## Innovative Workplace Safety Accommodations for Hearing-Impaired Workers

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### Introduction

Approximately 28 million Americans have some degree of hearing loss [1,9]. Hearing loss can result from a variety of factors, including: heredity, disease, physical trauma, and exposure to loud noises. The National Institute for Occupational Safety and Health (NIOSH) estimates that 10 million American workers have permanent hearing loss resulting from exposure to excessive noise at work [2]. The number of American workers with hearing loss from all sources is expected to increase over time as the workforce ages.

Hearing-impaired workers face challenges responding to emergencies, working safely around machinery, communicating with coworkers, and receiving training. Accommodations necessary to address these challenges may not be part of an employer's current hearing conservation practice. This Safety and Health Information Bulletin (SHIB) focuses on (1) *Emergency/Evacuation Response Considerations for Hearing-Impaired Workers*; and (2) *Workplace Safety and Health Considerations for Hearing-Impaired Workers*.

### Purpose

The purpose of this SHIB is to provide employers, workers and professional organizations guidance on accommodating the safety and health needs of hearing-impaired individuals in the workplace. Specifically, this SHIB:

1. Raises awareness about the safety and health challenges faced by hearing-impaired workers.

2. Informs employers of the wide range of accommodations available for the hearing-impaired worker and their application in the workplace as they relate to emergency evacuation, training, responding to safety hazards and communication.

3. Encourages employers to develop and establish procedures for hearing-impaired workers that further safety and health in their workplaces.

4. Encourages worker participation in the development, planning, and implementation of these accommodations.

## Background

The Occupational Safety and Health Administration's (OSHA) Occupational noise exposure standard includes requirements for a hearing conservation program (29 CFR 1910.95(c)). It covers employers in general industry with employees exposed to noise at 85 decibels (dBA) or above measured as an 8-hour time-weighted average sound level (TWA). It requires these employers to include their noise-exposed employees in a hearing conservation program that consists of noise exposure assessment, audiometric testing, hearing protection and training.[1] The nature of the workplace has changed since the standard took effect; many workers in the United States are aging and have some degree of hearing loss. There is also greater concern among workers about readiness to safely react to catastrophic events. In addition to emergencies caused by natural disasters, and technological accidents; possibility of acts of terrorism have become a concern. Accommodations are available to enable hearing-impaired workers to evacuate safely, and certain accommodations may benefit workers with no hearing loss, since some emergencies may adversely impact all workers' ability to hear or communicate. Accommodation measures in the workplace are an extension of good communication and safe practices for all workers**.**

Hearing-impaired workers also face routine workplace safety and health challenges. In particular, hearing-impaired workers may have difficulty understanding audible warning signals and alarms designed to indicate the approach of motorized vehicles. For those with severe and profound hearing losses, a common safety concern is localization. For example, "I know there are forklifts in the area but I do not know where they are coming from." Other concerns expressed by hearing-impaired workers include difficulty understanding conversation on the telephone, at meetings and in training sessions [16]. Fortunately, accommodations and equipment modifications are available to assist hearing-impaired workers to perform their jobs safely [4,9].

## A. Emergency/Evacuation Response Considerations for Hearing-Impaired Workers

### Customizing Worksite Emergency Preparedness for Hearing-Impaired Workers

The OSHA Emergency action plans standard (29 CFR 1910.38) requires an employer to develop a written emergency action plan when such a plan is required by a specific OSHA standard, such as 29 CFR 1910.120 hazardous waste operations and emergency response, and 29 CFR 1910.160 fire extinguishing systems. When the plan is required, it must describe the actions employees should take to ensure their safety if a fire or other emergency situation occurs. At a minimum, the plan must include: emergency escape procedures; procedures for employees who remain to operate critical plant operations before they evacuate; procedures to account for all employees after emergency evacuation; and procedures for reporting fires and other emergencies. The plan must also include the types of evacuation to be used in emergency circumstances. The employer must review the plan with each employee covered by the plan when it is developed, whenever the plan changes and upon an employee's initial assignment. Employers must consider employees with disabilities in the development of an emergency action plan when such a plan is required by a specific OSHA standard.

The plan must be in writing, kept in the workplace, and available to employees for review. For employers with 10 or fewer employees, the plan may be communicated orally and the employer does not have to maintain a written plan. The Appendix to 1910, Subpart E, Exit Routes, Emergency Action Plans, and Fire Prevention Plans is a nonmandatory guideline to assist employers in complying with the requirements of the employee emergency plan [3].

