

2. If hearing is judged to be necessary for CMV drivers, then new and existing drivers should be regularly tested for hearing impairment using the existing standards.

If hearing is deemed necessary for safe driving, the question of what criterion level to use in screening remains. One option would be to maintain the current standards and choice of screening methods. Some provinces in Canada and Switzerland use these standards and screening methods (in one form or another). The Federal Aviation Administration and the Federal Railroad Administration also use these screening methods.

The advantage of maintaining the status quo is that little or no additional cost would be incurred from that which already exists. The disadvantages of the current standards, though, are numerous. One limitation is that drivers with hearing impairments are not adequately identified with the current screening criteria. If hearing is necessary for safe driving, then there may be an unacceptable number of existing drivers with hearing loss on the road. From the data reviewed in Task B, one would expect 169,000 CMV drivers to have an average hearing loss greater than 40 db HL at 500, 1,000 and 2,000 Hz. Only about 2,640 drivers, though, fail their medical examinations because of difficulties with hearing. The large majority have their licenses recertified.

3. If hearing is judged to be necessary for CMV drivers, then new and existing drivers should be regularly tested for hearing impairment at the present level using only the pure-tone screening test.

It appears that the present standards are not being applied or, if applied, the results are not being used as a means for exclusion. One reason behind this may be the relative adequacy of the forced-whisper test and the pure-tone screening. The viewpoint in the hearing sciences is that the forced-whisper test may not be appropriate in the motor carrier setting. Administration of the test may vary by examiner, and the results can be influenced by the environment in which the test is conducted. The pure-tone screening test has standards to overcome these shortcomings. One option, then, may be to maintain the current screening level for pure-tone testing (not having an average hearing loss in the better ear greater than 40 db HL at 500, 1,000, 2,000 Hz), but eliminating the forced-whisper test as a screening tool.

The impact of such a change might mean that approximately 169,000 current CMV drivers could be identified as having hearing impairment, and with strict interpretation have their driving privileges revoked. This restriction, though, could depend on whether modifications to the driving environment are considered acceptable for hearing-impaired drivers. A ramification of this recommendation would be the significant cost involved in testing new applicants and existing drivers. The costs associated with maintaining the current criterion level and using standardized pure-tone screening are (1) screening (\$35 to \$55/exam) initially and every 2 years, and (2) lost employment. Applying this test to 5.5 million drivers would result in a \$247,500,000 cost that someone would have to bear.

4. If hearing is judged to be necessary for CMV drivers, then new and existing drivers should be regularly tested for hearing impairment with the pure-tone screening test using different criterion levels.

One might deem hearing necessary for driving, but attempt to update the criterion level. The indications from Tasks A, B, and C are that there is no evidence to support a hearing screening level at 40 db HL. Setting a new level may be one option. The goal, however, should be to identify criteria that could differentiate those who can perform a particular auditory task from those who cannot. In order to recommend a criterion level, one would have to define the following parameters: (1) determine which sounds are necessary for safe driving; (2) describe these sounds acoustically (intensity and frequency) within the context of the sound environment in which they will be heard and at the distance that would be required for adequate response; and (3) determine what level of hearing would be required as a function of frequency to detect the sounds in the defined environment. The data required to perform the above task do not exist currently; therefore, a specific criterion level cannot be recommended.

If a decision is made that hearing is not the primary issue, but that drivers must be alert to the four hearing-related situations noted above, then recommendations on restricted licenses and vehicle modifications can also be made. These suggestions might include the following:

5. If restricted licenses are judged to be necessary, hearing-impaired drivers should be able to wear and use a hearing aid.

6. If modifications are judged to be appropriate, hearing-impaired drivers might be required to install mirrors to enhance visual perception, alerting devices, and/or enhanced warning signal indicators, which would benefit all drivers.

Summary, it could be determined that hearing is necessary for encounters in the four described situations and that restricted licenses or vehicle modifications would be appropriate in addition to hearing screening tests. This scenario would involve some combination of the recommendations above.

