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Occupational Hearing Loss

Workers Compensation Under State and Federal Programs.

OCCUPATIONAL HEARING LOSS

Workers Compensation Under State & Federal Programs

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PREFACE

This report represents over a year of discussion and research in the compensation laws and practices of 50 States and the federal government.

The report documents severe limitations in the adequacy of workers compensation for noise induced hearing loss. The report also shows that the cost of hearing loss compensation to employers and insurers is minute compared to other worker's compensation costs and that major justified improvements can and should be made if hearing loss compensation is to provide any financial incentive for noise control.

During the research, many hours were spent questioning worker's compensation officials, employer and union representatives, insurance companies and lawyers. The people contacted volunteered numerous insights and facts which were invaluable to the report since published data is lacking.

A few persons deserve a special vote of gratitude. Jack Shampan, Program Officer, Environmental Protection Agency was not only helpful and understanding in matters dealing with my contract, but provided detailed and constructive suggestions, and was a good sounding board for ideas. Alice Suter, formerly of EPA and now of OSHA, has done the major recent work in documenting the speech difficulties caused by high-frequency hearing loss and gave me good advice and inspiration throughout. Robert Connelly, a Chicago audiologist, also reviewed the report and helped me improve it.

Finally, thanks to the School for Workers office staff, particularly Marcia Lane who did much interviewing and typed most of the report and Shlomo Cohen, my research assistant who helped obtain the data.

EXECUTIVE SUMMARY

The purpose of this report is to investigate workers compensation for permanent noise-induced hearing loss in 50 States and the federal government. The report examines claims activity, some of the main compensation rules, their scientific support and claims procedures. Finally, the Federal Employee Compensation (FEC) program for hearing loss is studied.

Unfortunately, there is a lack of statistical data for most jurisdictions. Thus, much information came from correspondence and telephone interviews with the compensation agencies, insurers and lawyers in the States involved. A sample of claims was studied in Wisconsin and the FEC program.

The main findings of the report are as follows:

1) While occupational hearing loss was found compensable in key cases 30 years ago and is covered in most State statutes, only nine States compensate more than a token number of hearing loss claims. Over 70% of the country's manufacturing workers live in 41 States which pay few or no claims.

2) Of the States compensating few or no claims, nine have statutory requirements of wage loss or total medical impairment (almost impossible to obtain under current medical standards). Another 32 States have few or no claims because of a variety of factors such as six-month waiting periods before filing after leaving the noise environment (usually after retirement), restrictive impairment formulas, severe filing deadlines, lack of worker choice of physician, or deductions for aging.

3) The maximum benefit for total loss in both ears varies greatly between States, ranging from $8,000 in New Jersey to $135,000 in the FEC program. The average maximum benefit for the 50 States is $21,700. However, maximum benefit levels should not be considered in isolation. Many States with high benefits pay few or no claims. In addition, the average award of around $2,000 - $2,500 is much lower than the maximum benefit.

4) In 1977, the total number of claims paid has been estimated at 6,095 for the 50 States, totalling approximately $13 million in payments. For the federal programs there were 2,300 estimated claims paid amounting to $17.6 million. It should be noted that the numbers of claims have been rising at 20-30% per year in the highest claim States, California and New Jersey, and in the FEC program.

5) A 10-year claims projection, assuming at a minimum 10% per year increases in the filing of claims, shows State claims of almost 16,000 and federal claims totalling nearly 6,000 in 1987. The total claims bill in 1987 would be $156 million for both programs. The 10-year benefits total for State and federal programs is projected at $835 million.

6) A review of the scientific evidence indicates that programs which have included high-frequency loss criterion in their impairment formulas are more in line with current research findings than those using the 1959 American Academy of Ophthalmology and Otolaryngology (AAOO) formula. The States using high frequency formulas include five

of the nine States with substantial claims, as well as the federal FEC program. In fact, the 1979 AAOO formula which now includes 3,000 Hz is the same formula used for over 15 years by the State of California.

7) Other common program features which restrict claims but are not supported by research are long waiting periods, severe hazardous noise definitions and deductions for aging.

8) A review of the FEC program showed that it has received more claims than all the States combined since 1970 and has developed a number of administrative problems in dealing with them. Since the FEC program is a government funded program with no employer rights to contest a claim, the agency has a burden of claims documentation and investigation which it was unable to meet until recently. A Hearing Loss Task Force, set up by the agency two years ago, handles all hearing loss claims and does a thorough job of making certain that claims are documented and valid. In addition, the agency has standards which could serve as models for States with restrictive programs. These include an impairment formula which recognizes high frequency loss, no waiting period and an ample time limit for filing a claim. Some administrative suggestions are made for the FEC program.

9) Recommendations are made for future research, including a study of a Model Hearing Loss Statute to incorporate new information on hearing impairment and experience with various State statutes.

10) A large scale research program should be undertaken to improve our knowledge of the social handicaps caused by hearing loss. The relationship between the percentage of audiometric impairment and the speech discrimination and social difficulties faced by the hearing impaired worker should be more definitely established. Such a program would also assist in the determination of fair and proper benefit levels for worker's compensation and disability programs.

CHAPTER I — INTRODUCTION

"Today, an unheralded abuse of one of the elementary senses granted by Nature to man is on the loose. The noise produced by our modern industrial machinery causes untold loss of hearing to thousands upon thousands of wage earners. This shocking condition has not only been kept from the general public, but it has also remained an enigma to the very people it victimizes, the workers themselves. Industrial deafness, as a result of industrial noise, for the most part is being met with silence by those responsible for creating it. Where silence is not enough to still the protests of forge workers, boilermakers, printing pressmen, machinists, etc., then denial, scientific double talk and legalistic hokum are the device of managerial protest . . . It staggers our sense of justice that as many as 20 or 30 years of a worker's lifetime can be encompassed in the disabling process of acquiring certain occupational diseases. Who is to pay for these years? The worker (the victim) or the industry? Industry says: The worker. We say: Industry . . . Compensation for total and partial loss of hearing must be incorporated into all compensation statutes" (Wood, 1953).

Background

For almost 300 years occupational hearing loss has been recognized as a hazard of certain trades like blacksmiths and boilermakers. Modern technology has extended the risk to many other industries using presses, forging hammers, grinders, saws, internal combustion motors, or similar high-speed, high energy processes.

Yet, government, employers and the public have generally ignored the problem until recently. There is a saying that if noise made the ears bleed, hearing loss would be taken more seriously. Because it develops gradually and has few noticeable symptoms, hearing loss is still demeaned with statements like: "Well, he doesn't need to hear a pin drop." The hard fact is that occupational hearing loss may cause a complete change in the worker's social and work life. In one study of weavers (Kell, et al., 1971) with "slight" hearing handicap by official U.S. medical criteria, the vast majority had trouble hearing in public, talking with friends or strangers or over the phone. They had seriously restricted their social lives and over 50% used lip-reading to aid understanding. Even when the hearing-impaired worker can do his or her job, inability to communicate may still exclude the worker from chances for promotion or job transfer.

Recent surveys indicate that a substantial portion of workers are faced with the hearing loss problem. A University of Washington study (Discher, 1975) found that hearing loss made up 28% of the probable occupational disease cases found in a worker sample. More than 10% of the workers sampled showed hearing loss. In a later publication, Quinn (1978) found that almost 30% of an industrial worker population reported being exposed to noise on

the job and over 40% of these thought it was a sizeable or great problem. In this survey, noise was the third most serious hazard cited, ahead of 11 other areas including "dangerous chemicals," "dangerous tools, machinery" and other items.

For the first time in 1970, the newly formed federal Occupational Safety and Health Administration (OSHA) set enforceable standards on work-place noise. Yet the federal noise limit was set at 90 decibels (dBA)* for the 8-hour working day, a compromise standard adopted from other regulations. The 90 dBA level would still result in impaired hearing for several million workers, even if it were perfectly enforced (Kryter, 1975).

An 85 dBA OSHA noise standard has been delayed because of concern over compliance costs. OSHA enforcement of the existing 90 dBA standard has been hampered by employer challenges and adverse court decisions finding that engineering controls for noise are not economically feasible. Many workers are still exposed to noise levels far above 90 dBA.

Thus, hazardous noise at work is still the rule, not the exception. Many industrially exposed workers will continue to suffer occupational hearing impairment. Because of this, worker's compensation for hearing loss is an essential public policy. It repays hearing-impaired workers in part for their work-related physical, social and economic handicap. Compensation costs and the fear of future increases also give employers an important incentive to invest funds to correct the noise problem.

In most States, employers and insurers have vigorously opposed worker's compensation for hearing impairment and have sponsored restrictive claims criterion and procedures. Until recently, the total number of U.S. hearing loss claims and benefit totals has been very small. However, at the federal level and in a few States, claims and benefits are rising very rapidly. With growing worker awareness and pressure for compensation reform, the trend will likely spread. The total compensation bill for occupational hearing loss claims can be predicted at over $800 million in the next decade**, without counting absenteeism, loss of employment potential and value of personal handicaps suffered by hearing-impaired workers.

