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Millions of American workers have been exposed to occupational noise levels which may result in hearing impairment. Federal civilian employees are covered by the Federal Employees' Compensation Act which is administered by the Office of Workers' Compensation Programs (OWCP) in the Department of Labor. Between 1969 and 1976, about 36,000 claims for hearing impairment compensation were filed by Federal civilian employees for a potential liability exceeding \$185 million. Findings/Conclusions: Most of this liability was due to Department of Labor modifications in 1969 and 1973 of a generally accepted hearing impairment formula developed by the American Academy of Ophthalmology and Otolaryngology (AAOO) and endorsed by the American Medical Association. The Act itself does not specify the criteria to be used in determining the extent of an employee's permanent impairment. It specifies that only the permanent portion of an impairment which must have been proximately caused by employment qualified for a scheduled award. These factors are often inadequately established and result in considerable overcompensation. While OWCP regulations require that compensation be provided for the full degree of impairment if the condition was aggravated by the occupational environment, agency officials have expressed concern as to whether the employer should be liable for the portion of impairment that existed before employment. Recommendations: The Secretary of Labor should have the OWCP immediately adopt the AAOO's formula for determining hearing impairment. Any future changes in the hearing impairment formula should be based on appropriate scientific research and advice from other Government agencies and scientific and medical organizations. The OWCP should employ noise-exposure level standards recommended by the

National Institute for Occupational Safety and Health as the basis for determining occupational relationship to noise-induced hearing impairment; and it should require the use of testing procedures which exclude temporary hearing loss and exaggerated responses in establishing degrees of hearing impairment. (RRS)

6578

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

To Provide Proper Compensation For Hearing Impairments, The Labor Department Should Change Its Criteria

Under the Federal employees' compensation program, the Department of Labor uses an improperly modified formula for computing hearing impairment. Most of the \$185 million potential liability for claims filed under the program since 1969 is due to Labor's inadequately justified modification of a generally accepted formula developed by the American Academy of Ophthalmology and Otolaryngology.

The Federal Employees' Compensation Act specifies that only the permanent portion of an impairment qualifies for a scheduled award and that the permanent impairment must have been proximately caused by the employment. These factors are often inadequately established and result in considerable over-compensation.

GAO is making recommendations to correct the formula, to improve the assessment of employer liability for hearing impairment, and to improve the accuracy of assessing the extent of permanent hearing loss.



HRD-78-67
JUNE 1, 1978



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-157593

To the President of the Senate and the
Speaker of the House of Representatives

This report describes the Department of Labor's need to change hearing impairment criteria to provide proper payment under the Federal Employees' Compensation Act.

Due to the steady increase in claims for hearing impairment compensation under the act, we reviewed the program to determine if it conforms with the act's intent and whether Labor performs its operations effectively and efficiently.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget, and the Secretary of Labor.

A handwritten signature in black ink, appearing to read "Thomas B. Heath".

Comptroller General
of the United States

D I G E S T

Claims by Federal workers for hearing impairment compensation under the Federal Employees' Compensation Act have steadily increased from 500 in 1969 to nearly 9,000 in 1976. About 36,000 claims during this 8-year period account for a total cumulative expected liability of about \$185 million. (See p. 1.)

The act does not specify the criteria to be used in determining the extent of an employee's permanent impairment, only the amount of compensation to be awarded. Consequently, the Department of Labor's Office of Workers' Compensation Programs has relied on the American Medical Association's guides for evaluating permanent impairments of all types, except hearing impairment. (See p. 7.)

Labor deviated from the Association's hearing impairment criteria for 1969 by modifying the Association's formula (adopted from the American Academy of Ophthalmology and Otolaryngology in 1961) for computing percentage hearing impairment so that more claimants could have their hearing loss classified as an impairment. (See p. 10.)

The National Academy of Sciences and the American Academy of Ophthalmology and Otolaryngology stated that this modification was not justified scientifically. (See p. 12.)

Labor modified its formula again in 1973, partially based on a 1972 report by the National Institute for Occupational Safety and Health. This report, however, was addressing another matter and only discussed one of several aspects of the formula.

Labor's 1973 modification still did not resolve the issue raised by the National Academy of Sciences and the American Academy of Ophthalmology and Otolaryngology. (See pp. 11 and 12.)

Most of the \$185 million potential liability for the 36,000 claims under the program is due to Labor's modifications of the Association's generally accepted formula. (See p. 13.)

The act specifies that only the permanent portion of an impairment qualifies for a scheduled award and that the permanent impairment must have been proximately caused by the employment. (See p. 16.)

While Labor requests employers to furnish information regarding the claimant's occupational exposure to noise, Labor's guidelines do not specify what intensity of noise and length of exposure (in hours per day or years of daily exposure) are necessary to establish a reasonable assumption of hearing impairment resulting from work environment. Guidelines simply note that prolonged exposure to noise above 85 decibels can prove damaging to hearing. (See p. 17.)

However, the National Institute for Occupational Safety and Health, recommends--for hearing conservation purposes--that employees not be exposed to daily noise levels exceeding 85 decibels for 8 hours, and indicates that daily exposure to less than this level for many years would result in insignificant impairment. (See pp. 5 and 16.)

In the 98 cases GAO reviewed, data on noise levels was sufficient to determine whether the claimants were exposed to levels above 85 decibels, but data on length of exposure at various levels was often not sufficient to determine that the work environment significantly contributed to the impairment. (See p. 18.)

Of the 50 awards reviewed in the Washington, D.C., and Jacksonville district offices, only

one had sufficient detail for comparison to the Institute's recommended criteria. Of the 48 awards reviewed from the San Francisco district office, however, 46 contained sufficient data for a comparison. (See p. 18.)

GAO found that in 2 of these 46 cases, none of the employees' impairment developed during periods of Federal civilian occupational noise exposure exceeding the Institute's recommended criteria. The compensation awarded in these 2 cases totaled \$26,000, or 6 percent of the total amount awarded in the 46 cases. (See p. 18.)

The audiograms provided by examining physicians (otologists) occasionally may not accurately reflect the claimant's true degree of permanent hearing loss. The recorded hearing loss may include (1) a degree of temporary loss resulting from recent occupational or nonoccupational noise exposure or (2) attempts by the claimant to exaggerate his true loss during the test. (See p. 19.)

Sometimes indications of test reliability can be derived by comparing it with other audiograms previously given to the employee by the employing agency. However, the accuracy of test results can only be assured when testing excludes temporary loss and exaggerated responses. (See p. 19.)

From a random sample of 98 hearing impairment awards from Labor's Washington, D.C., Jacksonville, and San Francisco district offices, GAO found 20 awards for which it believes there was sufficient evidence in the files to question the accuracy of the audiograms used as the basis of compensation. (See p. 20.)

In six of these awards, for example, there were audiograms supplied by a medical university's speech and hearing facility, in addition to those submitted by a private otologist. In each case, the university's test showed considerably less hearing loss than the otologist's audiograms. The average percentage impairment for these six cases was

37 percent from the otologist's tests and 21 percent from the university's tests. (See p. 20.)

The total extra amount paid in all 20 awards (for which GAO believes there was more reliable evidence for the claimants' true permanent impairment) was \$125,281, or 15 percent of the total amount awarded in the 98 cases. (See p. 21.)

RECOMMENDATIONS TO
THE SECRETARY OF LABOR

In view of the lack of scientific justification for Labor's modifications of the hearing impairment formula developed by the American Academy of Ophthalmology and Otolaryngology, and the resulting substantial increase in costs to the Federal Government, GAO recommends that the Secretary direct the Assistant Secretary for Employment Standards to have the Office of Workers' Compensation Programs immediately adopt the Academy's formula, without modification, for determining hearing impairment. (See p. 15.)

GAO further recommends that any future changes to the hearing impairment formula be based on appropriate scientific research and that advice be obtained from other Government agencies and scientific and medical organizations interested in the proper determination of hearing impairment. (See p. 15.)

To improve the determination of the extent the work environment contributed to hearing impairment, and to improve the accuracy of the assessment of the extent of permanent hearing impairment, GAO recommends that the Secretary direct the Assistant Secretary for Employment Standards to have the Office of Workers' Compensation Programs:

- Employ the noise-exposure level standards recommended by the National Institute for Occupational Safety and Health as the basis for determining occupational relationship to noise-induced hearing impairment.

--Require the use of testing procedures which exclude temporary hearing loss and exaggerated responses in establishing degrees of hearing impairment. (See p. 25.)

The Department of Labor advised GAO that it prefers to await the results of its planned hearing loss research study before considering GAO's recommendations. Labor also questioned the statistical reliability of GAO's sample. (See app. I.)

To protect the interests of the Government and taxpayers, GAO's recommendations should be adopted immediately. GAO is emphasizing that its random sample of hearing impairment cases from three district offices adequately identified problems in Labor's administration of compensation benefits for hearing impairment.