License restrictions that might require that hearing aids be worn in non-driving situations or that restrict driving conditions (i.e., no routes across railway crossings that have only passive warning systems) could be recommended to limit the crash risk that could be associated with hearing-impaired drivers. Modifications such as mirrors, enhanced turning signal indicators, and alerting devices (which convert auditory signals to a flashing light) may also enable hearing-impaired drivers to overcome some of the limitations of their hearing loss. However, no data are available at present to evaluate how effective license restrictions or vehicle modifications might be with respect to driving performance.

Another issue is whether vehicle modification should apply only to the **trucks** that hearing-impaired persons operate, or to all trucks. The increasing use of insulation in tractor cabs is lowering noise levels, but also blocking out sounds that could be important for all drivers. In a situation such as this, and if hearing emergency and warning sounds is judged to be important,

then modification of all trucks might be more relevant because all drivers would gain some benefit from it. Similarly, if hearing protection devices were recommended for CMV drivers, then modification of all trucks could be helpful. The disadvantage, though, might be the cost associated with equipping all trucks with these devices as opposed to only those driven by hearing-impaired individuals. If this were a significant cost, then another recommendation might be for the use of portable alerting devices by drivers with hearing loss.

7. Grant a waiver to those who pass a driving test designed to test their abilities to compensate for the loss of hearing.

8. License only those hearing-impaired or deaf persons who have experience driving a CMV.

If hearing is judged to be important for CMV operation, then another course of action might be to permit medical waivers for sufficiently qualified drivers. A number of states already do this for their drivers licensed in intrastate commerce. The Federal Aviation Administration conducts a flight test for pilots who fail the medical examination on the basis of hearing loss. If the pilot passes the flight test (which examines ability to function in the cockpit with an impairment), then he is granted a medical waiver.

Another option is to license in a waiver program only those drivers with hearing loss who have extensive experience driving CMVs. The crash experience of these drivers could then be followed prospectively to examine the risk associated with hearing-impaired drivers. A decision regarding new applicants could be made on the basis of this prospective data.

Some question, though, still remains over how to identify the drivers for such a waiver program. Granting waivers to drivers who are screened out under the present standards might be inappropriate. The fact that only 1 in 100 drivers with hearing impairment is screened out suggests that those who lose their licenses may be quite different from the others. This is not a problem if they are selected solely on the basis of hearing (they just may be unlucky). However, if they are recognized for other reasons (unrelated or related to hearing), they might be an unusual group, and a waiver program with these drivers may not provide useful information.

Another option is to use the present screening methods only to identify existing drivers with hearing impairment. Once identified, these drivers could be permitted to retain their licenses under a grandfather clause. Thus, the penalty of being recognized as hearing impaired is removed. It may also be possible that the hearing standards might be applied differently by physicians and examiners in such a situation. The goal of such an action, though, would be to identify a representative group of drivers who can be followed prospectively to determine the crash risk associated with hearing impairment.

Summary

The focus of this contract has been to determine whether hearing is necessary for driving performance and, if so, to what degree. With so little information accessible regarding hearing and driving, though, it remains unclear if hearing is or is not necessary for the safe operation of commercial motor vehicles. Future decisions regarding the hearing standards in force for CMV drivers will have to consider this difficulty. For this reason, we have presented a number of recommendations, each prefaced with an assumption that some level of hearing is either necessary or unnecessary for CMV operation. In our judgment, four actions merit discussion:

- 1. Have no regulations related to hearing impairment.**
- 2. Keep the existing regulations.**
- 3. Keep the existing regulations, but allow medical waivers.**
- 4. Keep the existing regulations, but change the screening criteria so that only the pure-tone test is acceptable.**
 - do not allow medical waivers**
 - allow medical waivers**

If hearing is understood to have little or no role in the safety risks of CMV drivers, then it may be possible to eliminate the regulations altogether. If hearing is considered to be a significant factor in CMV job performance and safety, then a decision must be made about the type and level of testing required to detect hearing-impaired drivers, and a decision may be made concerning whether or not a waiver program will be permitted. We consider, briefly, the economic consequences of the potential actions that could occur if hearing is determined to be an important factor in Table 6-1.