The *Americans with Disabilities Act* (ADA) does not require employers to have an emergency evacuation plan, but if an employer decides to have such a plan, they are required to include people with disabilities [10,14].

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[1] OSHA's standard at 29 CFR 1926.52 addresses occupational noise exposure in the construction industry.

To help prepare workers for emergencies, the Office of Disability Employment Policy (ODEP), at the U.S. Department of Labor, provides recommendations on emergency preparedness for people with disabilities. The ODEP report suggests three essential parts to an emergency evacuation plan: plan development, plan implementation and plan maintenance [4].

*Plan development* includes identifying the potential hazards, the accommodation needs of persons with disabilities, and key personnel who will be involved in an emergency. In developing a plan, employers should ask their employees for their input, and workers with disabilities should take responsibility for their safety by offering their ideas and input. The plan should address after-hours situations, and include a method to identify visitors with special needs. The plan also should include details on how information will be conveyed to hearing-impaired workers when they are away from their work areas. Finally, the plan should be easy to read and understandable.

Employers should consult with local fire, police and emergency departments as well as community-based organizations in developing the plan. While the plan should be in writing, it should be viewed as an ongoing process, periodically revised and updated to reflect changes in technology, personnel and procedures.

*Plan implementation* involves distribution of the plan in an accessible format to all employees and the integration of the plan into the employer's standard operating procedures. Drills, both scheduled and unscheduled, should be performed regularly. Such practice drills should encompass the needs of all individuals, including workers with disabilities, to ensure familiarity with the procedures and to determine where improvements are needed.

*Plan Maintenance* involves developing a system for identifying new safety concerns and the needs of new disabled employees, reviewing and modifying plans after practice drills, and ensuring that emergency equipment is being properly maintained in good operating condition [4,5,9,10].

**Alerting Device Options**

Traditionally, notification of an emergency has been done through the use of auditory devices which are effective for most workers. OSHA's Employee Alarm Systems standard (29 CFR 1910.165), addresses all emergency alarms required to be installed by specific OSHA standards. The standard indicates that an alarm system must provide warning for necessary emergency actions and be capable of being perceived above ambient noise by all employees. Since hearing-impaired employees may not be able to hear auditory alarms, OSHA considers strobe lights or similar lighting devices and tactile devices to meet the requirement of the standard [3].

Hearing-impaired workers may also have difficulty understanding voice communication over the public address (PA) system. The alarm may interfere with or drown out voice announcements, making the emergency voice communication system ineffective. Alerting device accommodations are available to notify hearing-impaired workers of emergencies, and they cause minimal distraction to other workers. Visual alarms equipped with flashing strobe lights or vibrating alerting devices can be hard-wired into the existing emergency notification system. The Underwriters Laboratories Standard for Emergency Signaling Devices for the Hearing-Impaired (UL 1971), establishes criteria for systems used for emergency notification [5].

Section 4.28 of the ADA Accessibility Guidelines (ADAAG) [2] specifically addresses specialized alarms (www.access-board.gov/adaag/html/adaag/htm#4.28). To be effective for notification, visual alarms must be installed where hearing-impaired persons can see them [6].

Many alerting device options are available for use in the workplace, depending on the particular needs of the hearing-impaired worker. However, not all of the devices listed below are appropriate for every hearing-impaired worker. Some of the devices are

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[2]  ADAAG contains scoping and technical requirements for accessibility to buildings and facilities by individuals with disabilities under the ADA. These scoping and technical requirements are to be applied during the design, construction, and alteration of buildings and facilities covered by Titles II and III of the ADA to the extent required by regulations issued by Federal agencies, including the Department of Justice and the Department of Transportation, under the ADA.

more appropriate for individuals with a severe-to-profound hearing loss, while others are appropriate for workers with a mild hearing impairment. The employer should work together with hearing-impaired employees, and perhaps with an occupational audiologist, in determining the device or combination of devices that work best for their particular situation.

Some alerting device options include:

- Exit signs set to flash when an emergency alarm sounds. These signs are typically connected to the emergency power system.

- Strobe lights [7] or vibrating alarm signals placed in all areas occupied by hearing-impaired workers.

- Visual or vibrating alarm signals at the worker's workstation.

- Vibrating pagers worn by hearing-impaired workers.

- Vibrating watches or other type of body alarm that is strapped on to the individual to alert a hearing-impaired worker.