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ABBREVIATIONS

AAOO	American Academy of Ophthalmology and Otolaryngology
AMA	American Medical Association
EPA	Environmental Protection Agency
GAO	General Accounting Office
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OWCP	Office of Workers' Compensation Programs

CHAPTER 1

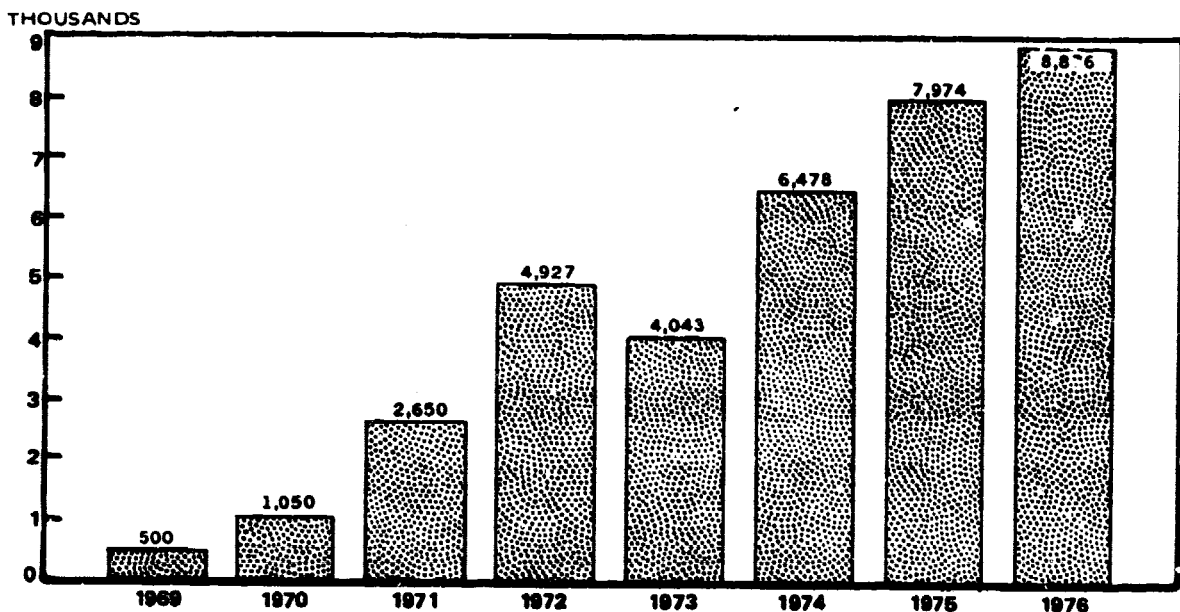
INTRODUCTION

Millions of American workers have been exposed to occupational noise levels which may result in hearing impairment. For those who can establish that the occupational noise exposure contributed to their hearing impairment, compensation payments, based on the degree of hearing impairment, are available through their State or Federal workers' compensation programs. Federal civilian employees are covered by the Federal Employees' Compensation Act (5 U.S.C. 8101) which is administered by the Office of Workers' Compensation Programs (OWCP) in the Department of Labor's Employment Standards Administration.

This report concentrates on the criteria used by OWCP for measuring hearing impairment and for establishing the occupational noise relationship to hearing impairment.

GROWTH OF HEARING IMPAIRMENT COMPENSATION UNDER THE ACT

Claims for hearing impairment compensation from Federal civilian employees have steadily increased from 500 in 1969 to nearly 9,000 in 1976, or about 36,000 during those 8 years, for an estimated total cumulative liability of about \$185 million. About 25,000 of these claims were adjudicated by November 1976, with about 80 percent of the claimants receiving an award, which averaged about \$7,000. Labor estimates that, based on claims adjudicated through January 1978, the approval rate has decreased to about 60 percent. The following chart illustrates the growth in hearing impairment claims under the act over the 8-year period.



Over 90 percent of the claims originated with Department of Defense employees, mostly from naval shipyards where hazardous noise levels are common.

OWCP officials were unable to estimate future growth of hearing loss claims.

NATURE OF HEARING LOSS/IMPAIRMENT

Hearing loss refers to the reduction of hearing ability between the average normal hearing of a young child and total deafness. Hearing impairment occurs when the hearing loss is great enough to interfere with the ability to hear and interpret speech.

Physics of hearing

The ear basically consists of the parts known as the outer, middle, and inner ear. Sound is generated by a source producing vibrations (sound waves) that may travel through any media and which, in air, actuate the hearing mechanisms. These vibrations set in motion the ear drum and small bones, or ossicles, of the middle ear. The motion of the ossicles, in turn, produces vibrations in the fluid in the inner ear's sensory organ, the cochlea. The vibrations are then transduced into nerve impulses by sensory hair cells (of which there are about 20,000) and transmitted to the brain, where they are perceived as sound.

Frequencies

The human ear, without hearing loss, can identify a wide range of sounds or pitch. For example, the musical pitch "A" above middle "C" can be produced on a piano by the key-activated hammer striking a string, which oscillates back and forth at a rate of 440 cycles per second, producing a fundamental frequency of 440 cycles per second. Humans can identify sounds with frequencies from about 16 to 20,000 cycles per second. Frequencies normally identified as being important for hearing speech range from about 500 to 4,000 cycles per second, with those of the greatest importance around 1,000 to 2,000 cycles per second.

Decibels

Loudness or intensity of sound depends on the energy behind the sound wave. The wave strikes the ear with a certain force; if the intensity of the sound is great, the force will be great also. This physical event is comprehended psychologically as loudness. A unit of intensity is a decibel. The sound level of conversational speech, for example, is about 60 decibels; fairly loud speech is about 70 to 80 decibels. Rock music may go up to 120 decibels.

Measurement of loss/impairment

Besides measuring intensity of sound, the decibel is the unit of measurement of hearing loss. An audiometer produces pure tones at different levels of loudness and in each of several frequencies. The lowest decibel level of loudness heard by a person is his hearing level for that particular frequency. Through a formula, these decibel levels are weighted, or averaged, for certain frequencies deemed important for speech communication and converted to a percentage of impairment.

The American Medical Association (AMA) supports a formula developed by the American Academy of Ophthalmology and Otolaryngology (AAOO) in 1959, which converts the simple average of hearing levels (in decibels) recorded in frequencies of 500, 1,000, and 2,000 cycles per second to percentage impairment. AAOO considers that an individual has suffered a hearing impairment--loss of ability to hear and interpret speech--when he or she has an average hearing level above 25 decibels. An average hearing level of 92 decibels represents a 100-percent hearing impairment in the AAOO formula. Thus, each average decibel between 25 and 92 represents a 1.5-percent hearing impairment.

Noise-induced loss

In hearing loss resulting from occupational noise exposure, the damage is caused to the hair cells of the inner ear (sensorineural deafness); unlike damage to the mechanical parts of the outer and middle ear (conductive deafness), this loss is generally not surgically correctable.

The growth of noise-induced damage primarily depends upon the intensity and duration of the noise and upon the sensitivity of the individual's ears. Noise-induced damage generally occurs first to the hair cells associated with the perception of frequencies between 2,000 and 8,000 cycles per second, with the greatest loss usually occurring at 4,000 cycles per second. As the exposure to noise continues, other hair cells become affected and the hearing impairment increases and spreads to higher and lower frequencies.

Causes other than noise exposure produce similar patterns of damage. The most common cause of sensorineural deafness is advancing age, or presbycusis, where the higher frequencies are affected first, with lower frequencies gradually following. Both noise-induced and presbycusis-related damage generally affect both ears at about the same degree. Other causes of sensorineural loss include meningitis, infections, drugs, multiple sclerosis, heredity, otosclerosis, neuritis, and vestibular disorders.

The Department of Health, Education, and Welfare's National Institute for Occupational Safety and Health (NIOSH) estimates that about 20 percent of the non-noise-exposed population by ages 55 to 70 will have a hearing impairment.

HEARING CONSERVATION

While compensating for impairment is the objective of workers' compensation programs, preventing injury is the objective of such agencies as NIOSH, the Department of Labor's Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA). Regarding hearing conservation, these agencies' objectives are to reduce the amount of noise exposure; their studies generally concern the percentages of the population protected or unprotected from loss or impairment with different noise exposure levels.

EPA, for example, contends that any measurable hearing loss at any frequency is unacceptable if the goal is the protection of health and welfare, with an adequate margin of safety. The Agency states that for most environmental

noise, protection at 4,000 cycles per second will insure that all other frequencies are protected. The Agency notes that a 75-decibel exposure for 8 hours a day for 40 years would cause a maximum of a 6-decibel hearing level shift in the 4,000 frequency in 90 percent of the population thus exposed.

NIOSH, in 1972, developed criteria for a recommended standard which would better protect the working population from incurring noise-induced hearing loss that could impair their abilities to understand everyday speech. NIOSH recommended a maximum exposure level of 85 decibels for an 8-hour day, but recommended that OSHA defer from adopting this standard for established installations until after an extensive feasibility study. A subsequent study by a management consulting firm estimated that it would cost industry about \$8 billion to meet this standard through engineering controls, or about \$284 million a year through nonengineering controls (i.e., hearing protection and audiometric testing and monitoring). OSHA's present standard incorporated a 90-decibel maximum exposure for an 8-hour day.