* A terminology glossary is included in Appendix 3.

**See Chapter II for a discussion of projected claims costs.

Purpose and Content of Report

Due to the recent trends in claims and future liabilities, there is a need to critically examine present State and federal laws, claims criterion, and claims and benefits totals. A thorough scientific study of this area is important to help compensation administrators review their own programs and give employers, insurers, government agencies, unions and others a factual basis for proposing changes. Hopefully, this report and later studies will serve this need.

The report is composed of seven chapters and three appendices. Chapter I gives a background of the issues and a short history of hearing loss compensation in the U.S.

Chapter II documents a study of claims activity and benefits in various States.

Chapter III examines the basic elements of a worker's compensation program for hearing loss and compares claims procedures between State and federal programs.

Chapter IV reviews the latest scientific information on issues like waiting periods, hearing loss formula, low and high fences (beginning and ending point of impairment), aging and other non-occupational factors.

Chapter V reviews hearing loss compensation at the federal level, including a detailed study of the Federal Employees Compensation (FEC) program which has experienced many more claims than all other jurisdictions combined.

Chapter VI is a brief study of federal and Wisconsin claims.

Chapter VII includes conclusions and recommendations for research and government policy.

Appendix 1 contains selected examples of hearing loss statutes and administrative rules.

Appendix 2 contains hearing loss claim documents.

Finally, a terminology glossary is included in Appendix 3.

Definition of Occupational Hearing Loss

This study is concerned with the type of permanent occupational hearing loss caused by long exposure to noise. Hearing loss is measured medically by an audiometric examination which tests the person's ability to hear pure tones at defined frequencies and decibel levels. Tests of speech discrimination (ability to repeat spoken words delivered at certain speech levels) are also used. It is assumed that performance on these tests is evidence of communication ability in real life. The typical pattern of loss begins with a drop in the hearing level in the high frequencies at 3,000 Hz, 4,000 Hz, and 6,000 Hz spreading later to lower frequencies. This type of loss is usually known as sensorineural hearing loss, because the noise exposure

damages the nerve cells of the inner ear, causing them to swell, distort and eventually die. This causes a permanent decrease of hearing sensitivity known as noise-induced permanent threshold shift. Sensorineural loss cannot be medically corrected. Hearing aids, though in some cases useful, do not provide substantial relief.

Sensorineural hearing loss is distinguished from conductive hearing loss where a perforated ear drum, fluid in the middle ear or damage to the middle ear bones prevent sound waves from reaching the inner ear. Conductive hearing loss may occur from explosions, middle ear infection, sudden pressure changes (aero-otitis), or blows to the head. Conductive hearing loss can usually be reduced or eliminated by medical treatment or surgical methods and can be compensated for with a hearing aid.

more readily

Relating Loss of Hearing to Social Handicap

One of the persistent problems in making policy decisions on noise control in the workplace and hearing loss compensation is the difficulty of relating pure tone hearing impairment to the impact on communication ability and the social and economic functioning of the affected person. What does the audiometric test result mean for the person's understanding, listening, and ability to converse? How does this in turn affect his or her family life, social activity, or job opportunities? This problem of relating impairment to disability is somewhat similar to other occupational diseases. For physical injuries like amputations, the medical impairment can be defined with precision - bone loss, numbness, loss of strength. Studies have been done to relate the medical factors to work limitations, loss of earning capacity and impact on private life. It is also possible to grade the severity of such injuries in a fairly uniform manner.

However, for hearing impairment (as well as lung disease and degenerative conditions such as back problems), there is a lack of agreed measures, both of the medical impairment and the impact on communication ability, work, and social life. Chapter IV will discuss the limitations of audiometric testing in measuring communication ability and scientific disagreements over the importance that should be attached to the speech discrimination problems caused by high-frequency hearing loss.

Also, there is little research that indicates how given problems affect personal, social, or economic life. As a result, it has been difficult to determine and defend fair and proper hearing loss compensation benefits.

Brief History of Hearing Loss Compensation in the U.S.
Early Worker's Compensation Programs

Most U.S. worker's compensation programs began between 1911 and 1920 in response to employer pressures to free themselves from high-cost negligence suits and worker desperation to secure even minimal guaranteed benefits. In return for a ban on court suits, employers agreed to minimum, compulsory compensation benefits for work injuries. The laws passed were quite restrictive and focused mainly on replacing wages lost due to temporary injuries or severe permanent disability. There were "scheduled" permanent benefits for losses of certain body parts or functions, including hearing. Infrequent cases of traumatic hearing loss due to explosions and other accidents were paid for under the schedule.

However, most States had little or no coverage for occupational disease. The few occupational diseases which were compensated were only paid on the basis of proven loss of earning capacity; e.g., silicosis cases during the 1930s. There is no record of claims for occupational hearing loss. Even in Wisconsin, where occupational disease has been covered in the law since 1919, the first claim for occupational hearing loss was not filed until the 1940s (Ginnold, 1974).

Part of the problem was the difficulty in measuring impairment. Audiometric techniques were not developed until the late 1920s, and the first accepted impairment formula, the American Medical Association (AMA) formula, was not approved until 1942 (revised in 1947). This formula used a weighted average of the 500, 1,000, 2,000, and 4,000 Hz frequencies. The inclusion of 4,000 Hz was a recognition of the value of high frequency hearing for "personal efficiency in daily living" (Fowler, 1947).

World War II and After

During the Second World War, the nation's shipbuilding and other metal industries hired hundreds of thousands of new workers. With a 24-hour per day, 7-day per week, war-time production schedule in over-crowded facilities, noisy conditions abounded. Worker awareness of occupational health was gradually increasing and many noise-exposed workers filed hearing loss claims after the war. In one 1948 New York case (*Slawinski vs. J. H. Williams and Co.*), the State Supreme Court awarded benefits over employer pleas for a "wage loss principle." They approved the claim as a "scheduled" injury and stated that "wage loss" was not required to collect benefits. It is not known how many additional claims were paid, but in 1951 the *New York Journal American* newspaper reported that 232 shipyard workers from Bethlehem Steel's Hoboken Yard in New York had filed a $5,000,000 suit in county court, alleging that employer negligence had caused occupational deafness (*New York Journal American*, 1951).

New York and Wisconsin Rules

Soon after the New York Supreme Court ruling and the subsequent awarding of claims, a medical advisory committee was appointed by the New York Worker's Compensation Commission to propose rules for hearing loss compensation. In 1953 they issued their report (New York Workmen's Compensation Board, 1953), with recommendations for the following: 1) six month waiting period away from noisy employment before filing; 2) a hearing loss formula averaging the frequencies of 500, 1,000 and 2,000 Hz with a low fence at 25 dB (re: ANSI-1969); and 3) a definition of noisy employment. These provisions were later adopted as rules of the New York Board and have been in effect almost without change to the present date.

Around the time of the New York cases, hearing loss claims began to be filed in Wisconsin by members of the Boilermakers Union and their attorneys. A Green Bay case eventually became a landmark decision in the Wisconsin Supreme Court, but the major claims pressure came from workers at the huge Ladish Forge Company in the Milwaukee suburb of Cudahy, where thousands of workers labored under extremely noisy conditions (Ginnold, 1974). Veterans of the period report that hammermen operating huge 30 ton forging hammers would frequently run in all directions, frantically holding their ears to escape the piercing shriek of steam from blown gaskets. Shear operators made as many as 16 cuts a minute on 5-inch steel, cutting the steel like butter with a deafening sharp "thwack." The abrasive cutoff wheels whined and whirred at an extreme level. Many workers in these departments who began work at 18 years of age had lost much of their hearing before the age of 30 years.

In response to union requests, a young labor attorney filed several hearing loss claims. The first claim filed was paid without challenge by the Ladish insurance carrier. However, the company balked when 100 additional claims were filed. The company then began organizing a movement among industry for a more restrictive law. Employers predicted that they would have to pay hundreds of millions of dollars in compensation claims and even threatened to move to other States unless something was done. The top Wisconsin union groups, faced with economic blackmail, agreed with employers in 1953 to a moratorium on claims. Ironically, soon after this limitation became law, the Wisconsin Supreme Court affirmed compensation in the Green Bay test case (*Green Bay Drop Forge vs. Wisconsin Industrial Commission and Albert Wocjik*, 1953). Similar to New York, a medical advisory committee was established and their recommendations for a six-month waiting period and a new compensation formula were almost identical to those of New York. These were included in the law in 1956.

AAOO/AMA Formula

The New York and Wisconsin debates over hearing loss compensation apparently were the basis for the later American Academy of Ophthalmology and Otolaryngology (AAOO) hearing loss formula accepted by the American Medical Association (AMA) in 1959 to replace the 1947 AMA formula (AMA Committee, 1961). The AAOO formula averaged hearing levels at 500, 1,000, and 2,000 Hz with the low fence at 25 dB (re: ANSI - 1969). It did not include the

six-month waiting period, though some of the AAOO leadership endorsed the six-month wait in their own States. When the AMA Committee (1961) adopted the AAOO formula in 1959, it stated that "hearing impairment should be evaluated in terms of ability to hear everyday speech under everyday conditions." It then defined hearing of everyday speech as the "ability to hear sentences and repeat them correctly in a quiet environment." Because of the limitations of speech testing at that time, hearing loss for speech was measured by a pure-tone audiogram. The AAOO formula excluded consideration of high-frequency hearing loss or other clinical measures of hearing impairment; e.g., speech discrimination tests, evaluation of tinnitus, recruitment, and others.