The first potential action would be to keep the current hearing standards in their present format. There would likely be no cost in "implementing" this action, but we would have to account for the fact that there would be about 166,100 hearing-impaired drivers who would not be screened from licensure by the current screening methods. This is a rather large number if one assumes that ability to hear is important for job performance and safety. If these 166,100 drivers have a 1.5-fold increased risk for crashes when compared to normal hearing drivers, there would continue to be about 1,956 crashes¹ associated with hearing impairment. Assuming that the cost in terms of property damage for an average CMV crash is \$14,600 (FHWA estimates), this would represent an annual cost of \$28,600,000.

A decision could also be made to keep the present standards, but permit the issuance of medical waivers for hearing-impaired drivers. The introduction of a waiver program could increase the number of hearing-impaired drivers by about 2,900 (if only drivers who are presently identified are included). Instead of 1,956 crashes, we would now expect to see 1,990 crashes: an addition of 34 crashes. This would raise the overall costs of hearing-associated crashes from

¹ The crash risk for general CMV population (0.00785 crashes/driver/year) multiplied by 166,100 and multiplied by 1.5.

\$28,557,600 to \$29,054,000. The cost of implementing a waiver program for these 2,900 drivers is not known.

If it is decided to retain of hearing regulations, but to employ the state-of-the-art in screening methodology (the pure-tone test with an audiometer), then a decision must also be made about what hearing level to screen on. Assuming that a strict definition of hearing impairment is applied (anyone with 20 db HL as an average at 500, 1,000, and 2,000 Hz would be screened out), then the current number of hearing-impaired drivers would drop substantially. About 166,100 existing drivers would lose their jobs. While the cost of crashes in property damage would also decrease, the cost of conducting audiometric testing in all 5.5 million drivers would be substantial--\$247,500,000. It is not clear at present, though, whether an appropriate hearing level can be determined for screening purposes. There are no data on the risk for crashes by the level of impairment.

Table 6-1. Alternative Actions

	Number of Hearing-Impaired Drivers	Cost of Implementation	Number of Crashes Due to Hearing Loss Per Year	Crash Cost (property damage)
Current Regulations	66,100	\$ 0	1956	\$28,157,600
- with waivers	169,000	?	1990	\$29,154,000
Strict Audiometric Screening	0	\$ -	0	\$ 0
- with waivers	at most 169,000	at least \$247,500,000	at most 1990	at least \$9,054,000

VII. SUMMARY OF THE WORKSHOP,
“HEARING DISORDERS & CMV DRIVERS”

Introduction

Under contractual directive of the Federal Highway Administration (FHWA), a workshop bringing together professionals in audiology, medicine, safety, trucking, noise, and epidemiology was held to discuss the issues relevant to licensing hearing-impaired drivers.

The first day of the conference was devoted to an overview and discussion of the scientific background surrounding the issues to provide the FHWA with information that could be of importance in its decision-making. Reviews of the literature and risk assessment prepared by the contractors were presented. Discussion centered on whether the material was complete and interpreted fairly; bringing to light both the strengths and limitations of the data in informing the FHWA about the risks of licensing hearing-impaired drivers. Several panel members also presented related material from their own work and experience.

During the second day, discussion focused on the conclusions that may be drawn from the scientific literature regarding policy. An exchange took place on possible recommendations or indications regarding screening for hearing impairment and on a waiver program. Details of the discussions are presented below. Changes in the documents were made to reflect the concerns raised.

Day One

Comments on the literature review

The consensus that emerged secured at the workshop was that the prepared literature review covered most of the issues regarding hearing ability and CMV operation in an adequate fashion and that the conclusions drawn in the document were fair. Participants agreed that the literature provided no strong evidence to suggest that hearing-impaired drivers have a substantially increased crash risk.

The major issue raised during this session was the ability of hearing-impaired individuals to compensate, behaviorally, for their medical impairment. Panel members felt that there are a number of ways for commercial motor vehicle drivers to compensate for hearing impairments. Deaf persons may have increased visual, tactile, and olfactory awareness. Many adventitiously deaf (those who lose all hearing ability after language abilities have developed); and hard-of-hearing persons are able to augment communication by speech and may also be more sensitive to changes in background noise than normal hearing persons.