Within the Department of Defense there are different noise exposure standards for each service. The Navy and the Defense Logistics Agency permit exposure up to a 90-decibel level, whereas the Army and Air Force permit exposure up to 85- and 84-decibel levels, respectively.

We issued a report ^{1/} on these differences and the Department of Defense, as of November 1977, drafted an instruction which proposes uniform procedures to establish and maintain hearing conservation programs. This instruction establishes a uniform policy of placing personnel in hearing conservation programs when they are exposed to more than 85 decibels for an 8-hour day.

ADMINISTRATION OF COMPENSATION

Compensation benefits provided under the Federal Employees' Compensation Act for occupational injuries and disease include compensation for loss of wages and dollar awards for bodily impairment or disfigurement, medical care, rehabilitation services, and compensation for survivors. In addition to administering the act, OWCP also administers the Longshoremen's and Harbor Workers' Compensation Act,

^{1/}See our report to the Congress entitled "Hearing Protection: Problems In The Department Of Defense," (LCD-77-308, Sept. 15, 1977).

which covers certain private-sector workers, including those working in the District of Columbia. Most other private-sector workers are covered by the various State workers' compensation statutes. Disabling injuries incurred during active military service are compensated by the Veterans Administration after separation from the service.

To relieve the OWCP district offices of some of their hearing loss claims backlog (a total backlog of about 12,000 hearing loss claims filed before 1976), a special task force of claims examiners was established in 1976 within the OWCP national office exclusively to adjudicate these claims. The task force, which has about 27 examiners plus support staff, is taking the backlog from each district office, starting with the New York and Washington, D.C., offices.

SCHEDULED AWARD

Compensation for hearing impairment under the Federal Employees' Compensation Act is provided as a "scheduled award." A scheduled award is provided for certain permanent disabilities, including hearing loss and loss of the use of other bodily functions or members, such as portions of the limbs and loss of vision. Benefits for scheduled awards are calculated in the same manner as those paid for other partial or total disabilities (66-2/3 percent of the employee's regular pay, or 75 percent in cases when the employee has one or more dependents); however, they are paid for a specified period of time for a specific loss.

Scheduled awards are payable whether or not the impairment results in a loss of wages. Compensation for loss of wage earning capacity may be paid after the schedule expires. The general purpose of scheduled awards is to obviate two problems in applying workers' compensation: (1) fairly and objectively determining precisely how much a particular impairment diminishes an individual's earning capacity and (2) compensating an employee for loss of a bodily function or member, despite the fact that the employee can return to work without apparent wage loss.

Under the act, hearing impairment is compensated for 200 weeks if the employee has a total impairment of hearing in both ears (binaural impairment), 52 weeks for a total impairment in one ear (monaural impairment), or a proportionate number of weeks dependent upon the percentage of impairment. For example, an employee with a 25-percent binaural impairment, a \$280 weekly salary, and dependents would receive \$10,500 (25 percent x 200 weeks x 75 percent x \$280). The maximum weekly compensation allowed is about \$678 (75 percent of the maximum pay for a Federal employee at the GS-15 level).

CHAPTER 2

IMPACT ON BENEFITS DUE TO

LABOR'S CHANGE IN FORMULA

The Federal Employees' Compensation Act does not specify the criteria to be used in determining the extent of an employee's permanent impairment. The act only specifies the amount of compensation to be awarded. Consequently, Labor relied on the American Medical Association's guides for evaluating permanent impairment, and did so consistently for all types of impairment until 1969. At that time, Labor modified the formula in the AMA guidelines, which AMA had adopted from the American Academy of Ophthalmology and Otolaryngology in 1961, so that more claimants could have their hearing loss classified as an impairment. Labor modified its formula again in 1973, partially based on a 1972 report by the National Institute for Occupational Safety and Health. Meanwhile, Labor continues to use the AMA guides for evaluating all other impairments.

The impact on benefits from these modifications was substantial. While the total impact could not be precisely determined--because we were unable to draw a nationwide random sample from all hearing loss cases--the 98 hearing impairment awards sampled from the Office of Workers' Compensation Programs' Washington, D.C., Jacksonville, and San Francisco district offices are representative. All 98 awards reviewed were awarded under the 1973 modified formula and totaled \$823,187. ^{1/} If the awards had been made using the AMA criteria, the total awarded would have been reduced by 63 percent to \$308,154.

The Labor modification of 1969 was done administratively, without benefit of medical or scientific study. The 1973 modification was partially based on a report by NIOSH which was addressing another matter (hearing conservation). The

^{1/}On December 27, 1976, we raised questions concerning OWCP's mathematical computation of the percentage of hearing loss under the 1973 modified formula. (See app. II for a detailed explanation of the computation method.) As a result, OWCP changed its method of computing the percentage of hearing loss. The change has resulted in a significant reduction in subsequent claims paid. For example, if the amount of the 98 awards were computed under the revised method, they would be reduced by 13 percent to \$710,436.

report, in that connection, only discussed one of several aspects of the formula and neither developed nor recommended a formula for measuring impairment.

LABOR'S MODIFICATIONS OF THE AAOO FORMULA

Labor's current formula is a modified version of a formula AAOO developed in 1959 and AMA adopted in 1961. The following briefly describes how these events evolved and their relationship to the current Labor formula.

AMA's adoption of the AAOO formula

The basis of the current AMA and subsequent Labor criteria originated with a complex hearing impairment formula tentatively adopted by AMA in 1947. The medical community's lack of acceptance of this formula led to AAOO developing a simplified formula which was published in 1959 and which AMA adopted in 1961.

AMA's tentative 1947 formula

Before adopting the AAOO formula in 1961, AMA recommended using a tentative standard procedure which it had endorsed in 1947. This tentative standard was more complex than the subsequent AAOO formula because it weighted the importance of each frequency's contribution to the capacity of hearing speech; thus, the loss of a given number of decibels in the middle of the intensity range became more important than corresponding losses for either very weak or very strong sounds. (This formula, applied to our sample of 98 awards, would have resulted in 88 percent more compensation than with the subsequent AAOO formula, but 12 percent less than Labor's current formula would have provided.)

AMA's Council on Physical Medicine and Rehabilitation reported in 1955 that AMA's 1947 method was fairly satisfactory for calculating percentage capacity to hear speech for persons who have conductive hearing losses, where the losses are not very different for different frequencies. They also reported, however, that for persons with nerve deafness, and particularly those for whom hearing for low and middle tones is good but for high tones is poor, the results often conflicted with the clinical evidence.

Development of the AAOO formula

The AAOO formula originated in 1958 from a group of people representing various disciplines and organizations related to hearing, such as AMA, Bell Laboratories, Central Institute for the Deaf, Haskins Laboratories, United States Naval Research Laboratory, American Speech and Hearing Association, and various universities. The group conference was jointly sponsored by AAOO and the National Advisory Neurological Diseases and Blindness Council.

The purpose of the conference was to pool information and opinions on which recommendations could be based for calculating handicaps resulting from hearing loss. It was reported that the conference members agreed that they could not, as scientists, designate a completely satisfactory method at that time, but that it would be better for an authoritative group to recommend using an interim method than to condone, by default, the continued use of methods formulated, in some instances, by groups with little or no knowledge of the subject. They agreed that if sentence intelligibility is a representative measure of everyday speech, there was enough information to recommend an interim method of determining handicap.

Although there was no general agreement about defining or assessing handicap due to hearing loss, the majority of the conferees agreed that, from a practical point of view, an adequate assessment of handicap could be made from pure tone measurements. The majority agreed that (1) if the ability to hear and repeat sentences correctly in a quiet environment is accepted as the best current representation of hearing for everyday speech and (2) if the measures used to calculate hearing loss for everyday speech are weighted equally, then, an average of the hearing level in decibels at the three frequencies of 500, 1,000, and 2,000 cycles per second is an acceptable interim method for determining hearing loss for everyday speech to estimate handicap. The minority recommended averaging hearing levels at 500, 1,000, 2,000, and 3,000 cycles per second to determine hearing loss for everyday speech.

An argument against using the 3,000 cycles per second frequency was the observation that the use of 500, 1,000, and 2,000 cycles per second proves adequate in representing hearing of everyday speech even in noisy situations, and that only slight differences occurred between normal subjects and subjects with losses above 2,000 cycles per second, in either a quiet or noisy environment.

It was unanimously accepted that the range of handicap is smaller than the range of auditory sensitivity, which is measured by pure tones. The range starts on the audiometer hearing level scale where significant handicap begins and ends with total handicap.

The formula consisting of the frequencies of 500, 1,000, and 2,000 cycles per second and the impairment percentage conversion of 1.5 percent per net decibel average over 25 decibels was published by AAOO in 1959, in its guide for the evaluation of hearing impairment.

AMA adopts formula in 1961

AMA adopted the AAOO formula in 1961 to replace the more complex standard that it had tentatively adopted in 1947. AMA has retained this formula as its guide for evaluating percentage impairment to date.

Labor's 1969 modification of the AAOO formula

Until 1969, Labor fully adopted AMA criteria for evaluating all types of injuries, including the AMA-supported AAOO formula for hearing impairment. In 1969, however, Labor modified the frequencies contained in the AAOO formula (500, 1,000, and 2,000 cycles per second) by deleting the 500 cycles per second and adding 4,000 cycles per second. Labor retained the other AAOO formula elements--the 1.5-percent conversion factor and the minimum 25-decibel average.