From 1959 on, a number of States adopted the AAOO formula along with other restrictions, including the six-month waiting period. Some of these States are Missouri, Rhode Island, Maine, Utah, North Carolina, Georgia, New Hampshire, Maryland, and Montana. Over 20 other States left the issue up to treating physicians, which usually meant use of the AAOO formula. The six-month waiting period in effect, excludes claims until retirement and the AAOO formula excludes the frequencies most likely to be affected by occupational hearing loss. This combination, along with low benefits, statutes of limitations, physicians chosen by insurance carriers and low worker awareness, has resulted in an absence of hearing loss claims. Beyond this, in some States occupational hearing loss has always been virtually noncompensable, such as in Pennsylvania, Michigan, Ohio, and until recently Illinois.

Even after many States had adopted the new, restrictive AAOO formula, the issue was not dead. In the two key states, New York and Wisconsin, the new rules had been put through partially through scare tactics and economic pressures by employers, without a real scientific basis. In Wisconsin the principal medical expert proposing the AAOO formula was Dr. Meyer Fox, Medical Consultant for Liberty Mutual Insurance Company and Medical Director for Ladish Forge Company, which was faced with over 1,000 hearing loss claims. Other AAOO committee members were close to major employers and insurance carriers. There still has been little supportive scientific or medical documentation to justify the departure from the original 1947 AMA formula.

Signs of Reform

After the mid-1960s, awareness of noise hazards and occupational hearing loss greatly increased. This led to renewed pressure from labor and other groups to control workplace noise and improve hearing loss compensation. Some States had never accepted the restrictive AAOO recommendations.* New Jersey continued to use the 1947 AMA formula as well as other high-frequency formulas. In 1961, California adopted a compromise, adding the 3,000 Hz frequency to the AAOO formula. Neither State imposed administrative obstacles such as the six-month rule. These States now have a relatively high volume of hearing loss claims.

* See Chapter III and Table 1 for a discussion of specific state hearing loss provisions.

The most important development was the adoption of guidelines for compensating high frequency impairment by the Federal Employees Compensation (FEC) program. This led to a major increase in federal hearing loss claims. The FEC program covers all federal employees, including noise exposed airbase and shipyard workers. In 1969, the FEC began using a formula averaging 1,000, 2,000, and 4,000 Hz. In 1972, the formula was changed to replace 4,000 Hz with 3,000 Hz, in line with recommendations published in a criteria document by the National Institute for Occupational Safety and Health (NIOSH, 1972). The FEC program* has received over 30,000 hearing loss claims since 1969 and has made awards in approximately 25,000 cases.

In response to the NIOSH study and other research, the AAOO recently (McCurdy, 1979) revised its formula by adding 3,000 Hz - an averaging of 500, 1,000, 2,000, and 3,000 Hz with a beginning impairment at 25 dB (re: ANSI - 1969). A few States have also introduced reforms such as reduced waiting periods, and compensation for high frequency loss. Some States are also removing requirements of economic loss.

On the other hand, a recent federal audit (General Accounting Office, 1978) has recommended that the federal programs return to the 1959 AAOO formula and some States are considering special restrictive statutes. Because of rapidly rising claims and considerable new information on hearing impairment, there is a growing debate over proper compensation rules and benefits for occupational hearing loss. A detailed review of compensation rules and a federal auditors report are included in Chapters III and V.

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* See Chapter V for a detailed review of the FEC program.

CHAPTER II — CLAIMS ACTIVITY AND BENEFITS IN STATE AND FEDERAL PROGRAMS

Obtaining Data on Hearing Loss Claims

Most worker's compensation agencies have devoted few resources to record-keeping or statistics (*Compendium on Workmen's Compensation*, 1973). The majority of States collect employer reports of injury but do not have data systems for retrieving case records as the claim is acted on and compensated or denied. Thus, only a few States publish data on compensable injuries and fewer still release even general data on closed claims that are paid or denied.

The situation is even more bleak for occupational diseases like hearing loss. Because of legal obstacles, many more claims are filed than are actually paid, but the data system does not usually distinguish this. Closed claim figures rarely have a good injury breakdown. Even where data are collected, the coding for different injuries may not distinguish between conductive hearing loss due to an accident and a sensorineural hearing loss due to noise exposure. In some cases temporary compensation for ear infections is lumped with permanent partial disability awards for occupational hearing loss. In many States with few or no claims for noise-induced hearing loss, there are frequent cases of permanent hearing loss due to explosions. This study is not concerned with those traumatic cases and they have been excluded from the statistics. For example, in Oklahoma there are over 100 traumatic hearing loss cases annually, most from the oil industry, but less than 10 claims are paid for sensorineural hearing loss due to long term exposure to occupational noise. Finally, because many States do not closely monitor claims-handling by insurers, many permanent claims are informally settled (compromised) with no results recorded.

In spite of the above problems, some States did provide statistical reports which gave firm figures on hearing loss claims paid. Wisconsin, New York, Washington, Oregon, Colorado, North Carolina, South Carolina, and Georgia are examples. Most of these States are among those participating in the Bureau of Labor Statistics-sponsored Supplementary Data System (SDS). This system is upgrading State worker's compensation data providing a coding system which allows some tabulation of noise-induced permanent hearing loss cases.

In the case of New Jersey and California, States with large numbers of claims, there are no detailed reports on claims paid. However, in New Jersey, the State with the largest number of claims, the figures used in this report were based on a hand sampling of claims by the agency's statistical division after a telephone discussion with the director. In California, three sets of State statistics are kept, none of which show the number of claims paid. With the help of agency personnel, estimates were made based on initial claims filed with the appeal board. In both these cases, the claims estimate made should be very close to the true figure.

In a number of other States, no figures existed on the number of hearing loss claims. Telephone conversations with examiners and office personnel confirmed the existence of

few or no claims. In most States, agency responses were cross-checked with attorneys, insurers, or union representatives. In a small number of cases where estimates were necessary, the claims figure is shown as a maximum. This maximum is felt to be a reliable estimate and was checked with key agency personnel.

Finally, letters were written to almost every State concerning the compensability of occupational hearing loss. Follow-up phone calls were made to each State. Based on the information obtained, some States were classified as partially or totally denying compensation to hearing loss claimants.

Review of Benefit and Claims Data

The first two columns of Table 1 show the numbers of hearing loss claims paid in 1977 and maximum benefits (the remaining data in this summary table will be discussed in Chapter III). For instance, in California, with 1,925 claims, there is no figure for loss in a single ear, but total loss of hearing in both ears (100% impairment under the California formula) would entitle the claimant to $21,770 (based on 311 weeks of compensation at $70/week). Looking at maximum benefits, the States vary widely. The average maximum benefit for total loss in both ears is $21,700 for all States. Among the nine States compensating the most claims, four States exceed this figure and five are below it. The FEC program has paid more claims than almost any State and also has the highest maximum benefit for total binaural hearing loss, amounting to $135,600. However, New Jersey compensates the highest number of claims among the States and has the lowest maximum benefits. On the other hand, States which have legal bars to hearing loss compensation, like Pennsylvania and New Mexico, have some of the highest maximum benefits.

The above simply points out that States cannot be compared by their relative benefit levels since there is no real relationship between claims awarded and benefit maximums. In fact, there may be little insurer resistance to increasing maximum benefits, where there are few claims due to other restrictions.*

Concerning actual claims, Table 1 shows that the two federal hearing loss compensation programs, even after a 1976 change in FEC administration, still compensate well over 2,000 claims annually, more than any State except New Jersey. Counting the 1,800 FEC claims amounting to $14 million and a minimum of 500 Longshore and Harbor worker claims with awards around $3-4 million, federal claims total $17-18 million. This exceeds the total for State claims of $13 million shown in Table 2.

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* See Chapter III.