Specific comments were also raised with respect to two areas in the literature where the ability to hear has been mentioned as being potentially important for truck and bus operation: truck maintenance and oral communication. On the one hand, the point was made that drivers are trained to listen for unusual sounds and leaks (e.g., in air-brake hoses) during pre-trip inspections. Hearing is the only sense that can detect certain warning signs. On the other hand, the point was made that many drivers do not conduct pre-trip inspections especially in large trucking firms. The Americans With Disabilities Act also requires that employers provide available technologies or assistance to overcome limitations.

Oral communication deficiencies were highlighted as a potential safety risk for CMV drivers, particularly bus drivers. The actual operational safety risks, though, are not known. Oral deficiencies also may be overcome with the help of written communication, amplifying devices, or a relatively new device, the cochlear implant. It was noted that job descriptions can also require hearing ability beyond that required by the FHWA. For example, the job description for bus driving could require verbal communication skills as necessary to provide the required service.

Some discussion centered on the study by Coppin and Peck of automobile accidents among deaf drivers in California. It was decided that, while Coppin and Peck's study was well designed and the best available at this time, the literature review should stress that the study is outdated, as the driving environment has changed considerably in the last 30 years (e.g., increased insulation and "soundproofing" are now available in motor vehicles). Other concerns of participants were that: (1) it is difficult to generalize the results found in the study for deaf automobile drivers to those which might be expected for either deaf or hard-of-hearing truck drivers, and (2) there is no explanation for the different results which Coppin and Peck found between deaf men and deaf women.

Comments on the risk assessment

Overall, panel members felt that the risk assessment was appropriate. They suggested that the report should stress that the literature-derived estimates of risk are highly uncertain because of the many limitations in the available data. For example, nearly all data available concern deaf drivers, while it is estimated that the majority of drivers who would be affected by a change in the current regulation would be hard-of-hearing drivers. Further, nearly all available studies are based on automobile drivers and, as discussed above, the best study is probably outdated.

Participants felt that it was important to note in the risk assessment that, while there are few well-designed studies on the effects of hearing impairment on motor vehicle operation, it does not appear that the crash risks of deaf automobile drivers are terribly high. As inadequate as the literature is, it is likely that a high relative risk for crashes would have been found if it existed.

More specific deliberations focused on information on the driving records of four hearing-impaired CMV drivers in Oregon and data regarding a nighttime ban on train horns in Florida. The first draft of the risk analysis reported that, based on a sample of four drivers, the relative crash risk of hearing-impaired drivers may be as much as 4 times higher than the rate for the general CMV driver population (based on DOT reportable accidents). Consensus was reached that the risk assessment should stress that conclusions about relative risks based on a sample of four drivers are highly uncertain. The confidence intervals that surround the estimates are large, especially because the crash rate reported by the State of Oregon for these drivers was based on only one accident.

The risk analysis also reported that after banning train horns at night in Florida, the number of motor vehicle collisions with trains nearly tripled, suggesting that ability to hear warning signals may play a role in preventing such collisions. Consensus was reached that no relative risk for hearing impairment can be inferred from the data because of a series of limitations with respect to CMV operation, including: (1) the study looked at another population (motor vehicles

net CMVs); (2) data were lacking on whether trucks were involved in any of the crashes; (3) there was no indication of whether any drivers were hearing-impaired; and (4) no consideration was given to the noise environment in which truck drivers operate.

It is also suggested that the risk assessment should place less emphasis on highway driving and heavy trucks because a large portion of CMV drivers drive locally, and a large portion of trucks on the road are delivery trucks. It was also agreed that the risk analysis should note that if truck cab noise levels are as high as reported (e.g., 90 db SPL) then all drivers are effectively deaf while driving, so that the question of hearing in this setting is irrelevant.

Presentations

Dr. Jean-Marie Ekoe presented information on the licensing status of drivers with medical impairments in the province of Quebec, Canada. Quebec is studying the driving risks associated with diabetes, coronary heart disease, and vision disorders among a group of CMV drivers with these impairments and a matched control. Preliminary results from this case-control study were shown. Dr. Ekoe indicated that the study of the risks related to hearing-impairment was viewed as a minor issue in Quebec. Regulations in Quebec have been changed progressively from 1981 to 1988 to allow hearing-impaired persons to operate CMVs. Presently only one deaf driver is licensed for CMV operation in Quebec.

