215**

Reference Audiogram. (Prescribed in paras 7-4b(1) and 7-8b(2).)

**DD Form 2216**

Hearing Conservation Data. (Prescribed in paras 7-4b(2), 7-4c, 7-4c(2), and 7-8b(2).)

**DD Form 2217**

Biological Audiometer Calibration Check. (Prescribed in para 7-4b(3).)

**Section IV****Referenced Forms****DA Form 285**

U.S. Army Accident Report.

**DA Form 3758-R**

Calibration and Repair Requirements Worksheet.

**DA Form 4103-R**

Visual Information (VI) Product Loan Order.

**DOL Form CA-1**

Federal Employee's Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation.

**DOL Form CA-2**

Notice of Occupational Disease and Claim for Compensation.

## Glossary

### Section I Abbreviations

#### ACAPS

Artillery communications aural protective system

#### AMEDD

U.S. Army Medical Department

#### ANSI

American National Standards Institute

#### CAPS

Communications aural protective system

#### CFR

Code of Federal Regulations

#### CVC

Combat vehicle crewman

#### dB

decibel

#### dBA

A-weighted decibel

#### dBp

peak decibel

#### DOD

Department of Defense

#### DOHRS

Defense Occupational Health Readiness System

#### DOHRS-HC

Defense Occupational Health Readiness System-Hearing Conservation

#### DOL

Department of Labor

#### HCO

Hearing Conservation Officer

#### HCP

Hearing Conservation Program

#### HCPM

Hearing Conservation Program Manager

#### HHA

health hazard assessment

#### Hz

hertz

#### IH

industrial hygiene

#### IHPM

Industrial Hygiene Program Manager

#### kHz

kilohertz

#### MEDCEN

U.S. Army Medical Center

#### MEDDAC

U.S. Army Medical Activity

#### MOI

memorandum of instruction

#### OH

occupational health

#### OSHA

Occupational Safety and Health Administration

#### OHPM

Occupational Health Program Manager

#### PNR

passive noise reduction

#### RAC

risk assessment code

#### RHL

reportable hearing loss

#### SPL

sound pressure level

#### STS

significant threshold shift

#### TB MED

Technical bulletin, medical

#### TG

technical guide

#### TQG

tactically quiet generator

#### TSG

The Surgeon General

#### TWA

8-hour time-weighted average sound level

#### USACHPPM

U.S. Army Center for Health Promotion and Preventive Medicine

#### $\mu$ Pa

micropascals

### Section II Terms

#### Audiogram

A record of audibility thresholds, for each ear, at specific pure-tone test frequencies.

#### Audiometer

An instrument for measuring hearing thresholds. Only audiometers that conform to the requirements and specifications of ANSI Standard S3.6-1989 are permitted for use by the DA, to include the Army National Guard and the U.S. Army Reserve.

#### Change in operations

Any increase in the number of noise-exposed employees and/or any technological changes in the work environment (for example, production line modifications, building renovations, additional or reduced numbers of noise-hazardous equipment per 29 CFR 1910.95(d)(3)).

#### Deafness

The otological condition in which the hearing threshold level for speech or the average hearing threshold level for pure tones at 500, 1000, and 2000 Hz is at least 93 dB bilaterally. This condition is generally accepted as representing 100 percent hearing handicap for hearing everyday speech.

#### Decibel

A unit of measurement used to express SPL. The dB level of a sound is related to the logarithm of the ratio of sound pressure to a reference pressure. The dB has meaning only when the reference quantity is known. The internationally accepted reference pressure in acoustics is 20  $\mu$ Pa which corresponds to 0 dB. This value is used in the most current acoustical literature. In the past, other units, including 20 micronewtons per square meter, 0.0002 microbar, and 0.0002 dynes per square centimeter, all physically equivalent to 20  $\mu$ Pa, have been used.

#### dBA

Sound pressure level measured with a sound level meter set to the A-weighted network and which meets the ANSI S1.4-1983 requirements. The A-weighting network reduces the contribution of lower frequencies, which are of less concern for hearing conservation.

#### dBp

Unit used to express the peak SPL of impulse noise. It is equal to 20 times the common logarithm of the ratio of the highest instantaneous sound pressure to a reference pressure of 20  $\mu$ Pa.

#### 8-hour time-weighted average sound level

A measure of the severity of the employee's workday noise environment. The TWA is an expression of the constant noise level, measured in dBA, which can potentially produce the same hearing damage over an 8-hour period, as the actual workday noise exposure. The TWA is always computed as if the TWA noise level is present for an 8-hour work shift, whether or not the workday noise lasts for 8 hours. Because the TWA is a measure of the noise environment, it does not reflect the effects of any hearing protection worn by employees. Implicit in the TWA is a 3-dB time-intensity exchange rate.