TABLE 1 Numbers of Claims and Criteria for Hearing Loss Compensation under Federal and State Programs

JURISDICTION	IS OCCUPATIONAL HEARING LOSS COMPENSABLE?	NO. OF CLAIMS PAID—1977 [1]	MAXIMUM BENEFITS—TOTAL LOSS IN BOTH EARS	TIME LIMIT TO FILE CLAIM	APPORTIONMENT (BETWEEN EMPLOYERS)	CHOICE OF PHYSICIAN	HL WAITING PERIOD	HL FORMULA	DEDUCTION FOR AGING	HEARING AID PROVIDED [2]		AGENCY PROVIDING HEARING AID	CREDIT IN AWARD FOR HEARING AID IMPROVEMENT	AURAL REHABILITATION [3] PROVIDED	DEDUCTION FOR PREEXISTING LOSS [4] [5]
										I	R				
Fed. Emp. Program	YES	1,800	$135,600	D-3 yrs.	N	Employee	N	NIOSH	N	Y	Y	WC	N	P	N
Longshore/ Harbor	YES	500	73,444	D-3 yrs.	N	Employee	N	Und	N	Y	Y	WC	N	Y	N
Alabama	YES	20	20,864	1 yr.	Unk	Carrier	N	ME	N	Y	N	WC	N	P	Y
Alaska	YES	4	28,000	D-2 yrs.	N	Employee	N	ME	N	Y	Y	WC	N	P	N
Arizona	YES	10	32,999	1 yr.	N	Employee	N	'59 AAOO	N	Y	Y	WC	N	Y	Y
Arkansas	YES	3	13,125	2 yrs.	Unk	Carrier	N	ME	N	Y	Y	WC	N	Y	N
California	YES	1,925	21,770	D-1 yr.	Y	Employee	N	'79 AAOO [6]	N [7]	Y	Y	WC	P [8]	P	Y
Colorado	YES	6	11,676	3-5 yrs.	N	Carrier	N	ME	N	Y	N	WC	N	Y	Y
Connecticut	YES	50	22,932	D-1 yr.	Y	Employee	N	'59 AAOO	N	Y	P	WC	N	N	N
Delaware	YES	5	13,125	D-1 yr.	N	Employee	N	ME	N	Y	Y	WC	N	Y	Y
Florida	NO-PPD	0	18,900	D-2 yrs.	N	Carrier	N	ME	N	Y	Y	WC	N	Y	Y
Georgia	YES	11	16,500	1 yr.	N	Carrier	6 mos.	'59 AAOO	N	Y	Y	WC	N	Y	Y
Hawaii	YES	5	37,800	D-1-2 yrs.	Y	Employee	N	'59 AAOO	N	Y	P	WC	N	P	N
Idaho	YES	3	18,576	1 yr.	N	Carrier	N	ME	N	Y	Y	WC	N	Y	Y
Illinois	YES	0	48,232	3 yrs.	N	Employee	N	ME	NR	NR	NR	NR	NR	NR	Und
Indiana	NO-PPD	0	15,000	2-3 yrs.	Unk	Carrier	N	ME	N	Y	N	WC	N	Y	Y
Iowa	YES	10	42,700	2 yrs.	Y	Carrier	N	ME	P	Y	Y	WC	N	Y	Y
Kansas	YES	6	14,197	1 yr.	N	Carrier	N	'47 AMA	N	Y	Y	WC	N	Y	N
Kentucky	YES	2	17,472	1-3 yrs.	N	Employee	6 mos.	'59 AAOO	Y	Y	N	WC	N	N	Y
Louisiana	NO-PPD	0	[9]	D-4 mos.	Unk	Carrier	N	ME	NR	NR	NR	NR	NR	NR	N
Maine	YES	10	46,344	2 yrs.	Unk	Employee	1 mo.	'59 AAOO	N	P	P	WC	N	Y	Y
Maryland	YES	28	17,000	2 yrs.	Unk	Employee	6 mos.	'59 AAOO	Y	Y	Y	WC	N	Y	Y
Massachusetts	NO-PTI	0	12,000	D-1 yr.	N	Employee	N	ME	N	P	P	WC	NA	P	N
Michigan	NO-PPD	0	[10]	D-4 mos.	N	Carrier	N	ME	N	Y	Y	WC	N	Y	Y
Minnesota	YES	50	33,490	D-3 yrs.	N	Employee	N	ME [11]	N	Y	Y	WC	N	Y	N
Mississippi	YES	2	13,650	D-2 yrs.	N	Carrier	N	ME	N	Y	Y	WC	N	Y	Y
Missouri	YES	28	15,120	D-1 yr.	N	Carrier	6 mos.	'59 AAOO	Y	N	N	NA	N	N	Y
Montana	YES	5	19,400	D-30 days	N	Employee	6 mos.	'59 AAOO	Y	Y	Y	WC	N	Y	Y
Nebraska	YES	0	15,500	D-6 mos.	N	Employee	N	'59 AAOO	N	Y	Y	WC	N	N	N
Nevada	NO-PTD	0	4,305	D-90 days	N	Employee	N	'79 AAOO	N	Y	Y	WC	N	P	Y
N. Hampshire	YES	0	38,520	2 yrs.	N	Carrier	6 mos.	'59 AAOO	P	Y	Y	WC	N	Y	N
N. Jersey	YES	3,000	8,000	D-1-2 yrs.	Y	Carrier	N	'47 AMA	P	Y	P	VR	N	N	N
N. Mexico	NO-PTD	0	25,869	1 yr.	Unk	Carrier	7 days	ME	NA	NA	NA	NA	NA	NA	Y
New York	YES	366	15,750	D-90/2 yrs	Y	Panel	6 mos.	'59 AAOO	N	Y	Y	WC	N	P	Y
N. Carolina	YES	17	25,200	D-2 yrs	N	Carrier	6 mos.	'59 AAOO	N	Y	N	WC	N	Y	Y
N. Dakota	YES	5	8,000	1 yr.	N	Employee	N	ME	N	Y	Y	WC	N	Y	N
Ohio	NO-PTD	0	13,500	6 mos.	Y	Employee	N	ME	N	NA	NA	NA	N	Y	Y
Oklahoma	YES	10	18,000	D-3-18 mo	Y	Carrier	N	ME	N	Y	P	WC	N	Y	N
Oregon	YES	48	16,320	D-6 mos.	N	Employee	N	500-4K [12]	N	Y	P	WC	N	Y	Y
Pennsylvania	NO-PTI	0	55,380	120 days	Unk	Carrier	N	ME	N	N	N	NA	N	N	Y
Rhode Island	YES	10	9,000	D-2 yrs.	N	Employee	6 mos.	'59 AAOO	P	Y	Y	WC	N	Y	Y
So. Carolina	YES	1	28,380	D-2 yrs.	N	Carrier	N	ME	P	Y	N	WC	N	Y	Y
So. Dakota	YES	0	23,250	2 yrs.	Unk	Carrier	N	ME	N	Y	Y	WC	Y	Y	Y
Tennessee	YES	6	15,000	1-3 yrs.	N	Panel	N	ME	N	Y	N	WC	N	N	N
Texas	YES	2	13,650	6 mos.	Y	Carrier	N	'59 AAOO	N	Y	Y	WC	N	Y	Y
Utah	YES	0	13,100	D-1 yr.	N	Carrier	6 mos.	ME	Y	Y	N	WC	N	N	Y
Vermont	YES	3	38,915	1 yr.	N	Employee	N	ME	N	Y	Y	WC	N	Y	Y
Virginia	YES	8	18,700	D-2 yrs.	N	Panel	N	'59 AAOO	N	N	N	NA	N	Y	Y
Washington	YES	240	14,400	D-1 yr.	Y	Employee	N	'59 AAOO	N	Y	Y	WC	N	NR	Y
W. Virginia	YES	42	33,480	D-3 yrs.	N	Employee	N	'59 AAOO	N	Y	Y	WC	N	Y	N
Wisconsin	YES	149	21,450	None [13]	Y	Employee	2 mos.	CHABA	Y	Y	Y	WC	N	Y	Y
Wyoming	YES	5	11,262	D-1/3 yrs	N	Employee	N	ME	P	Y	Y	WC	N	Y	N

FOOTNOTES

[1] Some state figures are maximums which may include a few traumatic hearing loss claims.

[2] States usually require medical proof or prescription for hearing aid.

[3] In most cases, provided by Vocational Rehabilitation agency.

[4] Where allowed, either pre-employment audiogram or medical evidence required. Where deduction is made, it is determined by subtracting the previous rating from current rating.

[5] For states not deducting, pre-existing loss is usually covered under second injury fund.

[6] California formula in effect since 1963, basis for 1979 AAOO formula.

[7] Compensation is generally decreased for ages below 39 and increased for ages above 39; also adjusted for type of employment.

[8] Award usually made on uncorrected audiogram since correction would also commit employer to lifetime purchase and maintenance of hearing aid.

[9] No fixed maximum; based on individual case.

[10] No maximum; all permanent disability benefits based on lifetime replacement of wage loss.

[11] No formula; courts have allowed speech discrimination scores, in addition to audiometric tests.

[12] Average of frequencies 500-4K with 25 decibel low fence.

[13] In 1975, Wisconsin eliminated the Statute of Limitations for occupational diseases. Disease claims barred by the time limit for injuries are paid from a special state fund.

SOURCE NOTE

Data from telephone survey of federal and state compensation agencies and state statistical reports. In a few cases, other published sources were used (Barth, Fox, National Commission on State Workmen's Compensation Laws, and U.S. Chamber of Commerce.) New Jersey, California, and Washington figures are close estimates from available raw data. Figures updated to October 1978 or later.