Labor made this modification because claims were being filed under the act by employees who had greater hearing loss in frequencies above 2,000 cycles per second, but were denied scheduled awards because there was not enough loss in the AAOO formula frequencies to qualify as an impairment. Also, some of these employees were apparently reassigned to lower paying positions free from injurious noise to protect them against further injury. Because these employees could not receive compensation for their wage loss, Labor revised the formula to include frequencies of the next higher octave--4,000 cycles per second--and thus enable the employees' losses to be classified as an impairment.

Labor obtained no scientific study or medical endorsement for this change, which made more employees eligible for awards and, on the average, may have increased the awards of those already eligible from about \$5,000 to about \$11,000.

Labor's 1973 modification of the AAOO formula

In 1973 Labor modified the formula again by replacing the frequency of 4,000 cycles per second with 3,000 cycles per second, while retaining the 1,000 and 2,000 cycles per second frequencies. This change was based on a 1972 NIOSH study, "Criteria for a Recommended Standard--Occupational Exposure to Noise." The specific basis was the NIOSH contention that hearing impairment for speech communication begins when the average hearing level at 1,000, 2,000, and 3,000 cycles per second exceeds 25 decibels.

NIOSH disagreed with the beginning point of impairment provided by the AAOO formula--26-decibel average at the frequencies of 500, 1,000, and 2,000 cycles per second--because it was based on the assumption that the ability to hear sentences and repeat them correctly in a quiet environment is satisfactory evidence for correct hearing of everyday speech. NIOSH essentially disagreed with using a quiet environment and complete sentences as a measure, since everyday communication involves a wide variety of environmental stresses and incomplete sentences.

However, NIOSH only addressed the beginning point of impairment and did not comment on what conversion factor would be appropriate to determine percentages of impairment beyond this point. ^{1/} Consequently, Labor retained the AAOO conversion factor.

VARIOUS ORGANIZATIONS QUESTION MODIFICATIONS OF THE FORMULA

After the first modification in 1969, the National Academy of Sciences and AAOO both declared that it was not scientifically valid; the American Mutual Insurance Alliance objected to Labor making the modification without first holding hearings or soliciting public comment.

^{1/}In hearings before a congressional subcommittee in October 1977, both NIOSH and EPA defended the Labor formula's beginning point of impairment, but they also indicated that their primary concern has been with how many people would have an impairment as a result of various levels and durations of noise exposure, rather than the extent of the impairment. NIOSH noted, however, that significant impairment is not generally seen until the average decibel level at the frequencies of 1,000, 2,000, and 3,000 cycles per second exceeds 55 decibels. (Labor's formula converts this to a 45-percent impairment.)

National Academy of Sciences

In 1972, after Labor made the modification to add the 4,000 cycles per second frequency, the National Academy of Sciences' National Research Council Committee on Hearing, Bioacoustics, and Biomechanics sent a letter to Labor declaring that it was invalid and not scientifically defensible to use the AAOO formula's conversion factors with frequencies other than those for which they were intended. This Committee statement was also endorsed by several people who were instrumental in developing the AAOO formula.

American Academy of Ophthalmology and Otolaryngology

AAOO, in its 1973 edition of "Guide for Conservation of Hearing in Noise," stated that any modifications of its formula, such as substituting other test frequencies, were not recommended by AAOO and may not be reported as AAOO guidelines.

AAOO also reexamined the assumptions underlying its formula and as of April 1978, had a draft formula which incorporates the 3,000 cycles per second frequency with the other frequencies of 500, 1,000, and 2,000 cycles per second. The draft formula continues its simple format of averaging decibel levels in the frequencies, instead of weighting each frequency, and it continues to convert average decibel levels to percentage impairment on a straight linear basis of 1.5 percentage points per each average decibel level over the 25-decibel minimum.

This draft formula, as applied to our sample of 98 awards, would have resulted in 27 percent less compensation than would have been provided by Labor's current formula.

American Mutual Insurance Alliance

When Labor modified the AAOO formula in 1969, the new formula was applied to Federal employees' claims for compensation but was not officially applied to claims filed under the Longshoremen's and Harbor Workers' Compensation Act. This act and its extensions provide workers' compensation coverage to certain workers who are not covered by State workers' compensation laws. Compensation under the act is paid by employers who are self-insured, or by insurance that is provided by private insurers to employers. While both the Federal employees' and longshoremen's and harbor workers' compensation programs are administered by OWCP, the AAOO formula remained the official formula for use under the longshore program until 1976, when it was replaced by Labor's formula.

After the modification of the AAOO formula in 1969, some OWCP district offices erroneously applied Labor's 1969 modified formula to claims filed under the longshore program. As a result, the American Mutual Insurance Alliance, in 1972, protested the modification. It expressed its concern about the lack of scientific basis for the modified formula and about the adoption of the modification without hearings or solicitation of public comments. The Alliance indicated that the Administrative Procedures Act (5 U.S.C. 551, 554) requires that interested parties be heard prior to formulating and promulgating policies and procedures which directly affect them. Accordingly, the Alliance requested that processing hearing loss cases under the Longshoremen's and Harbor Workers' Compensation Act be halted and held in abeyance until interested parties could be heard and given full consideration in deciding what the guidelines and procedures should be for determining compensable hearing impairment.

Labor responded to the Alliance, in 1973, that the AAOO formula was the official policy for measuring hearing impairment under the longshore program. However, in 1976, Labor changed this policy to provide that the modified Labor formula would be used to determine hearing impairment for claims filed under the program. This action was taken without holding hearings or soliciting public comments, as the Alliance had requested.

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In October 1976 the House Committee on Government Operations issued a report on the administration of the act and, based on its investigation and hearings, recommended that OWCP revise its hearing loss criteria to be more consistent with those used in other compensation programs, such as those of States and the Veterans Administration.

In this regard, we found that the AAOO formula is used most often in State workers' compensation programs and is the basis for Veterans Administration benefits.

CONCLUSIONS, AGENCY COMMENTS, AND OUR EVALUATION

Between 1969 and 1976 about 36,000 claims for hearing impairment compensation were filed by Federal civilian employees, for a potential liability exceeding \$185 million. Most of the liability incurred is due to the Labor modifications in 1969 and 1973 of a generally accepted hearing impairment formula developed by AAOO in 1959 and still endorsed by AMA.

Labor's modifications to the AAOO formula were not supported by AAOO, and the appropriateness of the modifications was questioned by the National Academy of Sciences' National Research Council and by members of the AAOO committee which developed the original formula.

Although Labor used a NIOSH study as its basis for the second modification in 1973, this study did not address or recommend a change to the formula. It addressed hearing conservation and indirectly touched on the compensation formula by discussing the beginning point of impairment. It did not consider how it should be incorporated in the AAOO formula, which was developed as a simplified measure of the full range of impairment.

We do not believe Labor should have made the adjustments without obtaining scientific study, or at least general acceptance by the medical community, of the whole formula. Nor do we believe it was appropriate for Labor to apply its modified formula to a segment of the private sector through the longshore program without first affording public response to this modification, as provided by the Administrative Procedures Act.

In commenting on the proposals in our draft report, Labor stated that the wise course of action would be to await the results of its planned hearing loss research project before considering changes in this area. Labor also noted that NIOSH and EPA have both publicly supported OWCP's present formula. In addition, Labor questioned the statistical reliability of our sample for basing our far-reaching and economically significant recommendations.

Our sample was not scientifically selected from all hearing loss cases on a nationwide basis, but it was randomly selected from each of three OWCP district offices covered by our review and collectively represents more than half of all hearing loss cases. We believe that the sample adequately identifies problems in Labor's administration of compensation benefits for hearing impairment.

While NIOSH and EPA did publicly support the beginning point of impairment part of the OWCP formula, the agencies publicly noted that they had not addressed the other part of the formula which defines impairment's growth rate. Further, the National Academy of Sciences and AAOO's statements--that it is invalid and scientifically unjustified to modify one part of the AAOO formula without considering the inter-relationship of the modification with the other part of the formula--indicates that Labor's modified formula is not generally accepted by the scientific community.

RECOMMENDATIONS TO THE
SECRETARY OF LABOR

In view of the lack of scientific justification for Labor's modifications of the hearing impairment formula developed by AAOO and the resulting substantial increase in costs to the Federal Government, we recommend that the Secretary direct the Assistant Secretary for Employment Standards to have OWCP immediately adopt the AAOO formula, without modification, for determining hearing impairment. We further recommend that any future changes--other than reverting to the unmodified AAOO formula--to the hearing impairment formula be based on appropriate scientific research and that advice be obtained from other Government agencies and scientific and medical organizations interested in the proper determination of hearing impairment.

CHAPTER 3

NEED TO ESTABLISH CAUSAL RELATIONSHIP BETWEEN OCCUPATIONAL NOISE EXPOSURE AND PERMANENT IMPAIRMENT

As specified by the act, only the permanent portion of an impairment, which must have been proximately caused by the employment, qualifies for a scheduled award. Our review showed that these factors are often inadequately established and result in considerable overcompensation.