Dr. Robert Wallace presented preliminary results from a dataset of elderly drivers in Iowa which suggest that elderly persons who are hard of hearing may have an automobile accident rate similar to that of elderly drivers with fairly normal hearing levels. Based on a sample of more than 3,500 drivers, Dr. Wallace reported no significant difference in the probability of an accident between the two groups of drivers.

Dr. David Lipscomb presented information relevant to the audibility of warning sounds to a CMV driver. He indicated that a person in a noise environment of 92 db SPL, such as that of a truck cab at operating speeds, is functionally deaf. He noted that: (1) a warning sound must be 9 in 10 db above the background noise levels to be adequately audible; (2) hearing protection devices are required in other high-noise industries; (3) linear earplugs are an innovation that could be useful in a CMV setting; and (4) hearing-impaired drivers can probably compensate for their impairment.

Dr. Marc Kramer presented an overview of the difficulties and limitations that governments and industry face in setting policies for the hearing-impaired and for hearing protection. He had been involved in a project that involved assessing whether hearing was crucial for various job tasks required of corrections officers. He introduced information to show that it is very difficult to assess and measure the role of hearing in occupational tasks.

Dr. Richard Schwing stressed the role of driver behavior in causing and preventing accidents. He indicated that, in some scenarios, drivers can compensate for potential risk factors to such an extent that they are actually safer drivers than drivers in the general population. He said that it is important to determine whether hearing-impaired drivers can compensate similarly.

Day Two

Comments on screening for hearing impairment

Panelists felt that there were some problems with the current FHWA hearing screening standards. The forced whisper test, though widely used, is unreliable and cannot be replicated, meaning that a person with a given impairment may pass the test with one doctor, but not with another. Audiometric examinations are standardized, but require training of personnel and are expensive. The overriding opinion was that the forced whisper test was inappropriate for screening and that audiometric tests were an accepted standard.

Given participants acceptance that audiometric screening would be more appropriate than forced whisper screening, a number of questions important to regulatory decisions were raised to the panel members, "If we require tests, who should perform them? If we allow waivers and test periodically, how often should we test, and what do we test for?" These queries were followed by a good deal of discussion; the consensus was:

1. It is not possible to decide which tests are needed without first knowing whether there are specific auditory cues available to drivers such that hearing plays a role in safety.
2. If it is determined that hearing plays a role in driving safety, then it must be determined what level of hearing is needed for each job task.
3. After determining what level of hearing is needed, an audiologist could design an appropriate testing protocol. It is not possible to say who should perform the tests until it is known what they are. The tests should have a low false-negative rate (i.e., passing someone who ought to fail), and additional tests must be available to ensure that there are no false-positive tests (i.e., failing someone with sufficient hearing).
4. Any required testing should be inexpensive and easily performed at any doctor's office. This is necessary because most truck companies are small and are not necessarily located near facilities that could provide tests that require highly specialized professionals or equipment.

Some ~~panels~~ expressed doubts that a study could indicate whether a hearing screening would be ~~required~~. It is possible that all drivers are functionally deaf in the cab because of the high noise levels. Further, if truck driving were classified as a dangerous profession because of high noise levels, then drivers would need hearing protection, and hearing may not be available in any event, because hearing protection in most cases blocks hearing.

Comments on potential policy decisions

Most discussion on the second day focused on determining what possible conclusions, if any, could be drawn from the scientific literature regarding policy. The potential policy actions were generally outlined as: (1) Do nothing; keep the regulations as they are. (2) Do away with the

hearing requirements completely; and (3) Have something in between the first two options such as have some regulations regarding hearing, but not me current standards.

Central to this issue, though, was the determination of whether or not hearing is reasonably necessary for safe CMV operation. This question was posed to all participants, with the chair asking respondents to first consider the question on the basis of the existing literature, and second on the basis of their experience or other knowledge.