Abbreviations

D = Discovery Rule (time limit begins when worker becomes aware of disability; otherwise, usually starts with date of injury)

I = Initial Hearing Aid

ME = Medical Evaluation (impairment percent determined by physician; decision on degree of hearing impairment left to individual medical opinion, which usually means the AAOO formula)

N = No

NA = Not Applicable

NR = No Response

P = Possible

PPD = Permanent Partial Disability

PTI = Permanent Total Impairment

PTD = Permanent Total Disability

R = Replacement Hearing Aid

Und = Undecided

Unk = Unknown

VR = Vocational Rehabilitation

WC = Worker's Compensation

Y = Yes

Among the nine States compensating more than a token number of claims, New Jersey and California lead the way with 3,000 and 1,925 claims respectively. This is not surprising because as will be discussed in Chapter III, both States compensate high frequency hearing loss and have no waiting periods or serious restrictions on claims. The total for all nine high claim States is 5,870 claims. If we add a maximum of 225 claims from the remaining States which pay few or no claims, the total for all States is 6,095. It is striking to note that 41 out of the 50 States have paid few or no claims.

Total State benefits for hearing impairment of $13 million in 1977 was *less than 3 tenths of 1 percent of the $6 billion total U.S. worker's compensation* bill. Thus, even the rapidly rising dollar volume for occupational hearing loss claims is still a minute factor in total worker's compensation costs.

Figure 1 is a map comparing States by claims activity and compensability of hearing loss. As shown, only the Pacific Coast States, and Wisconsin, Minnesota, New York, Connecticut and New Jersey compensate more than a few claims. Thirty-two States comprising the Plains and Mountain States and most of the South have few or zero claims even where they allow hearing loss compensation. Finally, nine States make occupational hearing loss virtually non-compensable by special requirements to be discussed in Chapter III.

Table 2

Total State Benefits Paid, 1977

	Number of Claims	Average Benefits	Total Benefits[5]
New Jersey	3,000	1,500[1]	4,500,000
California	1,925	3,000[2]	5,775,000
New York	366	2,485[3]	910,000
Washington	240	2,300[4]	552,000
Wisconsin	149	2,300[3]	342,700
All Other	415	2,300[4]	931,500
	—	—	—
Totals	6,095		$13,011,200

Source Notes: From Table 1

[1]Average of nine claim sample from attorney files plus agency estimate.
[2]State estimate.
[3]Actual figures.
[4]Using Wisconsin average since some State claim figures unavailable.
[5]Calculated from claims number and average benefits.

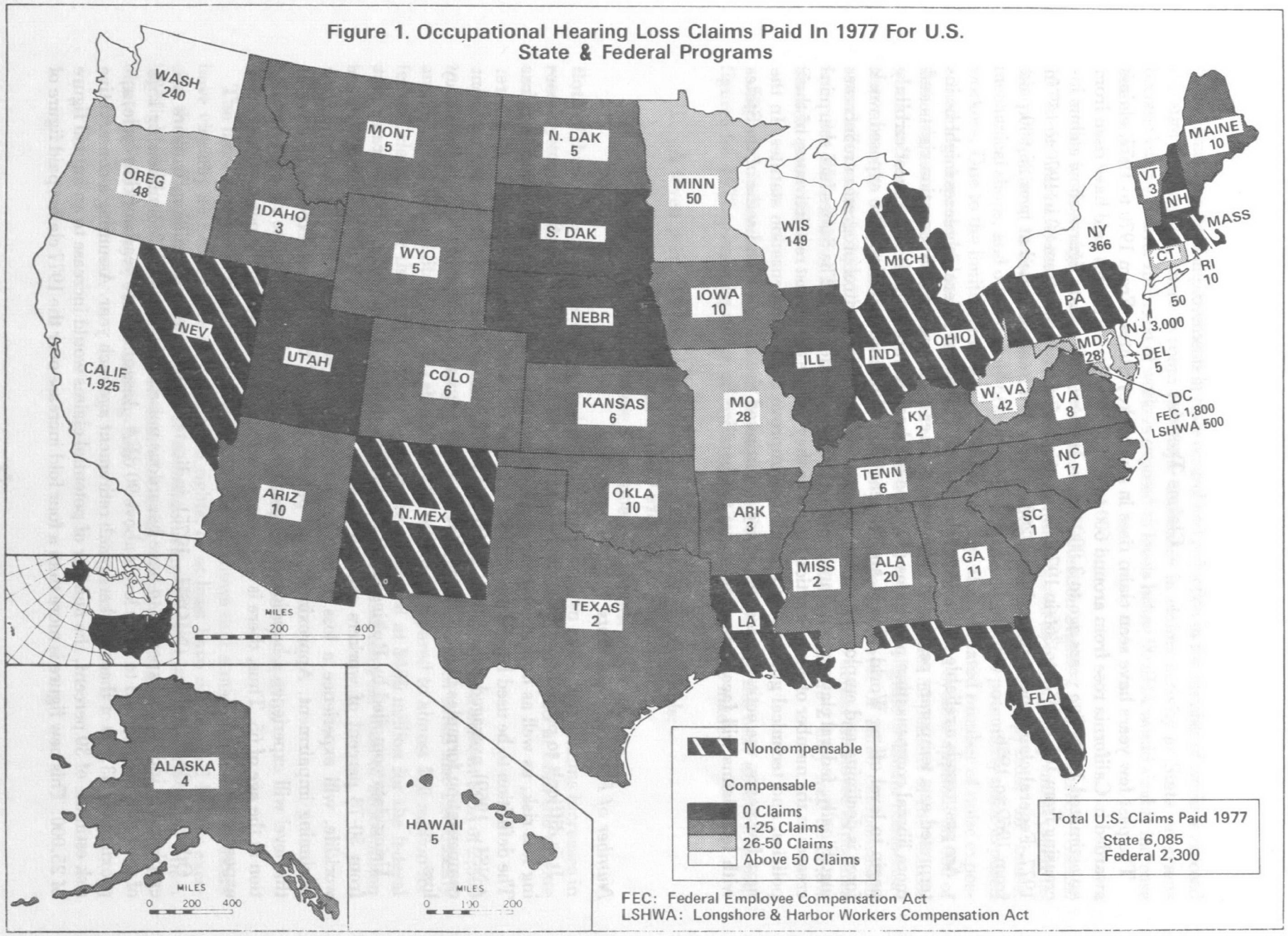


Figure 1. Occupational Hearing Loss Claims Paid In 1977 For U.S. State & Federal Programs

Claims Trends

The past few years have seen claim rises in several key States. From 1970 to 1977, claims awarded in California rose from around 600 to 1,925. New Jersey claims paid have risen from an estimated 1,500 five years ago to 3,000 today. In New York, State figures show claims increasing from 165 in 1972 to 366 in 1976. Wisconsin claims paid rose from 80 in 1970 to 149 in 1977. Federal claims paid jumped from 266 in 1966 to a total estimated at over 25,000 paid from 1969 to 1976.

Are past trends a reliable indication of the future? The recent federal increases might be interpreted as a temporary peak, due to growing worker awareness of compensation rights and more liberal compensation provisions. The rise has been so rapid that it will almost certainly begin to level off as World War II and Korean War shipbuilders retire. The exposed work force is declining and employer hearing conservation and noise control programs are increasing. Finally, federal claims procedures have tightened considerably. The States face sharp increases in the number of compensation claims as they reduce the unjust restrictiveness of their policies, and technical guidance is provided to improve State compensation statutes. In the next few years, the active States should see a continued rise in claims and some of the States with few claims will face serious pressures to liberalize laws and policies.

Estimate of Future Claims and Benefits

Number of Potential Claimants

It is difficult to project future claims because the experts differ both on the extent of hearing loss risk, as well as how much hearing loss is needed before hearing impairment begins. The definition to be used here is the NIOSH criterion for beginning impairment of 25 dB (re: ANSI - 1969) averaged over 1,000, 2,000 and 3,000 Hz. This is more liberal than present compensation formulas in most States. Yet the trend is towards compensating high frequency loss.

Using data compiled by Robinson (1971) and Baughn (1973), Kryter (1975) indicates that from 50-78 percent of workers exposed to noise levels averaging 90 dBA over a 40 year worklife, will experience a loss of hearing sensitivity exceeding the NIOSH criterion for beginning impairment. Approximately 30 percent more of the workers exposed to noise at this level will experience a handicapping hearing loss than will a non-noise exposed population at the age of 65. Thus, there is a 30 percent increase in risk due to the occupational noise exposure.

Other NIOSH studies (NIOSH, 1975) indicate that almost 23 million workers are employed in industries expected to have hazardous noise levels, of which 3.3 million, or 15% of the total, are exposed to noise levels above 90 dBA. Assuming a 40 year worklife cycle, approximately 83,000 of these workers reach retirement age each year. Assuming a conservative risk estimate of 30 percent, the number of potential claims would increase to an annual figure of 25,000. This new figure is more than a four fold increase over the 1977 claims paid figure of

6,000. Thus, in spite of improvements in noise control and reduction in the number of workers exposed through automation, there is room for major increases in claims activity as State programs become less restrictive. Inclusion of workers exposed to levels below 90 dBA would sizably increase this estimate.