While the Office of Workers' Compensation Programs' regulations require that compensation be provided for the full degree of impairment if the condition was aggravated by the occupational environment, employing agency officials have expressed concern whether the employer should be liable for the portion of impairment existing before employment. Continuing growth of the impairment after the time of last occupational noise exposure (including growth of impairment after retirement) is also a matter for potential future concern. Our sample showed that preemployment impairment may be a relatively minor compensation problem overall. Postemployment-impairment growth, however, has potentially substantial compensation consequences.

INADEQUATE EVIDENCE OF OCCUPATIONAL NOISE EXPOSURE

Hearing loss may result from various causes other than occupational noise, and it is sometimes difficult, if not impossible, to determine whether a person's sensorineural loss is due to aging or to noise exposure. The greater the intensity and duration of occupational noise exposure, however, the greater the likelihood that the person's hearing loss was at least partially caused by the occupational noise.

The National Institute for Occupational Safety and Health reported in its 1972 criteria document for occupational noise exposure, that while 27 percent of the non-noise-exposed population by retirement age would have a hearing impairment, this percentage increases for the population who are exposed to working lifetimes of noise exposure. NIOSH reported that of the population exposed for many years to daily noise levels of 80 decibels, 30 percent would have a hearing impairment by retirement age (3 percent more than would have incurred an impairment in the non-noise-exposed population). For the

population exposed to a daily rate of 85 decibels, the percentage with an impairment increases to 43 percent, at 95 decibels it increases to 70 percent.

Consequently, NIOSH determined that a maximum daily 8-hour occupational noise exposure level of 85 decibels would be appropriate criterion for hearing conservation purposes. NIOSH also determined that this level should be regarded as equivalent to 90 decibels for 4 hours, 95 decibels for 2 hours, 100 decibels for 1 hour, etc.

OWCP evaluates hearing loss according to standards defined by NIOSH in its 1972 report and uses an 85-decibel exposure level as a guide for determining whether an impairment is work related. Unlike NIOSH, however, OWCP guidelines do not specify what length of exposure (in hours per day or number of years of daily noise exposure) is necessary to establish a reasonable assumption of causal relationship.

OWCP instructions provided to claims examiners and district medical directors, regarding the relationship between occupational noise and hearing loss, state:

- Noises with an intensity in excess of 85 decibels can prove damaging to hearing.
- It is generally accepted that an employee may suffer noise-induced hearing loss from prolonged exposure to a working environment with a noise level above 85 decibels.

Accordingly, claims examiners generally accept evidence of any length of exposure to 85 decibels or more as adequately establishing at least partial occupational relationship to hearing impairment.

It may take many years of daily exposure to 85 decibels, however, before this exposure would significantly contribute to a person's hearing loss. A joint Air Force and Environmental Protection Agency study in 1973, for example, determined that after 20 years of a daily 8-hour exposure to 85 decibels, the average decibel loss in the frequencies of 500, 1,000, 2,000, and 4,000 cycles per second would only be about 3 decibels, and that the greatest amount of loss that could be expected after 10 years of such exposure would only be about 7 decibels.

Results of sample

Generally, information furnished by the employing agency to OWCP regarding the claimant's history of noise exposure is enough to establish that the claimant has been exposed to noise levels of 85 decibels or more for some period of time. The information, however, often is not complete enough to reasonably estimate whether the exposure exceeds the time and intensity weighting of the NIOSH recommended criteria. While this information was adequate in 46 of the 48 cases we sampled in the San Francisco district office, it was adequate in only one of the 50 cases we reviewed in the Washington, D.C., and Jacksonville district offices. Typical information supplied in these 50 cases was a range of noise levels the claimant would have been exposed to--such as 77 to 148 decibels. But, little or no information was available on the length of exposure at each decibel level.

Of the 46 San Francisco district office cases we reviewed in which data was available on the duration of noise exposure, in 2 cases none of the impairment developed during a period of Federal civilian occupational noise exposure exceeding the NIOSH-recommended conservation criteria. The total compensation provided for the impairment not related to noise exceeding the NIOSH criteria in these 2 cases totaled \$26,000, or 6 percent of the total awarded in the 46 cases.

In one of the cases in which the claimant did not exceed the NIOSH recommended criteria, the noise exposure history was as follows. From February to September 1966 (7 months), the claimant worked in seven shops, primarily exposed to background noise of 50-75 decibels, with intermittent exposure up to 102 decibels less than 2 hours a day in two of the shops. From September 1966 to April 1975 (9 years), the claimant was exposed to background noise (62-65 decibels for 5 hours), crane hoist (68-78 decibels for 1-1/2 hours), and crane in motion (78-83 decibels for 1 hour). The claimant's award of \$10,266 was provided for a 29-percent impairment based on a July 1975 audiogram. The claims examiner stated:

"Although noise exposure was less than 85 decibels, it was the opinion of the District Medical Director that the exposure at 83 decibels (for 1 hour or less) was of a duration and intensity that hearing loss could result."

In the other case, the noise exposure was as follows. From 1950 to 1975, the claimant was exposed to background noise (74-82 decibels for 6-1/2 hours), chipping (88-98 decibels for 1 hour), and miscellaneous noise (83-93 decibels for 1/2 hour).

Using the NIOSH weighting criteria, 1 hour of chipping at 95 decibels equals 4 hours at 85 decibels, and 30 minutes of miscellaneous noise at 90 decibels equals 1 hour at 85 decibels. The total equivalent of 5 hours at 85 decibels is less than the NIOSH recommended criteria of 8 hours at 85 decibels. The claimant was awarded \$15,871 for a 34-percent impairment. The claimant's hearing impairment was zero in 1954, with total equivalent daily exposure of 5 hours at 85 decibels since that time.

INADEQUATE AUDIOMETRIC TESTING

Although claims are adjudicated on the basis of otological evaluation provided by an examining physician (an otologist), the audiograms provided occasionally may not accurately reflect the claimant's true degree of permanent hearing loss. The recorded hearing loss may include a degree of temporary loss resulting from recent occupational or nonoccupational noise exposure or may include attempts by the claimant to exaggerate his true loss during the test. The recorded loss may also be inaccurate because of faulty measurement equipment or noisy testing areas.

Sometimes these inaccuracies become apparent if these test results are compared with other tests given during the claimant's employment. Consistent tests, however, do not necessarily assure that other test results did not also contain temporary hearing loss. Test result accuracy can only be assured when testing is done which excludes temporary loss and exaggerated responses.

Even when a person has been away from a noisy environment for several hours, the remaining temporary loss (which has not yet recovered from that noise exposure) can be significant. A temporary loss averaging 5 decibels, for example, could add 7.5 percent to an impairment evaluation. The degree of temporary loss in any individual circumstance depends on (1) the intensity and duration of noise exposure and (2) the individual's susceptibility to temporary hearing loss from noise exposure. Multiple tests, with periods of quiet in between, would disclose the presence and amount of temporary loss.

The 1972 NIOSH report contained the following example of an individual's temporary hearing loss recovery. This individual, with normal hearing, was exposed to a noise level of 103 decibels for 2 hours. After 5 hours of recovery in a quiet environment, the person still had an average temporary loss of nearly 10 decibels over the preexposure hearing level (using the OWCP formula frequencies of 1,000, 2,000, and 3,000 cycles per second).

Sample results

From our sample of 98 hearing impairment awards, we found 20 awards for which sufficient evidence in the files indicated that the audiograms used for the basis of compensation may have contained decibel losses that were significantly greater than the claimant's true permanent hearing loss.

In 6 of the awards (from the Jacksonville district office) audiograms were supplied by a medical university's speech and hearing facility and by a private otologist. In each case, the university's test showed considerably smaller hearing loss than the otologist's audiograms. Also, the university tests were generally more consistent with the trend of the claimants' impairment growth, as recorded by employer-administered audiograms. The average percentage impairment for these 6 cases from the private otologist's audiograms was 37 percent; from the university's tests, the average was 21 percent.

No rationale was provided in the case files to indicate why the private otologist's, rather than the university's, audiograms for the six claimants were used to determine the compensation awarded. It also could not be determined, from the case files, what caused these differences in audiograms (i.e., whether it was temporary loss, exaggerated responses, or a combination of both).

In the 14 remaining cases, sufficient evidence indicated that the audiograms used for determining compensation showed significantly greater hearing impairment than the claimants' true permanent impairment. Some of these, as in the above cases, involved apparent improper selection by OWCP between audiograms given by different otologists. In 11 of the 14 cases, there was only one otologist examination, but these were substantially inconsistent with the trend of the claimants' impairment growth, as recorded by employer-administered audiograms.

In one of the cases from the Washington, D.C., district office, for example, we found that an otologist's audiogram supported a 24-percent binaural impairment; the employee received an award of \$7,430. Our review showed that an employer's audiogram given to the employee less than 1 year before supported a zero-percent impairment. We brought this case to the attention of the employing agency, which subsequently gave the employee additional tests. The claimant was reported to be uncooperative in his responses during the first test, and, although considered to be an unreliable audiogram,

the results showed an 11-percent binaural impairment. A second testing (which required two tests before the responses were considered honest), given a few weeks later at a hospital clinic, showed no impairment.