Responses did not vary considerably among the participants. The general feeling was that hearing played a minor role in safe CMV operation. Comments were raised that 'me current literature doesn't suggest that a large risk exists related to hearing, that the noise levels of the driving environment can render hearing irrelevant to the task, and that the issue may be better considered at the job-level description or between the employee and employer. At the same time, the point was brought out that, because of the uncertainty of existing studies, one cannot rule out that hearing is not important for safe CMV operation. The personal experiences of the participants bore this conclusion out as well. Comments were raised that hearing would be important for its augmentation of the visual sense and that hearing is necessary in situations where it is not possible to gather facts by the other senses.

The prevailing recognition was mat few.data exist on the crash and driving records of drivers with hearing impairments, particularly in the **CMV** setting. Quite a few panel members advised that hearing-impaired persons should be permitted to be licensed, but that they should be monitored over a period of time to determine if a higher safety risk does or does not exist.

The FHWA indicated that it has already decided to give waivers to drivers with vision impairments under certain conditions. THE FHWA asked for panel members' thoughts on the possibility of a similar program for hearing-impaired drivers. Nearly all participants were receptive to this idea. Their recommendations included the following:

1. Have an audiologist design a procedure for testing hearing so that accident rates can be tracked by degree of impairment. This could be as simple as classifying people as mildly hard of hearing, severely 'hard of hearing, and deaf, or as rigorous as performing a complete audiometric test battery. This is important because to date most available literature focuses on deaf persons, but most affected truck drivers will be hard of hearing.
2. **In order** to determine relative risk, a waiver program must control, at a minimum for type of truck (e.g., delivery vs. semi), type of driving (e.g., mainly city vs. mainly highway), and risk exposure (e.g., miles per year).
3. There is more than one perspective to consider in any evaluation. Most hearing loss (excluding congenital deafness and possibly adventitious deafness) is highly correlated with age, and thus with CMV driving experience. On the fit statistical evaluation, an appropriate comparison group for older drivers with hearing loss is probably older drivers without hearing loss; they would have similar levels of driving experience and could show the independent influence of hearing on safety. However, it would also be important to consider how me

experience of hearing-impaired drivers compares to that of the overall CMV driving population, as well as with that of inexperienced drivers who would be the most likely replacements for older, experienced drivers (when, e.g., they lose their jobs due to noise-induced hearing loss, depending on the hearing regulations).

4. There was some sentiment that the government should focus its resources on impairments that are believed to pose a greater safety risk than does hearing loss. One possibility would be to use the Canadian model and actually test to see if the crash risk is higher for drivers with medical impairments. Representatives from the FHWA responded that, because of concerns for guaranteeing public safety, it was unlikely that they could grant waivers without a monitoring program.

5. The FHWA should be encouraged to undertake one large study to examine the effects of all disabilities for which waivers are going to be granted, rather than a separate study for each. This would reduce planning and administrative costs and increase statistical power.

“Hearing Disorders and Commercial Drivers”
June 8-9, 1992
Alexandria, VA

AGENDA

Monday June 8, 1992

- 9:00 am. - 10:00 am. FHWA Presentations
- Introduction
Elaine Viner, Office **of Motor Carrier Standards**
 - Welcoming Remarks
Jill Hochman, Office **of Motor Carrier Standards**
 - Vi&o Presentation
- 10:00 am. - 10:15 am. Welcome and Introductions of Participants
Ronald **Laporte, University of Pittsburgh**
- 10:15 am. - **10:30** p.m. coffee
- 10:30 am. - 12:30 p.m. Issues Relevant to Hearing Disorders and Commercial Driving’
- Chair: Lester Lave. **Carnegie-Mellon University**
- Introduction
Thomas Songer, University **of Pittsburgh**
 - Role of Hearing in the Driving Task
Catherine Palmer, University of Pittsburgh
 - Hearing Loss and Motor Vehicle Crashes
Thomas Songer
 - Noise and Noise-Induced Hearing Loss
Evelyn Talbott
University of Pittsburgh
 - Hearing Loss in CMV Drivers
Ronald LaPorte
 - Screening Auditory Capabilities
Catherine Palmer
 - summary
Thomas Songer

10-minute presentations, 10-minute comment periods.