On the federal side, a recent Environmental Protection Agency (EPA) survey (Glenn, 1977) obtained responses from 1,699 Federal facilities classed as having the greatest potential for occupational noise problems. These establishments, mainly shipyards, air bases, mechanical shops, and other metalworking shops, employed 841,000 potentially noise exposed workers. Due to the limited coverage of the EPA study, the estimated number of noise exposed workers is probably conservative. If a 30 year federal retirement cycle is applied, 28,000 of these employees can be assumed to retire each year. Assuming that 30 percent of the retirees would suffer a compensable hearing impairment, 8,400 would be eligible to file for compensation annually. This number is far above the present federal level of 2,300 compensation awards for noise induced hearing loss. Since we do not know the actual employee exposures from the EPA federal facilities study, even the projections in Figure 2 may well be below the real potential.

Figure 2 indicates a projection of federal and State claims over the next decade. Actual figures for 1977 are used as a benchmark and two assumptions are made:

1. A seven percent annual cost-of-living increase in benefit levels;

2. A ten percent annual increase in numbers of claims.

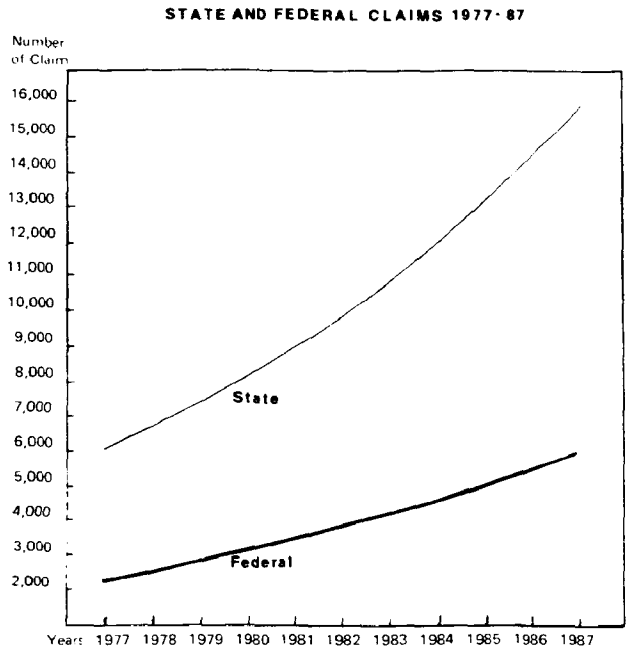
Both of these assumptions seem somewhat conservative, given more rapid claims increases in recent years and as shown, the number of potential claimants employed in both the private and public sector exposed to hazardous noise levels.

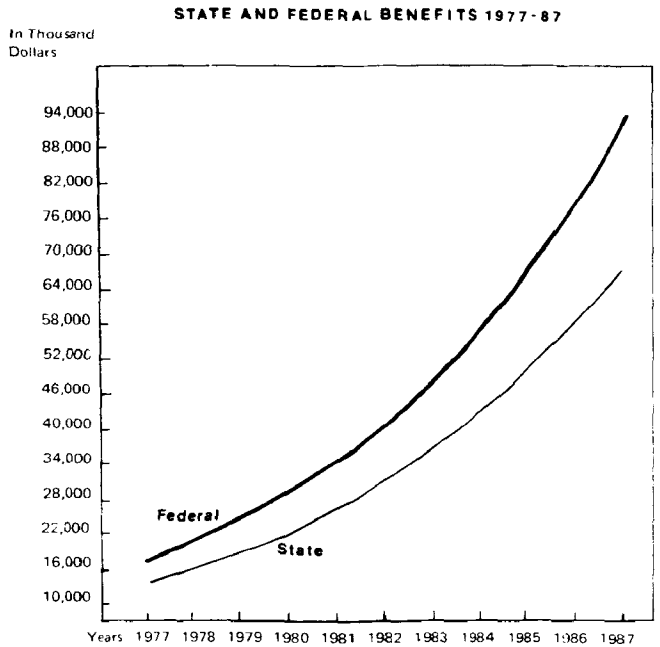
As the figure illustrates, federal claims may be expected to rise from a present total of 2,300 to 6,000 by 1987 while State claims go from 6,095 to 15,809. Benefit totals also rise quickly and by 1987, annual State benefits should be $66 million compared to almost $90 million for federal claims. Over the decade, total benefits are estimated at $480 million for the federal program and $356 million for the State programs, for a grand ten year total of $836 million for all claims.

Gaps in Coverage of Hearing Loss Compensation

The large number of States with few or zero claims shows that a majority of U.S. workers have virtually no hearing loss compensation rights, or at least have not learned how to exercise them. Figure 3 is a comparison of manufacturing employment State-by-State which highlights this point. The figures on manufacturing employment are taken as a rough indicator of the employee risk of hearing loss.

Figure 2 Projected Claims and Benefits in State and Federal Hearing Loss Compensation, 1977 - 87





CUMULATIVE CLAIMS 1977-87

STATE 106,852

FEDERAL 40,315

CUMULATIVE BENEFITS 1977-87

STATE $355,538,623

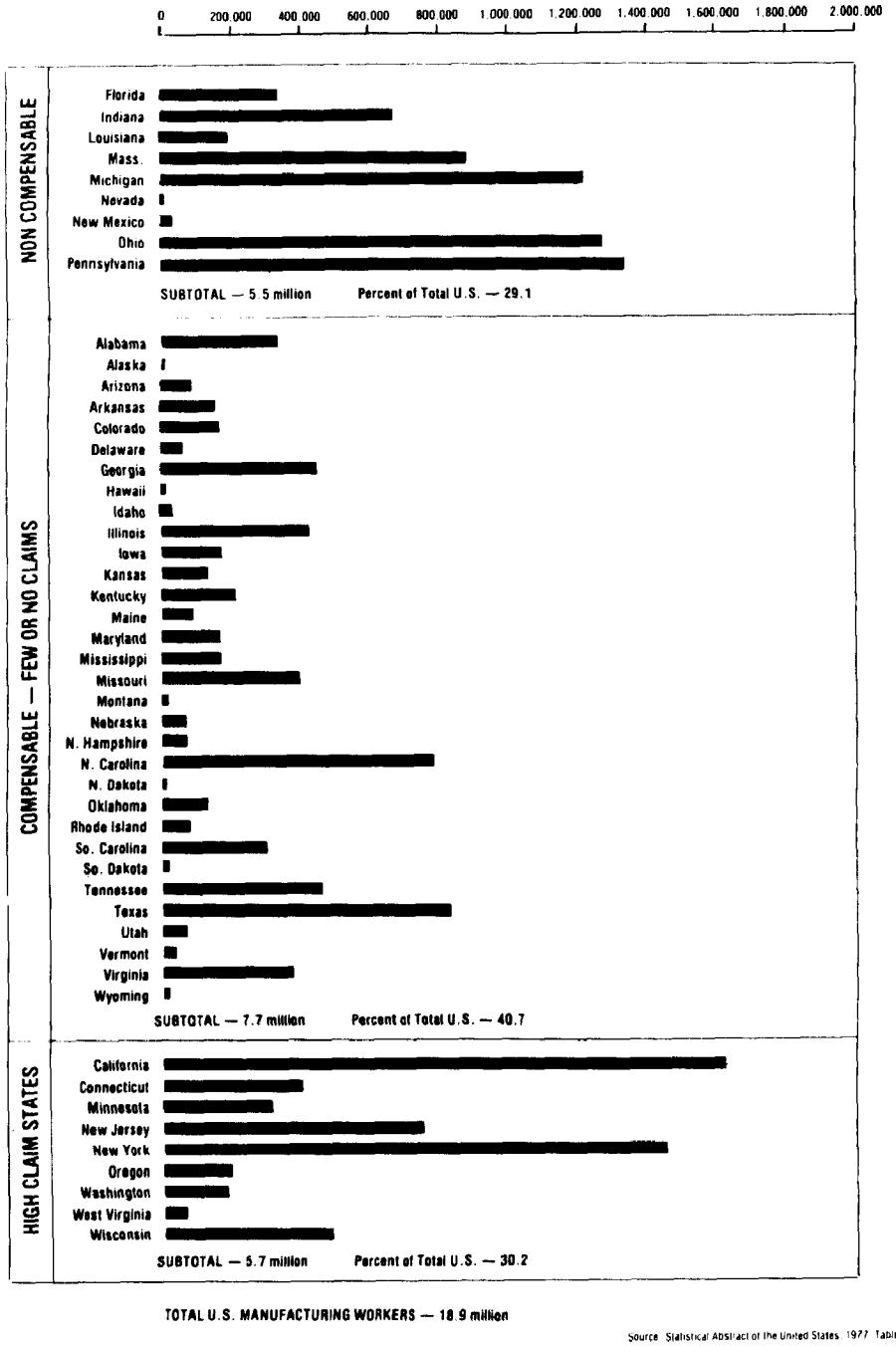
FEDERAL $480,187,000

Source Calculated by author

Figure 2. Projected Claims and Benefits in State and Federal Hearing Loss Compensation, 1977-87

FIGURE 3

Comparison of U.S. Manufacturing Employment by State, 1976



Source: Statistical Abstract of the United States 1977 Table 656 p. 401

Figure 3. Comparison of U.S. Manufacturing Employment by State, 1976

Of the nearly 19 million U.S. manufacturing workers, less than 30% or 5.6 million work in States which have paid more than a token number of hearing loss compensation claims. Around 5.5 million, or 30% of the total, work in nine States which do not compensate partial hearing loss. This includes many of our key industrial States like Ohio, Pennsylvania, Michigan, Indiana and Massachusetts. Over 40%, or 7.7 million employees, work in States where few or no claims are being filed, even though hearing loss compensation is on the books. In fact, as Figure 1 graphically indicates, the only States paying sizable numbers of claims for hearing loss (with minor exceptions) are three clusters on the Pacific Coast, the Atlantic Seaboard, and the Upper Midwest.