#### Hertz

Unit of measure for frequency, numerically equivalent to cycles per second.

**Impulse noise**

A short burst of acoustic energy consisting of either a single impulse or a series of impulses. The pressure-time history of a single impulse includes a rise of 40 dB or more in 1 second or faster to a peak pressure, followed by a somewhat slower decay of the pressure envelope to ambient pressure, both occurring within 1 second. When the intervals between impulses are less than 500 milliseconds, the noise is considered continuous, except for short bursts of automatic weapons fire which are considered impulse noise.

**Industrial Hygiene Program Manager**

The individual designated to execute the installation's IH program according to TB MED 503.

**Installation medical authority**

The unit/command surgeon, MEDDAC/MEDCEN commander, or the Director of Health Services who is designated as the lead medical officer for the installation concerned.

**Noise**

In the non-technical sense, any unwanted sound. Noise may be steady, either a pure tone or a combination of tones, or it may consist of one or more impulses. The term is usually applied to sounds having a complex character with numerous separate frequency components extending over a wide range of frequencies and not generated to convey meaning or information.

**Noise contour**

Boundary area, where hearing protectors are required.

**Noise dose**

The ratio of the severity of a noise environment to the severity of exposure to 85 dBA for 8 hours per day, expressed as a percentage.

**Occupational medicine staff**

An OH physician, audiologist, OH nurse, industrial hygienist, radiation protection officer, optometrist, and technicians of each specialty area.

**OSHA reportable hearing loss**

Present when an individual has an increase in hearing thresholds  $\geq 25$  dB for the average of 2000, 3000, and 4000 Hz in either ear, as compared to the individual's original (first) baseline hearing test. It is reported one time and is not reported again until there is an additional increase of  $\geq 25$  dB for the average of 2000, 3000, and 4000 Hz, in the same ear as the previous increase, or if there is a change in hearing  $\geq 25$  dB for the average of 2000, 3000, and 4000 Hz in the other ear, as compared to the original baseline. For example, if the first OSHA RHL is reported in 1995 and an additional average increase of 25 dB does not appear until 1998, the OSHA RHL would only be reportable in 1995 and 1998, NOT the intervening years.

**Peak pressure level**

The highest instantaneous pressure reached during an impulse noise event and expressed in dB. For Army hearing conservation purposes, peak pressure levels are unweighted; that is, a weighting network is not used when measurements are taken.

**Potentially hazardous noise**

Exposure to steady-state noise having a TWA of  $\geq 85$  dBA. Also, exposure to impulse/impact noise levels  $\geq 140$  dBP.

**Potentially hazardous noise area**

Any work area where personnel are likely to be exposed to sound levels  $\geq 85$  dBA for steady-state noise or impulse noise levels  $\geq 140$  dBP.

**Pressure**

As used in acoustics, refers to the change in the instantaneous pressure relative to the ambient atmospheric pressure.

**Reference audiogram**

The first audiogram obtained (and available) upon entrance to active military service or employment with the DA, the Army National Guard, or the U.S. Army Reserve. The term applies to pre-placement, pre-assignment, entrance or baseline audiograms. Free from auditory fatigue and other transient otologic pathologies, it is used for comparison with future audiograms.

**Risk assessment code**

An expression of risk which combines the elements of mishap probability and health hazard severity. Risk assessment codes are expressed in Arabic numbers from one to five. The RAC rank orders the hazard. Hazards with lower RAC numbers require more immediate attention than hazards with higher RAC numbers.

**Significant threshold shift**

A change in hearing of an average of  $\geq \pm 10$  dB at 2000, 3000 and 4000 Hz in either ear, and/or any change of  $\geq \pm 15$  dB at 1000, 2000, 3000 or 4000 Hz in either ear, relative to the current reference audiogram.

**Steady-state noise**

A periodic or random variation in atmospheric pressure. It may be continuous, intermittent, or fluctuating, with an SPL varying over a wide range, provided such variations have a duration exceeding 1 second.

**Time-intensity exchange rate**

The change in the level of sound required to double the damage potential of the sound during a fixed time period of exposure. For Army hearing conservation purposes, the exchange rate is 3 dB. This exchange rate is implicit in the TWA and noise dose.