In another case from the Washington, D.C., district office, two private otologists providing the audiograms used for determining compensation noted skepticism about the test results' reliability. Since the skepticism was noted and because the resulting 36- and 43-percent binaural impairments did not correspond to the trend of previous shipyard audiograms (which showed a 5-percent monaural impairment 1-1/2 years earlier), the OWCP deputy medical director in the national headquarters recommended that no award be given. He noted that screening audiograms are not acceptable as medical evidence but are probably indicative of the general level of claimant's hearing over a period of several years. The district commissioner, however, awarded \$10,066 based on the 36-percent impairment because the claimant died before another test could be given.

The total extra amount paid in all 20 awards for which there was sufficient evidence to question the claimants' true permanent impairment was \$125,281, or 15 percent of the total amount awarded in the 98 cases.

One case in our sample, but not included in the above 20 cases, illustrates the effect of temporary hearing loss. In this case, shipyard audiograms for the claimant consistently showed high decibel losses for 12 years, with the impairment growing steadily from 62 to 72 percent. Two years after the last shipyard audiogram--but while still employed by the shipyard--the employee was tested by a private otologist and the results showed a similar 75-percent impairment. The private otologist, however, referred the employee to a medical university hospital for more extensive testing. The university test results showed only enough decibel loss to equal a 3-percent monaural impairment. Accordingly, the claimant's \$232 award was based on this 3 percent. Without referral to the university hospital, the claimant would have received a \$22,320 award for a 75-percent impairment and the apparent temporary loss would not have been indicated.

PREEMPLOYMENT AND POSTEMPLOYMENT HEARING IMPAIRMENT

Employing agency officials have expressed concern about compensating the portion of hearing impairment that preexisted Federal civilian employment. Postemployment increases in hearing impairment may also concern employing agencies in the future.

Preemployment

The Department of the Navy has objected to the payment of preemployment impairment under the act. In a list of suggested improvements sent to OWCP in 1977, the Navy explained that it understood that compensation for aggravation of pre-existing injuries is an accepted workers' compensation principle in the case of disability, but, it objected to extending this principle to partial disabilities, and particularly to disabilities which increase gradually, such as hearing or eyesight.

This problem, however, has been alleviated for new Department of Defense employees. Defense has prepared an instruction which requires that all personnel being considered for initial, entry-level civil service or active duty assignment in an occupational speciality that involves routine daily exposure to hazardous noise (8 hours at 85 decibels) must have hearing ability which meets certain prescribed criteria set below the hearing impairment level.

In State workers' compensation programs, the preemployment impairment may be compensated through a second injury fund, if the total impairment meets certain minimum criteria prescribed by the program. About half of the State programs require that the combined impairment results in a permanent total disability; the others are less restrictive.

Results of our sample indicated that about 12 cases probably had some significant degree of hearing impairment (as measured by the OWCP formula) before employment, and that excluding this impairment would have reduced the total amount awarded in all 98 cases by about 10 percent. On the other hand, if the AAOO formula had been used, there would have only been about two cases with any significant degree of pre-employment impairment.

Postemployment

Many retired employees (and employees still employed but removed from noise exposure) may have a hearing impairment that will continue to increase. Whether the previous noise exposure is directly responsible for the continuing growth of hearing loss is debatable, but continued growth of impairment from the aging process will occur in many, if not most, cases.

EPA, in congressional testimony, noted that the aging process inevitably increases damage that has already been done by noise, and that a hearing handicap that is half noise-induced and half age-induced is just as debilitating as a hearing handicap caused by noise alone. NIOSH estimates that about 70 percent of the population not exposed to many years of hazardous noise will not have an impairment-level hearing loss by retirement age.

No OWCP guidelines address the issue of incremental hearing impairment beyond the date of last occupational noise exposure or beyond retirement.

There were only two sample cases in which the claimant had already received an award for impairment and later received awards for additional impairment incurred after retirement.

Most of the original awards have only been made during the past 3 years, so it may be a while before the full impact of incremental filings can be estimated.

CONCLUSIONS, AGENCY COMMENTS, AND OUR EVALUATION

OWCP has accepted a noise level of 85 decibels as its criterion for determining whether the impairment is work related, but has not informed its claims examiners about what duration of exposure to accept. Accordingly, OWCP claims examiners have considered that any duration of exposure to 85 decibels or greater is sufficient evidence of occupational relationship to impairment.

This appears unreasonable when compared to (1) the NIOSH recommended hearing conservation standard of a maximum daily exposure level of 85 decibels for 8 hours and (2) the small hearing loss that is expected from this level after several years at such exposure.

Therefore, OWCP should establish an appropriate compensation criterion for determining the relationship of hearing impairment to work environment, including the levels and durations of noise exposure warranting compensation.

Audiograms used for compensating awards are frequently inaccurate in measuring permanent hearing impairment. Temporary hearing loss and employees' exaggeration of test responses are both possible causes of test inaccuracies and this problem may be more widespread than our 20 sample cases indicate. Therefore, tests should be given to assure exclusion of temporary loss and other exaggeration.

While payment of preemployment hearing impairment concerns employing agency officials, the policy's impact on future hearing impairment compensation may be substantially reduced through recent action by the Department of Defense to prevent placing new hires with significant hearing loss into positions subject to hazardous noise.

Apparently, few incidences of workers filing for additional awards for incremental hearing impairment after retirement have occurred. The future impact, however, could be substantial, with increased impairment due to the aging process.

In commenting on the proposals in our draft report that OWCP employ the noise-exposure level standards recommended by NIOSH and require use of testing procedures that assure excluding temporary hearing loss and exaggerated responses, Labor stated that it would be in everyone's best interest to await results of their planned research study before considering our recommendations. Labor commented that:

- contrary to indications in our report, accurate noise-level exposure data are not readily available;
- as indicated in our report, individual reactions to noise exposure may vary and criteria which are geared to populations or norms should not be used as hard and fast rules in the workers' compensation system; and
- in addition to including a degree of temporary noise-induced hearing loss, audiometers' tests may also be inconsistent, due to variations in testing conditions and competent levels of testing personnel and that malingering is not a significant problem.

We believe that Labor's planned research study is needed to obtain data on causal relationships between occupational noise exposure and permanent impairment, which will provide a basis for standards on compensation for hearing impairment. We also concur with Labor's comments on the nonavailability of noise-level exposure data, variances in individual reactions to noise exposure, and problems in determining degree of hearing impairment.

However, we believe that Labor needs to take interim action to assure a causal relationship between occupational noise exposure and hearing impairment to protect the interests of the Government and taxpayers. Action is particularly needed in cases such as those disclosed by our review, where available evidence indicates employees have not been exposed to noise levels exceeding the NIOSH criteria or there are inconsistencies in the audiometric testing.

RECOMMENDATIONS TO THE
SECRETARY OF LABOR

To improve the determination of the extent that the work environment contributed to hearing impairment, and to improve the accuracy of assessing the true extent of permanent hearing impairment, we recommend that the Secretary direct the Assistant Secretary for Employment Standards to have OWCP:

- Employ the noise-exposure level standards recommended by NIOSH as the basis for determining occupational relationship to noise-induced hearing impairment.
- Require the use of testing procedures that exclude temporary hearing loss and exaggerated responses in establishing degrees of hearing impairment.

CHAPTER 4

SCOPE OF REVIEW

Our review was made primarily to determine if the occupational hearing loss compensation for Federal employees, established under the Federal Employees' Compensation Act, conforms with the act's intent and whether Labor performs its operations effectively and efficiently. We specifically tried to determine

- whether Labor's hearing impairment formula under the act was properly developed and
- whether Labor is appropriately determining if hearing loss was caused by Federal employment.

We reviewed the act's legislative history; the regulations, policies, and operating procedures established by Labor; pertinent records, documents, and case files; and pertinent medical and scientific literature. We interviewed Labor officials at the locations visited and also officials of the Veterans Administration, the National Institute for Occupational Safety and Health, the Environmental Protection Agency, the Postal Service, the Navy, and various State workers' compensation programs. We also interviewed otolaryngology and audiology experts, including authors of medical and scientific literature that we reviewed, and officials and members of research groups from various scientific organizations.

Our review was performed primarily at the Office of Workers' Compensation Programs' headquarters in Washington, D.C., and at its Jacksonville, Florida; San Francisco, California; and Washington, D.C., district offices. We selected case files at these locations to review OWCP's development and adjudication process of hearing loss cases under the act. We also obtained information from Labor's Office of Administrative Law Judges and the Employees' Compensation Appeals Board.

U.S. DEPARTMENT OF LABOR
OFFICE OF THE ASSISTANT SECRETARY FOR ADMINISTRATION
WASHINGTON, D.C. 20210



Mr. Gregory J. Ahart
Director
Human Resources Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Ahart:

The draft report "Department of Labor Needs to Change Hearing Impairment Criteria to Ensure Proper Payment Under the Federal Employees' Compensation Act" has been reviewed, and our comments follow.