Some of the States which have no hearing loss claims are basically nonindustrial, like New Mexico, Nevada, Wyoming, and Idaho. Regardless of legislative restrictions, we would expect few claims. However, some of the States with zero or few claims have a large industrial worker population, such as Illinois, Missouri, Texas, Virginia, North Carolina, South Carolina, Georgia, Alabama, and Florida. Some have large numbers of noise-exposed miners, like Tennessee, Kentucky, Montana, and Utah. Even West Virginia's 42 claims seem extremely low in relation to the 60,000 miners in the State.

As will be discussed later, individual union pressures have been responsible for increasing hearing loss claims in many States. Yet a number of the States which have zero claims are heavily unionized. Figure 4 shows differences in union organization between States. The average for the U.S. was 26.2% in 1974. Compared to this, many of the States with few or zero claims have high levels of organization. This includes Ohio (33 percent), Michigan (38 percent), Illinois (35 percent), Indiana (33 percent), and Pennsylvania (38 percent).

The great variation between the States in claims activity requires further investigation. The following chapter will compare various State laws and administrative practices and will question how some outside factors like union activity can affect claims volume.

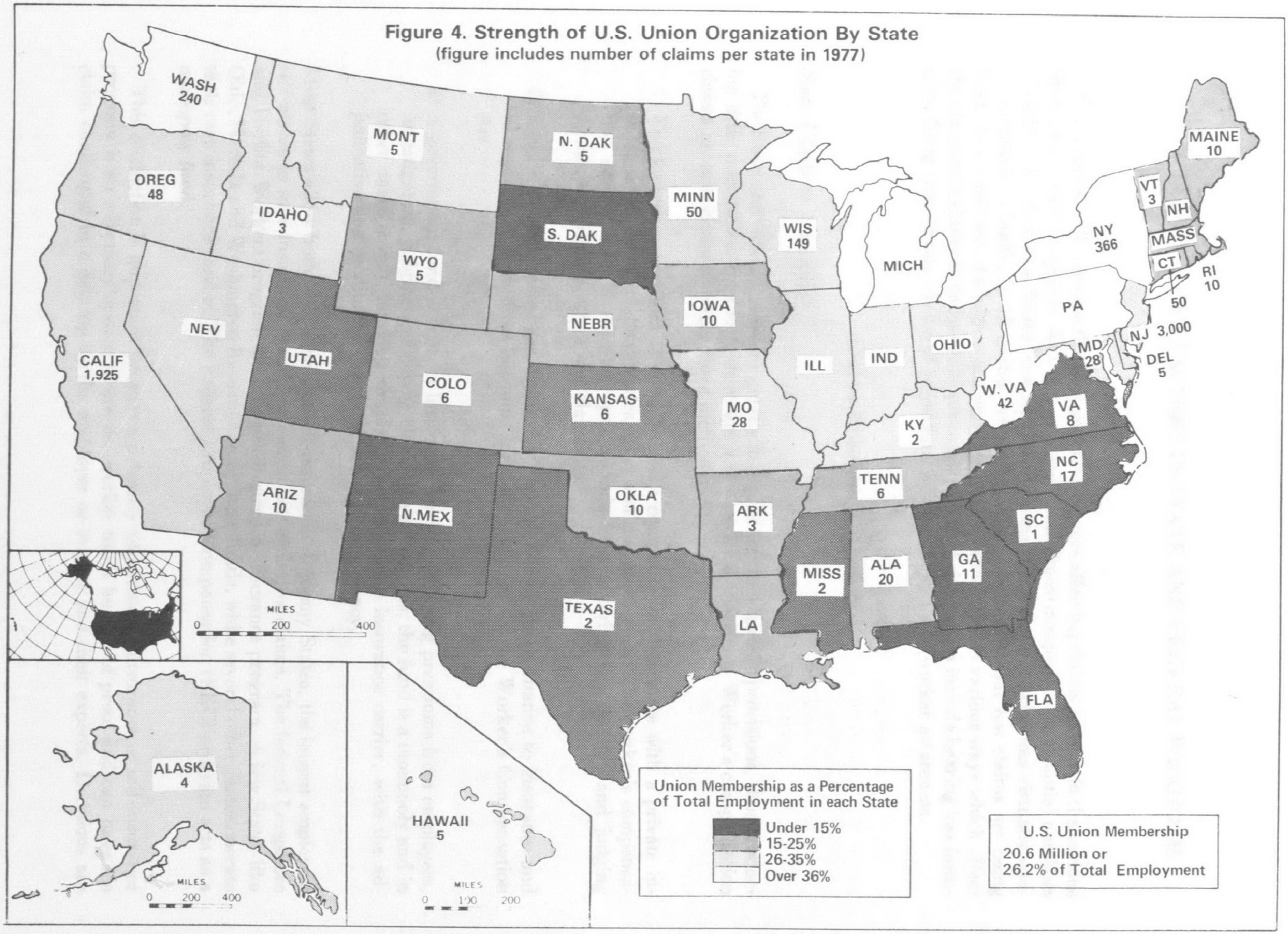


Figure 4. Strength of U.S. Union Organization By State
(figure includes number of claims per state in 1977)

CHAPTER III — KEY FACTORS IN STATE AND FEDERAL PROGRAMS

This chapter will compare the laws and other factors affecting claims activity in the various State and federal programs. As Figure 1 shows, nine States compensate substantial numbers of claims. Another nine States have legal restrictions which make hearing loss virtually non-compensable. Finally, in 32 States, hearing loss is compensable but few claims are being filed. As we will see, the high-claim and low-claim States differ in various ways which affect the claimant's ability to successfully process a claim. Major factors include hearing loss formulas, filing time limits, choice of physician, waiting periods and worker awareness.

Claims Procedures: Overview

State Funds vs Insurance

The State and federal laws vary greatly in procedures and specific provisions, thus producing little uniformity. However, there are a few major distinctions. Worker's compensation claims are administered under three methods:

1) Employers are required to carry worker's compensation insurance with a private insurance carrier which investigates, pays and disputes claims. The worker's compensation agency plays a relatively passive role in monitoring the insurers and judging disputes between insurers and claimants.

2) Employers are allowed to "self-insure" themselves as an alternative to insurance and handle claims themselves but must meet the standards of the Worker's Compensation Act.

3) A government fund acts as an insurance carrier, collecting premiums from employers, investigating, judging and paying claims. In some cases, the fund is a monopoly and in other cases it may function simply as a competitive insurance carrier, with the adjudicative and monitoring functions in a separate agency.

Most States allow both insurance and self-insurance. In many States, the largest employers self-insure to save insurance premiums and to better control claims. The federal Longshore and Harbor Workers program is also a self-insurance/insurance program. A few States like Ohio, Nevada and Washington have monopoly State funds, while several other States operate their own insurance carrier. The Federal Employee Compensation (FEC) program acts as a monopoly fund.

This distinction is important because a privately administered insurance or self-insurance program is an adversary system where the worker has a burden of proof and can have his claim challenged in a hearing by the employer or insurer and their experts. Decisions are

generally appealable through the normal court system. Agency rules and policies can be challenged in court. In contrast, a monopoly fund like the FEC or in States similar to Ohio has more administrative discretion. Its rules and decisions on individual cases are less appealable and it plays a more active role compared to the private parties.

Injuries vs Disease

The other major distinction in provisions is between injuries and occupational disease. The great majority of physical injuries occur as the result of a well-established accident and require only minor medical costs and less than 15 days lost time.

The typical temporary injury occurs on the employer's premises, usually from a provable accident with witnesses to the event, e.g., crushed limb, fall off a platform, struck by a forklift. In most cases, because the liability appears limited and the employer and insurer want to get the person back on the job, medical care is provided and benefits are paid with little delay. Of course, if the injury is not fully documented or looks like a possible permanent disability, e.g., serious back strain or slipped disc, the employer may withhold payment or begin a lengthy investigation similar to a case of serious occupational disease. However, the routine procedure for most injury claims is as follows:

1) The injured employee notifies the employer of the injury.

2) After verification, the employer provides medical care through a physician selected by him or the employee, depending on the State law (in some cases, the insurer has the right to select the doctor). He also reports the injury (if it involves enough lost-time) to the insurer and the State agency.