- Two-way vibrating pagers that receive text messages and have the ability to respond in full length text.

- "Hearing Dogs"- trained to alert the hearing-impaired worker to a person entering the room, abnormal machinery sounds, malfunctioning equipment, the telephone ringing or other alerting needs.

- Buddy systems [5,7] where a coworker alerts a hearing-impaired worker to an emergency situation. This system should not be relied on as the sole means of alerting the hearing-impaired worker to an emergency situation because of the relatively low reliability of this approach.

- Amplified telephone ring signaler to alert the worker to a phone ringing.

- A modem that converts the personal computer into a Telecommunications Device for the Deaf (TDD).

- Instant messaging or e-mail pop-up.

- A flashlight provided to hearing-impaired individuals for signaling their location in the event they are separated from the rescue team or buddy.

The Job Accommodation Network (JAN) website, a service of the Office of Disability Employment Policy, has a wealth of information on alerting devices at www.jan.wvu.edu. JAN's "Employers' Guide to Including Employees with Disabilities in Emergency Evacuation Plans" covers requirements for including people with disabilities, guidelines and accommodation considerations. Toll-free (800) 526-7234 [14].

Other useful resources are DisabilityInfo, www.disabilityinfo.gov, and the Center for Disability Issues and Health Professionals, www.cdihp.org.

The United States Fire Administration publishes many guides on the subject of disability and related emergencies at www.usfa.fema.gov, toll-free (800) 561-3356 [5,6,8].

**Other Safety and Health Workplace Accommodations**

- TTY: A teletypewriter (TTY) is a telephone device that enables hearing-impaired individuals to make and receive telephone calls. The device requires two TTY users to type messages back and forth to communicate. When messages are typed on the TTY keyboard, the information is displayed on the TTY display panel and transmitted through the phone line to a receiving TTY.

- TRS: The Telecommunications Relay Service (TRS) is a 24-hour, 7 day a week, free nationwide relay network service that handles voice-to-TTY and TTY-to-voice calls. Using

a TTY or other mechanism (Voice Carry Over phone, voice phone or videophone), an individual dials the toll-free number to contact the TRS system which will connect the caller to a communications assistant (CA) who directs the call. When the recipient answers the call, the CA explains his or her role in the call and will relay the communication between the two parties exactly as stated by both parties, either in text or voice. For more information about Telecommunications Relay Services, link to: http://www.nidcd.nih.gov/health/pubs_hb/telecomm.htm, and www.fcc.gov/cgb/dro

- Cell phone with a portable TTY. It is important to make sure that the cell phone is TTY compatible.

- Wireless TTY. Provides instant TTY access anywhere within a selected wireless data network. Such TTYs have e-mail, fax, text-to-speech and speech-to-text message capabilities.

The ADA Standards for Accessible Design, as well as other technical assistance materials, can be obtained from the U.S. Department of Justice ADA website at www.ada.gov. The Department of Justice operates a toll-free ADA Information Line at (800) 514-0301 (voice), or TTY (800) 514-0383, which directs callers to an ADA specialist [5,6,10,12,14].

## B. Workplace Safety and Health Considerations for Hearing-Impaired Workers

### Responding to Vehicles in the Workplace

Workers with hearing loss working around or operating powered industrial trucks (e.g., forklifts) or other heavy equipment may be concerned about their ability to detect dangerous situations. The employer should work together with hearing-impaired employees in determining the accommodation or combination of accommodations that work best for their particular situation. The following are suggested accommodations that can be made to minimize such safety risks:

- Use tape, paint or ropes to highlight paths of travel for forklifts, vehicles and heavy equipment.
- Designate separate doors for mechanized and people traffic.
- Establish rules requiring that all forklifts and vehicles must stop at all intersections.
- Install sensor warning lights that blink as the vehicle approaches. Directional warning lights such as the left light signals traffic on the left, and the right light signals traffic on the right, may be beneficial.
- Install flashing strobe lights on vehicles or forklifts to alert hearing-impaired workers to oncoming vehicles.
- Install mirrors at all intersections within the warehouse. Dome mirrors situated along aisleways may be beneficial.
- Use vibrating pagers - place a transmitter in the moving equipment so that the driver can press a button that sends a signal to the vibrating receiver worn by the hearing-impaired employee to alert the worker to the approaching forklift.
- Position a rear vision camera so that a vehicle operator will be able to see behind him/her.