12:30 p.m. - 1:30 p.m. Lunch

1:30 p.m. - 2:30 p.m. Panel Member Presentations

Jean-Marie Ekoe, MD
Robert Wallace, MD
David Lipscomb, PhD
Marc Kramer, PhD
Richard Schwing, PhD

Chair: Ronald LaPorte

2:30 p.m. - 5:30 p.m. Risks Associated With Hearing-Impaired Drivers

Chair: Ronald LaPorte

-Introduction
Lester Lave

-Risk Analysis
Thomas Songer

3:15 p.m. - 3:30 p.m. Break

3:30 p.m. - 4:30 p.m. -Comments and Discussion

4:30 p.m. - 4:45 p.m. -State and International Regulations for CMV Operation
Jennifer Gibson
University of Pittsburgh

4:45 p.m. - 5:30 pm. -Comments and Discussion

Tuesday June 9, 1992

8:00 a.m. - 12:30 p.m. Recommendations/Choices Regarding ~~Hearing Devices~~ and Commercial Drivers

Chair: Lester Lave

8:00 a.m. - 8:30 a.m. Overview

8:30 a.m. - 10:15 am. Discussion

10:15 a.m. - 10:30 a.m. coffee

10:30 a.m. - 12:30 p.m. Discussion

12:30 p.m. Adjournment

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VIII: GLOSSARY

Audiometer' -primary instrument used by the audiologist to measure hearing threshold. (Bees & Humes 1990)

Body Soundproofing — technique used by engineers in design to limit the amount of noise that enters the cab of a truck from the engine.

CMV — Commercial Motor Vehicle; in this context, refers to large trucks weighing at least 12,000 lbs operating in commerce.

db(A) — a sound level measured with a meter using an A-weighting network (filtering that approximated the 40-phon curve). It is the dB scale usually used to measure sound to which people are exposed. (Katz 1985)

Deaf — used to denote any person whose auditory channel is sufficiently damaged to preclude the auditory development and comprehension of speech and language with or without amplification. (Alpiner & McCarthy 1987)

Forced-Whisper Screening — one procedure used to test hearing before the audiometer became commercially available. The examiner used either spoken voice or whispered voice whether the patient responded appropriately. The obvious problem with this type of procedure is that it is difficult to determine the level of one's voice or whisper.

HL — Hearing Level; the level of a sound relative to 20 dB HL, which is equal to average hearing threshold for young, normally-hearing adults. It is the dB reference on audiometers and ordinarily conforms to ANSI Standard 3.61969 (R1973). (Katz 1985)

HPD -Hearing Protection Device; devices used to inhibit sound (loud noise) entering the ear used to preserve the individual's residual hearing.

Hz — hertz; unit measuring frequency of sound equal to one cycle per second.

Hearing Loss- any loss of sound sensitivity. partial or complete., produced by abnormality anywhere in the auditory system. (Martin 1984)

~~Hearing Threshold~~ the faintest level at which a listener can detect 50% of the signals presented.

Intensity — the physical correlate of loudness; measured in decibels.

Masking — the amount by which the audibility threshold is worsened by the introduction of another sound. (Katz 1985)

Noise-Induced Hearing Loss (NIHL) — a sensory or sensory-neural impairment of hearing sensitivity usually greatest around 3000-6000 Hz, caused by long term noise exposure. (Katz 1985)

Pure-Tone Screening — brief, inexpensive examination, usually of many people, to find those likely to have hearing loss. Intensity is set at one level and presented at each frequency. The intensity level is not varied. One either passes or fails a screening. (Katz 1985)

Road Accident — a collision involving at least one vehicle, resulting in property damage, injury, or death.

SPL — Sound Pressure Level; a dB level on a scale that has 0 dB equal to 20 micropascals.

Temporary Threshold Shift (TTS) — **short-term** effect which may follow an exposure to noise.. It refers to an elevation in hearing threshold which recovers gradually following the noise exposure.. (Katz 1985)

HCS-1 0/3-93(1 00)E
HCS-10/R5-93(100)
HCS-20/R8-95(50)