**Trained U.S. Army Medical Department personnel**

For hearing conservation purposes, medical,

audiology, IH, environmental science, or engineering personnel with approved training in the areas of hearing conservation (that is, the Council for Accreditation in Occupational Hearing Conservation or equivalent civilian or military training).

**Unit Hearing Conservation Officer**

The individual designated in writing to manage the unit's HCP and to serve as a point of contact.

**Section III****Special Abbreviations and Terms**

This section contains no entries.

## Index

This index is organized alphabetically by topic and subtopic. Topics and subtopics are identified by paragraph number.

### Audiogram

Annual, 7-2, 10-3  
Definition, glossary  
Funding for, 7-5  
Reference, 1-4, 7-2, 7-4, 10-3, glossary  
Termination, 1-4, 7-2  
90-day, 1-4, 7-2

### Audiometric technician

Training, 7-4

### Calibration

Acoustic calibrators, 4-2  
Defense Occupational Health Readiness System audiometer, 7-3  
Sound level meters, 4-2, glossary

### Command emphasis

Installation commander, 1-4, 9-1

### Commander or supervisor, 1-4, 9-1

### Compensation claims, 1-4, 7-5, 7-7

### Council for Accreditation in Occupational Hearing Conservation, 7-4, glossary

### Danger signs and decals

Color-coding, 4-6  
Contours, 1-4, 4-6, glossary  
Posting, 1-4, 4-6  
Size specifications, 4-6

### Defense Occupational Health Readiness System, 1-5, 4-5, 7-3, 7-8, 10-2, 10-3

### Discipline. See violations.

### Earplugs

Carrying case, 1-4, 6-1, 6-5, 9-1, table 6-1  
Custom, 6-3  
Disposable, 6-3, 6-4  
Foam, 6-3, 6-4, table 6-1  
For difficult-to-fit cases, 6-3  
Handformed, 1-4, 6-1, 6-3, 6-4, 6-5  
Musician's, 6-3  
Preformed, 1-4, 6-1, 6-3, 6-4, 6-5, 10-3  
Single-flange, 6-3, 6-4, table 6-1  
Sizes of, 6-4, 10-3, table 6-1

### Engineering controls, 1-4, 3-2, 4-2, 5-1, 5-2, 5-3, 5-4

### Equipment

Audiometric test booth, 7-3  
Maintenance of, 5-1, 5-2  
Military-unique, 6-2  
Noise-hazardous, 1-4, 4-1, 4-6, 5-2, glossary  
Personal protection. See Hearing protectors, types.  
Procurement specifications, 1-4, 5-3  
Ventilation systems, 7-3

### Health education

Materials, 1-4, 1-5, 8-2  
Requirements, 1-4, 3-2, 8-1, 8-2

### Health Hazard Assessment Program, 1-5, 6-2, glossary

### Health Hazard Information Module, 1-4, 4-5

### Hearing Conservation Program

Assistance, 1-5, 7-4, 10-2  
Effectiveness, 1-4, 7-1, 10-1, 10-2, 10-3  
Elements, 3-2, 8-1, 10-2  
Evaluation, 3-2, 10-1, 10-2, 10-3  
Initiation, 3-3

Participation, 1-4, 3-3, 4-4, 10-2, 10-3  
Quality assurance, 1-4, 10-3  
Waivers, 3-4, 6-2

### Hearing Conservation Program Manager, 1-4, 4-5, 6-4, 7-6, 7-7, 8-1, 9-3, 10-2

### Hearing loss

Diagnosis, 1-4, 7-5  
Funding for diagnostic evaluation, 7-5  
Funding for evaluation for compensation claims, 7-5  
Noise-induced, 1-4, 2-2, 2-3, 7-1, 7-5  
Ototoxins, 3-3  
Permanent, 1-4, 2-1, 2-3  
Preventable, 2-3, 3-1, 6-3  
Reportable, 1-4, 7-7, glossary  
Reporting, 10-3  
Symptoms, 2-2, 2-4

### Hearing protectors

Care and use, 1-4, 3-4, 6-1, 6-4, 6-5, 8-1, 9-2, 9-3  
Characteristics, 6-3  
Funding, 1-4  
Job descriptions, 1-4, 9-2  
Requisition, 1-4, 6-4, table 6-1

### Hearing protectors, types

Acoustic filler, 6-3, table 6-4  
Ear canal caps, 6-1, 6-3, 8-2, table 6-1  
Earcup seals, 6-3, 6-5, tables 6-4 and 6-5  
Earplugs. See earplugs.  
Headsets, 6-3, tables 6-1 and 6-5  
Hearing aids, 6-3, 7-4  
Helmets, 1-4, 6-1, 6-2, 6-3, 6-5, tables 6-1, 6-2, 6-4, and 6-5  
Noise muffs, 1-4, 6-1, 6-2, 6-3, 6-4, 6-5, 8-2, tables 6-1, 6-4, and 6-5