As you may know, the Employment Standards Administration will shortly open bidding on an extensive research project focusing on the many problems associated with properly compensating occupationally related hearing impairment. Therefore, until the results of our study are available, we do not feel it is in the best interest of the Department, other Federal agencies, or future hearing loss claimants, to change the compensation procedures.

Chapter 1 - Introduction

The estimate of an 80 percent approval rate (page 1) for hearing loss claims is misleading. This figure is considerably higher than the approval rate for claims processed by OWCP's Hearing Loss Task Force. Between May 1976 and January 1978, the Task Force adjudicated 6,065 claims with an approval rate of 56.1 percent. Only part of this difference can be explained by the change in OWCP standards in March 1977. Based on the work of the Task Force, we suggest a 60 percent approval rate would be more accurate.

OWCP's Hearing Loss Task Force currently has 27 claims examiners and has received cases from district offices in Boston, Philadelphia, Jacksonville and New Orleans in addition to New York and Washington, D.C.

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Chapter 2 - Impact on Benefits Due to Labor's Change in Formula

Contemporary research on hearing impairment indicates acceptance of the increasing importance of frequencies above 2,000 HZ for understanding speech in noise and, concurrently, the declining importance of lower frequencies, such as 500 HZ. Currently, the AAOC is in the process of revising its formula. Two Federal agencies (EPA and NIOSH) have publicly supported OWCP's present formula, while both OSEA and the VA are studying the matter.

Therefore, we do not believe it to be in the best interest of the Department of Labor, other Federal agencies or potential hearing loss claimants to adopt, at this time, a formula which is currently under review by its sponsor and which does not have universal acceptance among the medical and scientific community or interested Federal agencies. We believe the wise course of action is to await the results of our hearing loss research project prior to considering changes in this area.

Chapter 3 - Need to Establish Causal Relationship Between Occupational Noise Exposure and Permanent Impairment

The report intimates that accurate noise level exposure data are readily available, when in actuality this is hardly the case. Unfortunately, the availability of accurate noise level exposure data depends not only on what the claims examiner requests but also what the employing agency is willing or capable of providing. Experience indicates many agencies refuse or are unable to provide accurate noise level exposure data. Among the many reasons are the closing or moving of installations, no past noise exposure surveys ever conducted, and discontinued use of machinery or other equipment for which no noise level data were ever collected.

Further, individual reactions to noise exposure may vary widely. As stated on page 6 of the GAO report "The growth of noise induced damage is primarily dependent on the intensity and duration of the noise and on the sensitivity of the individual's ears" (emphasis added). Since the sensitivity of an individual's ears may not be normal, criteria which are geared to populations, or norms, should not be used as hard and fast rules in the worker's compensation system.

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In addition to including a degree of temporary noise induced hearing loss, audiometric tests may also be inconsistent due to variations in test conditions and competence levels of testing personnel. Malingering, however, is not, in our opinion, a significant problem as the report intimates.

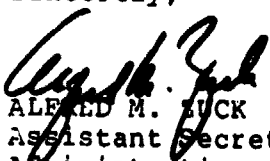
Page 33 of the report states, "Some of these, as in the above cases, involved apparent improper selection by the claims examiner between audiograms given by different otologists." The selection of the audiogram to be used as the basis of the award is a function of the medical adviser, not a claims examiner.

The subject of both GAO recommendations on page 41 of the report will be focused upon during our upcoming research project. Again, we feel it is in everyone's best interests that we await results of this study prior to considering the recommended changes.

Chapter 4 - Scope of Review

We question whether the results of a review of 98 case files, whose selection was apparently not based on any scientific or statistical criteria, should be the basis for making such far-reaching and economically significant recommendations, as the report does. We also believe the report should provide the medical and scientific sources utilized in drawing its conclusions and making its statements of fact.

Sincerely,



ALFRED M. LUCK
Assistant Secretary for
Administration and Management

GAO note: Page references in this appendix may not correspond to page numbers in the final report.



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

HUMAN RESOURCES
DIVISION

IN REPLY
REFER TO:

December 27, 1976

Mr. Fred G. Clark
Assistant Secretary for
Administration and Management
Department of Labor

Dear Mr. Clark:

We are making a review of the administration of the Federal Employees' Compensation Act (FECA) by the Department's Office of Workers' Compensation Programs (OWCP). As part of this review, we have been evaluating the criteria and standards used by OWCP for awarding compensation for hearing loss.

We recognize that there is an OWCP Task Force that is reviewing the administration of the FECA and that OWCP is considering the possibility of funding a study of hearing loss compensation criteria. Since any revisions to the present criteria that may result from such studies may not take effect for many months, we would like to bring to your attention one feature of the criteria which does not seem to be supported by the findings of prior studies. These studies were made by the American Academy of Ophthalmology and Otolaryngology (AAOO), the Department of Health, Education and Welfare's National Institute of Occupational Safety and Health (NIOSH), and the National Academy of Sciences' Committee on Hearing, Bioacoustics and Biomechanics (CHABA).

This matter concerns the OWCP method of deducting a "fence" from each of the measured frequencies instead of the AAOO, NIOSH and CHABA accepted method of deducting a fence from the average of the measured frequencies. If our review of a sample of 100 compensated hearing loss cases filed between calendar year 1970 and 1976 is representative of the 11,000 hearing loss cases in the backlog, the differences in these two methods could potentially represent an average of about \$1,900 more per applicable case by using the OWCP method, or a potential \$9 million.

BACKGROUND

Hearing loss compensation is a "scheduled award" provided by the FECA to Federal civilian employees who incur a hearing impairment, or aggravate a pre-existing one, while performing their duties. As a scheduled award this compensation is awarded whether or not the impairment results in a loss of wages (most do not). Compensation is based on the percentage of hearing loss the employee has accumulated. The FECA provides 52 weeks of compensation for complete loss of hearing of one ear; and 200 weeks for complete loss of hearing of both ears. Compensation is computed at three-fourths of the employee's average weekly wage for employees with dependents, and two-thirds for employees without dependents. This cannot exceed three-fourths of the maximum pay of a GS-15.

The annual number of hearing loss compensation claims have grown rapidly from an estimated 200 in 1966 to 8,000 in 1975, totaling 28,000 for that period. Of the claims that have been adjudicated, we estimate that over 70 percent were awarded compensation, and that they received an average award between \$6,000 to \$9,000. As of November 1976, Labor officials estimate a backlog of hearing loss claims of about 11,000. OWCP has a special Hearing Loss Task Force to expedite adjudication of the backlog.

OWCP FORMULA FOR COMPENSATING HEARING LOSS

The FECA does not specify the criteria and standards to be used in determining the employee's hearing loss. OWCP, therefore, has established a formula for computing the compensable percentage of hearing loss.

Until 1969, OWCP used a formula developed by the AAOO and adopted by the American Medical Association (AMA). This formula is still in use today by most State Workers' Compensation programs.

The formula consisted of taking the levels of loudness (decibels, or dB) at which a person can hear pure tone in each of the frequencies of 500, 1000, and 2000 Hertz (cycles per second) in each ear, deducting a 25 dB fence from the average of these decibel levels (to exclude a range of loss considered normal for the ability to hear everyday speech) and multiplying the result by a factor of 1-1/2 percent to convert the decibel loss to percentage hearing impairment.

The binaural hearing loss is then computed using the following formula adopted from AMA guidelines:

$$\frac{5 \times \% \text{ of impairment in better ear} + \% \text{ of impairment in worse ear}}{6}$$

In 1969, to recognize impairment caused by higher frequency decibel losses, OWCP changed the test frequency levels used to 1000, 2000, and 4000 Hertz. It retained all other aspects of the AMA/AAO formula including the deduction of the 25dB fence from the average of the decibel readings from the tested frequencies.

In 1973, OWCP modified the formula to its present form, based on a 1972 NIOSH report "Occupational Exposure to Noise."^{1/} This report said:

"Simply stated, hearing impairment for speech communication begins when the average hearing level at 1000, 2000, and 3000 Hz exceeds 25dB re ANSI (1969)." (Underscoring added)

Based on this report OWCP changed the frequency levels to 1000, 2000, and 3000 Hertz, and kept the 25dB fence. They also continued to use the AMA/AAO 1-1/2 percent conversion factor and the same binaural weighting.

However, OWCP discontinued deducting the 25dB fence from the average decibel readings of the frequencies, and changed to computing an average after deducting the fence from each frequency. No rationale was given by OWCP for making this specific change.

EFFECT OF CHANGE IN FENCE DEDUCTION METHOD

In a January 1973 memorandum to the OWCP Director, outlining the recommended standards for the new formula, the OWCP Medical Director recommended the use of the NIOSH suggested criteria. In an example to illustrate the criteria, however, he deducted the fence from the hearing level at each of the frequencies instead of the average hearing level of these frequencies, as was intended in the NIOSH criteria. (In June 1976, the OWCP Medical Director acknowledged to us that this OWCP deduction method was incorrect and that he would recommend that OWCP make this change.) Since the example he used had no hearing levels less than 25 decibels, the difference in amount of compensation that would be awarded in the two methods of deducting the fence was not apparent. However, whenever the hearing levels are not all at 25 decibels or above, the difference in computed impairment can be substantial.