## Training Accommodations

Training is an integral component of a safe workplace, yet training may pose unique challenges for employers who have workers with hearing impairments. Training programs that ensure that procedures are understood and followed are paramount to creating a safe work environment [15].

Hearing-impaired workers often need customized training tools to ensure their safety. There are a variety of training mechanisms that can be tailored to hearing-impaired individuals in the workplace. Again, the decision to use a particular training accommodation is one that should be made by the employer and employee after considering the needs of a specific situation.

- Assisted Listening Devices (ALDs). These devices amplify sound and transmit it to a

person's hearing aid or to a receiver worn by the individual. The speaker talks into a microphone or transmitter and the listener either uses the telecoil (t-coil) on their own hearing aid or wears a receiver designed to work with the specific ALD.

- Captioned videotapes; open or closed. Closed captioning requires the use of a decoder to view the captions, while open captioning displays the text automatically. These captions are identical to captions displayed at the bottom of the screen in foreign language films. No special equipment is required to view open captioning.

- Scripting. A script of the video might be provided as a last resort if there is no captioning, and if the visual content is not of great significance to the information provided through the video. However, providing the script as a supplement to the captioned video in advance of viewing the video gives the user additional preparation time to understand what will be communicated.

- Qualified sign language interpreter. For more information, see the Equal Employment Opportunity Commission's (EEOC) ADA Technical Assistance Manual for Title I, Chapter III, 3.10.9 Providing Qualified Interpreters at http://www.jan.wvu.edu/links/ADAtam1.html#111.

- Communication Access Realtime Translation (CART) Services. CART is a service in which an operator types the spoken word into a computer that instantly displays the typed words in English on a monitor or other display. This service is useful during small and large group situations when verbatim conversation is essential to effective communication. CART offers word-for-word translation. This service typically needs to be scheduled in advance of a meeting.

- Computer-Assisted Notetaking. This service can be used to provide effective communication during group training sessions. It involves the use of a laptop or personal computer, word processing software, and possibly a PC projector. Typically, a typist who participates in the group activity acts as a notetaker while the hearing-impaired individual either watches the computer monitor or the text projected onto a wall or screen.

- Web-based training. Use web-based meeting software or video conferencing.

- Tape recorded meetings. After the training session, the tape can be listened to separately in a controlled listening environment with the ability to rewind and playback as often as necessary. The tapes can also be transcribed.

- TTY Videophone in a video conferencing format. This allows for full view of the group in addition to TTY communication directly on the TV monitor.

- Communication Access Software. Currently, there are innovative systems that provide multisensory, interactive communication by converting speech to text, and to real-time on-screen sign language. More information about these products is provided at www.myicommunicator.com and www.signtelinc.com.

- Area and meeting room systems. Options may include: FM desktop systems: portable sound field-desktop or tote bag; FM System with Speakers–Wireless; Conference Microphone; Ceiling Speakers. [9,12,13,14,16].

**Tips for Assisting People with Hearing Impairments**

- Speak in a clear, normal tone; do not over-enunciate or exaggerate words.
- Speak directly to the individual, even if there is a sign language interpreter present.
- Face into the light when speaking and do not cover or turn your face away.
- Flick the light on and off when entering a room to draw attention to your presence.
- Offer pencil and paper. While writing a message, do not talk; a hearing-impaired person cannot read a note and your lips at the same time.

- In situations where lights may be inadequate, provide the individual with a flashlight to help the hearing-impaired person lip-read in the dark. [5,8,13].
- Use a microphone when speaking to a group.
- A presenter should repeat a question raised by the audience into the microphone before answering the question.

## Conclusion

The risk of miscommunication, injury, and other dangers presented to hearing-impaired workers in the workplace can be minimized through the implementation of the practical steps described above. The best way to help hearing-impaired employees feel prepared for a workplace emergency  and be motivated to use safe work practices is to solicit their input and provide knowledge, information, and accommodation choices.

## References

1) Northern Virginia Resource Center for Deaf and Hard of Hearing Persons.   "Emergency Preparedness and Emergency Communication Access" December 2004.

2) NIOSH, www.cdc.gov/niosh/topics/noise.

3) U.S. Department of Labor/OSHA. www.osha.gov.

4) U.S. Department of Labor, Office of Disability Employment Policy. "Emergency Preparedness for People with Disabilities, Summary Report".  April 2004.

5) Federal Emergency Management Agency, U.S. Fire Administration. Emergency Procedures for Employees with Disabilities in Office Occupancies.