### Hearing protectors, use for

Combat scenarios, 2-3, 2-4, 6-2  
Evaluating military-unique equipment, 6-2  
Infantryman's helmet, 6-1, 6-2, table 6-2  
Noise-hazardous areas, 1-4, 2-2, 2-3, 6-1, 9-3  
Personnel working in industrial-type operations, 1-4, 6-2  
Training, non-combat or non-industrial scenarios, 6-2  
Visitors, 3-4, 6-1, 6-2

### Installation Hazard Abatement Plan, 1-4, 4-4, 5-1

### Military Occupational Health Vehicle, 1-4

### Noise dosimeter, 1-4, 4-2

### Noise-exposure

Daily limits, 5-3, 6-2, tables 6-2 and 6-3  
Evaluation of, 1-4, 3-4, 8-1  
Levels, 1-4  
Magnitude of, 1-4, 4-5  
Occupational, 3-1, 8-2  
Ototoxins, 3-3  
Records, 1-4, 7-8

### Noise levels

Airborne high-frequency, 3-3, 4-2, table 3-1  
Audiometric test booth, 7-3, table 7-1  
Hazardous, 1-4, 2-2, 4-5  
High-intensity, 2-1, 2-3  
Impulse, 2-1, 3-3, 4-2, 5-2, 6-2, glossary  
Steady-state, 2-1, 3-3, 4-2, 5-2, 5-3, 6-2, 6-2, tables 6-2 and 6-3, glossary

### Operations, change in, 1-4, 4-1, glossary

### OSHA Reportable Hearing Loss, 1-4, 7-4, 7-7, glossary

### Procedures

Audiologist, 1-4, 6-3, 7-4, glossary  
Audiometric technician, 7-4, glossary  
Civilian personnel officer, 1-4, 9-4  
Course director, 7-4  
Director of Engineering and Housing, 1-4, 4-6  
Flight surgeon, 1-4, 6-5  
Hearing Conservation Officer, 1-4, 6-4, 6-5, 7-3, 7-6, 9-3, 10-3, table 6-1, glossary  
Industrial Hygiene Program Manager, 1-4, 4-1, 4-5, 4-6, 5-4, 9-3, glossary  
Industrial hygienist, 5-2, 7-3, glossary  
Installation commander, 1-4, 9-1, 9-3, 10-3  
Installation medical authority, 1-4, 3-4, 7-8, 8-2, 10-3, glossary  
Military treatment facility, 1-4, 7-5  
Noise-exposed personnel, 1-4, 3-3, 4-5, 7-2, 8-1, 9-2, glossary  
Noise survey personnel, 4-3  
Physician, 1-4, 7-4, 7-5, glossary  
Safety manager, 1-4, 4-5, 9-3  
Unit commanders or supervisors of noise-hazardous personnel and areas, 1-4, 4-5, 4-6, 7-7, 9-1, 9-2, 9-3  
Unit Hearing Conservation Officer, 1-4, 4-5, 6-4, 6-5, 7-6, 9-3, glossary  
USACHPPM Hearing Conservation Program, 1-5, 7-4, 10-2  
U.S. Army Medical Department personnel, 4-4, 6-3, glossary

### Risk assessment codes, 1-4, 4-4, 4-5, glossary

### Safety and Occupational Health Advisory Council, 1-4, 7-6

### Significant threshold shift

Definition, glossary  
Detection of, 7-4  
Negative, 10-3  
Notification of, 1-4, 7-6  
Positive, 1-4, 7-6, 10-3  
Reporting, 7-4, 7-6, 10-3  
Testing for, 7-2  
Temporary, 6-2

### Sound pressure levels, 4-2, glossary

### Survey equipment

Acoustical calibrator, 4-2  
Airborne high-frequency and ultrasonic noise, 3-3, 4-2, table 3-1  
Octave band analyzer, 4-2  
Sound level meter, 4-2, glossary

### Technical assistance, 1-5, 4-2, 6-2

### Threshold shift, 6-2

### Time-intensity exchange rate, 4-2, glossary

### Time-weighted average, 1-4, 3-3, 4-1, 4-2, 4-5, 6-2, glossary

### Violations

Disciplinary action, 1-4, 9-3, 9-4  
Reporting of, 1-4

**UNCLASSIFIED**

**PIN 068571-000**