For example, an employee aged 59 with dependents, earning \$300.80 weekly, under the OWCP formula was found to have a 10 percent hearing impairment for an award of \$4,512.00. If OWCP had used the average method he would have received \$1,466.40.

^{1/} Although this report only addressed noise conservation and not hearing loss compensation, it did, in relevance to both topics, address the beginning point of hearing impairment.

This difference is explained below.

(A) AWARD USING OBCP FORMULA OF DEDUCTING FENCE FROM EACH FREQUENCY

<u>Frequencies</u>	<u>Decibel readings</u>					
	<u>Right ear</u>	-	<u>25 fence</u>	<u>Left ear</u>	-	<u>25 fence</u>
1,000	25	-	25 = 0	10	-	25 = 0
2,000	25	-	25 = 0	10	-	25 = 0
3,000	50	-	25 = 25	45	-	25 = 20
			<u>25</u>			<u>20</u>
			÷ 3			÷ 3
Average decibel loss			<u>8-1/3</u>			<u>6-2/3</u>
Conversion factor			x 1.5%			x 1.5%
Percent loss each ear			<u>12-1/2%</u>			<u>10%</u>

Weighted combined loss = $(5 \times 10\% + 12-1/2\%) \div 6 = 10\%$ (rounded)
 Compensation = $10\% \times 200$ week standard for binaural loss x \$300.80
 weekly wage x .75 factor for claimants with dependents = \$4,512.00

(B) AWARD IF THE FENCE HAD BEEN DEDUCTED FROM THE AVERAGE

<u>Frequencies</u>	<u>Decibel readings</u>	
	<u>Right ear</u>	<u>Left ear</u>
1,000	25	10
2,000	25	10
3,000	50	45
	<u>100</u>	<u>65</u>
	÷ 3	÷ 3
Average gross decibel loss	33-1/3	21-2/3
Less 25dB fence	- 25	- 25
Average net decibel loss	8-1/3	0
Conversion factor	x 1.5%	x 1.5%
Percent loss each ear	<u>12-1/2%</u>	<u>0%</u>

Compensation = $12-1/2\% \times 52$ weeks standard for monaural loss
 x \$300.80 weekly wage x .75 factor for claimants with dependents = \$1,466.40

As this case illustrates, there will be a difference in award between the two methods whenever there is less than a 25 decibel loss in at least one of the frequencies for at least one of the ears (see different percentage calculations for the left ear). For those with a loss of 25 decibels or above in all frequencies, the award would be the same with either approach (see calculations for the right ear).

To approximate the significance of the cost difference between the two deduction methods with regard to the 11,000 claims in the backlog, we reviewed a sample of 100 compensated cases selected from the Washington, D.C. (mainly Norfolk, Virginia area cases), Jacksonville, and San Francisco District Offices, and from the Hearing Loss Task Force (mainly New York area cases at the time of our sample). These claims were filed in calendar years 1970 through 1976. ~

Over half (59) of the cases had an average decibel loss less than the fence in one or both ears. These 59 awards averaged \$5,679, or \$1,905 more than if the average deduction method had been used. We are unable to determine with statistical precision how representative this is of the total hearing loss backlog, but if the assumption were made that it is representative, and that 70 percent will receive compensation, the total difference in cost for these cases, between the two deduction methods would be about \$9 million. (11,000 cases x 70% awarded x 59% with a loss less than the fence in at least one frequency x \$1,905.)

OTHER STUDIES CONCERNING THE OWCP DEDUCTION METHOD

The Department of Labor's Internal Audit also commented on the computation of hearing loss cases under OWCP's formula in a letter to OWCP in May 1974. The internal auditors recommended that OWCP consider changing to the average method of deducting the fence.

The OWCP director declined to make this revision and defended his position with a letter on the subject from the Acting Chief, Noise Section Physical Agents Branch of NIOSH.

In the letter, the Acting Chief made several observations. He noted that the average method of deduction is most clearly related to hearing ability, and that the OWCP method would be slightly inequitable in some borderline cases - but not in cases of substantial loss, where both methods give essentially the same answer. In regard to the cases of substantial loss, he commented that it would be harder to declare either method as better

The OWCP director based his defense of OWCP's method on the Acting Chief's comment regarding it being harder to declare either method as better, and on a FECA program memorandum number 139, dated April 9, 1971 that gives the claimant the benefit of doubt when there is up to 10 percent difference between two audiograms.

The internal auditors disagreed with OWCP and stated that all claimants should receive all compensation to which they are entitled but no more. Consequently, in 1975 the auditors again reported the finding, this time to the Assistant Secretary for Employment Standards. The Assistant Secretary, however, concurred with OWCP's decision to keep its deduction method and cited the NIOSH letter as justification for not changing the method.

Also during 1974, the Department of Navy, because of its concern about the OWCP hearing loss formula and the increase in awards under it, requested CHABA to develop a new formula for hearing loss which could be used with the 1000, 2000, and 3000 Hertz frequencies. In March 1975, CHABA recommended the following formula:

"For every decibel that the average of the pure-tone thresholds at 1000, 2000, and 3000 HZ exceeds 36dB relative to the American (ANSI) Standard of 1969, allow 1.75% in impairment of hearing up to a maximum of 100%. * * *"
(Underscoring added)

CHABA also cited a study which made the point that, on the average, the hearing loss at the 3000 Hertz level would have to reach 53dB before any impairment is judged to exist. This is considerably higher than the 25dB fence currently being deducted at the 3000 Hertz level.

In October 1975, the Department of Navy wrote to OWCP suggesting that OWCP consider changing its method of awarding compensation for hearing loss. Navy cited the CHABA report as support for its suggestion.

OWCP rejected the CHABA recommendation on the basis that it showed no new studies but merely modified the formula to restrict the dollar compensation for neurosensory hearing loss.

OWCP did not, however, specifically argue against the "average" method contained in this formula.

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Two institutions that have developed criteria for hearing loss compensation, the AAOO and CHABA, both recommend deducting the fence from the average frequency readings. In addition, the 1972 NIOSH report on hearing loss conservation criteria, upon which OWCP bases part of its current compensation criteria, also describes that impairment begins when the average hearing level of the frequencies tested exceeds the fence.

The Acting Chief of NIOSH's Noise Section Physical Agents Branch also agrees that the average threshold is most closely related to hearing ability, and that the OWCP (each) method is slightly inequitable in borderline cases (cases in which both methods don't give the same answer--those without substantial loss). Of the compensation hearing loss cases we reviewed, 59 percent fit this borderline category.


In view of the support for the averaging method and the significant costs involved, we are bringing this matter to your attention for consideration before the completion of any future study on hearing loss compensation contemplated by OWCP.

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We would appreciate your comments on this matter, including any actions that you plan to take.

We wish to acknowledge the courtesies and cooperation extended to our representatives during our review.

Sincerely yours,



Frank M. Mikus
Assistant Director

cc: Secretary of Labor
Assistant Secretary for
Employment Standards
Director of Audit and Investigations

GAO note: By letter dated February 7, 1977, Labor advised us that its own study of calculating the ratable hearing loss had confirmed our conclusion. It stated that OWCP would return to the use of the average method of computing compensation for hearing loss. On March 7, 1977, OWCP issued a memorandum instructing its district offices to start using the average method immediately.

PRINCIPAL LABOR OFFICIALS
RESPONSIBLE FOR ADMINISTERING
ACTIVITIES DISCUSSED IN THIS REPORT

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
SECRETARY OF LABOR:		
Ray Marshall	Jan. 1977	Present
William J. Usery, Jr.	Feb. 1976	Jan. 1977
John T. Dunlop	Mar. 1975	Jan. 1976
Peter J. Brennan	Feb. 1973	Mar. 1975
James D. Hodgson	July 1970	Feb. 1973
ASSISTANT SECRETARY FOR EMPLOYMENT STANDARDS:		
Donald E. Elisburg	Mar. 1977	Present
John Mumford (acting)	Feb. 1977	Mar. 1977
John C. Read	May 1976	Jan. 1977
Bernard E. DeLury	May 1973	Apr. 1976
Vacant	Jan. 1973	May 1973
Richard J. Gruenwald	Jan. 1972	Jan. 1973
Horace E. Menasco (acting)	Oct. 1971	Jan. 1972
Arthur A. Fletcher	May 1969	Oct. 1971
DIRECTOR, OFFICE OF WORKERS' COMPENSATION PROGRAMS:		
Ralph M. Hartman	Jan. 1978	Present
Everett P. Jennings (acting)	Jan. 1977	Dec. 1977
Herbert A. Doyle, Jr.	Feb. 1974	Jan. 1977
Herbert A. Doyle, Jr. (acting)	Sept. 1971	Feb. 1974
ASSOCIATE DIRECTOR, DIVISION OF FEDERAL EMPLOYEES' COMPENSATION:		
John D. McLellan (acting)	Feb. 1978	Present
William L. Massey (acting)	Jan. 1978	Jan. 1978
Albert Kline	Feb. 1974	Dec. 1977
Herbert A. Doyle, Jr.	Sept. 1971	Feb. 1974

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