6) U.S. Fire Administration. Fire Risks for the Deaf or Hard of Hearing. Publication FA-202, December 1999.

7) USDA Employee Emergency Response Guide. Emergency Evacuation Suggestions for Individuals with Disabilities, pp. 29-30.

8) U.S. Fire Administration. Orientation Manual for First Responders on the Evacuation of People with Disabilities.  Publication FA-235, August 2002.

9) National Organization on Disabilities. Emergency Preparedness Initiative: Guide on the Special Needs of People with Disabilities for Emergency Managers, Planners and Responders 2002. www.nod.org, (202) 293-5960, TDD: (202) 293-5968.

10) U.S. Equal Opportunity Commission. U.S. Department of Justice, Civil Rights Division. "Americans with Disabilities Act: Questions and Answers."  August 23, 2002.

11) U.S. Department of Justice, Civil Rights Division, Disability Rights Section. Enforcing the ADA: A Status Report from the Department of Justice.  Issue 4, 2003.

12) U.S. Department of Justice, Civil Rights Division, Disability Rights Section. ADA Business Brief: Communicating with People Who Are Deaf or Hard of Hearing in Hospital Settings, October 2003.

13) NJ Arts Access Task Force. ADA Self-Assessment Survey and Planning Tool. March 2003.

14) Job Accommodation Network. "Employers' Guide to Including Employees with Disabilities in Emergency Evacuation Plans".  Linda Batiste and Beth Loy.

15) *Occupational Health and Safety*. "Safety First". Jennifer Juergens, June 2004, Vol. 73, No. 6, p. 94.

16) ADA and Accommodation of the Hard of Hearing**.** Presentation at the National Hearing Conservation Association Conference, February 2005. George R. Cook, Au.D. CCC-A, Occupational Audiologist. Workplace Group (336) 931-0300. www.workplacegroup.net.

## Other Useful Resources

1) U.S. Department of Justice, Civil Rights Division, Disability Rights Section. "ADA Information from the Department of Justice". The Department of Justice answers questions about the ADA and provides free publications by mail and fax. This 7-page document lists pertinent ADA legal documents, general publications and guides, Technical Assistance Publications for Businesses and Non-Profit Service Agencies, and Technical Assistance Publications for State and Local Governments.

2) The Office of Disability Employment Policy Technical Assistance Programs: Training and Technical Assistance to Providers (T-TAP) at www.t-tap.org, The National Center on Workforce and Disability for Adults (NCWD-Adults) at www.onestops.info, National Collaborative on Workforce and Disability for Youth (NCWD/Youth) at www.ncwd-youth.info, The Job Accommodation Network (JAN) at www.jan.wvu.edu, and The Employer Assistance Referral Network (EARN) at www.earnworks.com.

3) Resources for Assisted Listening Devices. Hearing Products Report www.hearingproductsreport.com.

4) U.S. Department of Justice, Disability Rights Section, ADA Information Services, Revised February 2004.

5) The Better Hearing Institute, http://www.betterhearing.org/ hearing_solutions/listeningDevices.cfm

6) The Access Board, An independent federal agency devoted to accessibility for people with disabilities. Provides technical assistance in ADA and ADAAG. www.access-board.gov/links/disability.

7) U.S. Department of Transportation, www.dot.gov, Federal Transit Administration, Easter Seals Project ACTION, www.projectaction.org. ACTION is a national technical assistance program to facilitate cooperation between the disability and transportation communities. It offers various resources, training and technical assistance to make the ADA work for every-one.

**Federal Agency Resources-Public Education Websites**

1) U.S. DOL  www.dol.gov  ODEP - Job Accommodation Network (JAN) www.jan.wvu.edu

2) U.S. Department of Justice  www.justice.gov ADA Information Services  www.ada.gov

3) U.S. Fire Administration  www.usfa.fema.gov

4) Federal Emergency Management Agency www.fema.gov

5) National Institute Occupational Safety and Health  www.cdc.gov/niosh/topics/

6) The Access Board  www.access-board.gov Independent Federal Agency

7) U.S. Department of Commerce www.doc.gov National Oceanic and Atmospheric Administration www.noaa.gov

8) U. S. Department of Transportation www.dot.gov Easter Seals Project Action www.projectaction.org

9) U. S. Department of Education  www.ed.gov National Institute on Disability and Rehabilitation Research (NIDRR)

10) U.S. Federal Communications Commission www.fcc.gov.  For information on Telecommunication Relay Services