3) The insurance company checks the employer's first report of injury. Unless there is an unusual feature or evidence of non-compensability, a check is sent to the injured employee, with a report to the compensation agency. In a few States, the agency must review the claim and issue an order before payments are made.

4) For short-term injuries (the average temporary injury has a healing period of less than 15 days) the insurance company will usually not question the time off for healing. However, for more serious cases, the insurance company will probably begin contacting the employee's doctor concerning an early date for return to work. In the case of disagreements concerning the healing period, a doctor's recommendation for light work or permanent disability ratings, the insurance company will send the employee to their own specialist for an evaluation.

5) In some serious claims the insurance company will simply cut off payments at a predetermined point, and wait for the claimant to press the issue at a hearing, which may take up to a year or so.

A hearing loss claim usually follows a different sequence from a proven injury. The employer may have no hearing testing program and may have no evidence of the employee's hearing levels. The employee may become accustomed to his gradual decline in hearing ability. He may deny hearing difficulties and project blame to the speaker. He will probably start to isolate himself since personal contacts start to become embarrassing. The affected person will most likely not be aware of the hearing impairment until he is told repeatedly by family and friends or gets the results of an audiometric examination from his doctor. Even his doctor may not relate his loss to his occupation, and neither the employer nor his doctor may be aware of worker's compensation for occupational hearing impairment. Even after the employee is aware that his hearing problem may have been occupationally related, he may be fearful to approach the employer or may be uncertain how to proceed. Because of factors such as these which might delay the filing of a claim, statutory time limits on filing are a powerful obstacle to fair hearing loss compensation, as will be discussed.

Retired employees may have been away from the plant for months or years and may be reluctant to return. If the employee has not previously notified the employer of his claim, in most cases the employer will refuse to submit a First Injury Report. The claimant may have no documentation that the hearing loss was occupational and the employer will not want to concede liability in a serious disease claim.

In a case where the employer or insurer refuses to pay or acknowledge the claim, the employee and/or his representative must begin a contested claim, which follows the sequence below:

1) The claimant submits a petition or application to the worker's compensation agency (see Appendix 2 for the Wisconsin application for hearing and medical report), alleging an occupational hearing loss. Where possible, this petition should also be accompanied by a medical and audiometric examination of the claimant's hearing, which will show both the compensation agency and the insurer that the claim is documented. The claimant should be ready to prove his occupational exposure, as well as the extent of his hearing impairment. The claimant should be ready to defend against allegations that the hearing impairment occurred in previous employment, that the impairment was caused by non-occupational factors, or that filing requirements were violated.

2) The agency notifies the insurer of the petition and awaits a reply.

3) The insurer evaluates the petition and may send the employee to their medical specialist. (In 24 States, the initial exam must be from a doctor chosen by the insurer or employer.) They will probably also investigate other aspects of the claim such as alleged noise-exposure, and possible non-occupational factors, and whether legal time limits were met.

4) The insurer might voluntarily pay the claim if it is not too large and they feel it is well-proven and not precedent-setting.

5) While awaiting hearing or before scheduling a hearing date, the employee and/or attorney will usually have to open discussions with the insurer to obtain an earlier settlement. Depending on the law, the quality of evidence and possible precedent, this may result in: 1) a *dropping* of the claim; 2) a *stipulation* in which the claimant retains all rights and the insurer pays full benefits; 3) a *compromise* which gives the claimant a lump-sum for part of the claim and releases the carrier from further liability; or 4) *hearing and award* in which the agency adjudicates the issues.

6) In a few States, where the claim record is complete, the compensation agency may schedule a pre-hearing on its own initiative to allow each side to state its case and expedite a possible settlement without the expense of a hearing.

States differ greatly in their settlement styles. Some States like New Jersey have a hearing and award for all claims. California freely allows compromises for most claims. In Wisconsin, 80% of all hearing loss cases are uncontested by insurers or are paid on a stipulation which protects all claimant rights. Compromises are frowned upon and only used in 20% of the cases, where there is a major question of non-occupational loss or conflicting audiograms.

Differences Between State and Federal Procedures*

There are several major differences between the State and Longshore programs and that for federal employees. The State programs, as well as the Longshore and Harbor Workers program, are basically adversarial in nature. Since the employer and/or insurer have economic stakes in the outcome, they can be counted on to contest the fact of the injury or illness, its relationship to the job, the length or severity of the condition, and so forth. The insurer's experts are pitted against the worker's experts. If the worker does not meet his burden of proof, the claim is denied or can be appealed to the court system. Each side is also free to negotiate on the claim and to resolve it short of a legal hearing. Agency rulings on cases which go to hearing are also limited to interpretations of law and fact and must be based on a full consideration of the evidence. All parties have a full opportunity to present their own evidence and cross examine the opposition.

On the other hand, the Federal Employee Compensation program (FEC) does away with the adversarial relationship. There is a statute of limitations and burden-of-proof for the worker. Yet, the agency itself, rather than a private insurer or the employer, has the full burden of investigating the claimant's allegations. The examiner has great freedom in deciding the facts to be considered. There is no negotiation between employer and claimant and no compromise allowed. All claims are adjudicated by the examiners of the FEC, usually without a formal hearing.

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* See Chapter V for a discussion of the FEC program.

Federal employing agencies may present facts to FEC that controvert the claim, yet FEC rules do not permit the employer to present evidence in a hearing, to have the claimant examined by its physician, or to cross-examine the claimant or witnesses. Even where the federal agency objects to continuation of pay for an injury, alleges that there was no hazardous exposure, or objects to the veracity of the claimant's statements, the FEC examiner is free to disregard employer statements and make his ruling. The right to request a hearing or to appeal an adverse decision rests solely with the claimant. The final decision is made by the Employee Benefits Review Board within the Department of Labor, with no court appeal. The FEC also makes its own interpretations of statutory language and sets administrative policy on impairment formulas, without going through formal rule-making procedures under the Federal Administative Procedures Act. As will be discussed below, the non-adversary nature of the FEC program has allowed the adoption of a formula compensating high frequency loss, and claims procedures without waiting periods or other restrictions.

Compensation Criterion and Considerations

The following sections will analyze some of the reasons why certain States have low claims activity. Table 3 gives a breakdown of States by claims activity—high, low, and non-compensable. Several key claims provisions in each State are graded as either positive or negative. That is, the specific provisions in the hearing loss compensation statutes of each State are evaluated in Table 3, as to whether they encourage the filing of claims, or whether such provisions in effect, discourage and limit the filing of claims. For example, the 1959 AAOO hearing loss formula is a restrictive and limiting factor in the filing of claims. Therefore, those States using this formula have a filled in box in the HL Formula column in Table 3, signifying a negative impact on claims. As the table shows, most of the high claim States have few negative features in their programs. The low claim States have a much larger share of negative items. This table is designed to given an overview of the discussion in the remainder of this chapter.

Hearing Loss Compensation--Payment for Disability or Impairment

A major issue in U.S. worker's compensation has been whether permanent disability benefits should be restricted to cases of economic loss, or should be permitted where there is physical impairment, but no loss of job or earnings. This issue is also at the root of many restrictions on permanent compensation for occupational hearing loss. It is recognized that workers who suffer a hearing impairment are faced with a handicap in carrying out normal personal activities as a result of the impairment. However, since most hearing-impaired workers do not lose their jobs or suffer a measurable wage loss, their handicap is considered by many to be outside the scope of worker's compensation.

Since the early debates on hearing loss compensation 30 years ago, many States have overcome the economic loss argument, and hearing loss is compensated on the basis of impairment percentage alone. However, the nine States shown as non-compensable in Figure 1 require a claimant to show "incapacity to work," "disablement," "inability to earn normal

Table 3
State and Federal Worker's Compensation Rules Affecting Occupational Hearing Loss-Positive and Negative Impact on Claims

	JURISDICTION	NO. OF CLAIMS PAID—1977	COMPENSABLE yes ■ no	MAXIMUM BENEFITS—1 TOTAL LOSS IN BOTH EARS over $21,700 ■ under $21,700	TIME LIMIT TO FILE CLAIM discovery rule ■ no discovery rule	APPORTIONMENT (BETWEEN EMPLOYERS) no ■ yes	CHOICE OF PHYSICIAN worker choice ■ insurer or employer choice or panel	HL WAITING PERIOD no ■ yes	HL FORMULA inc. freq. above 2,000 Hz ■ no freq. above 2,000 Hz	DEDUCTION FOR AGING no ■ yes	DEDUCTION FOR PRE-EXISTING LOSS no ■ yes
HIGH CLAIM STATES	Fed. Emp. Program	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Longshore & Harbor	☐	☐	☐	☐	☐	☐	☐	2	☐	☐
	California	☐	☐	☐	☐	■	☐	☐	☐	☐	■
	Connecticut	☐	☐	☐	☐	■	☐	☐	■	☐	☐
	Minnesota	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	New Jersey	☐	☐	■	☐	■	■	☐	☐	■	☐
	New York	☐	☐	■	☐	■	■	■	■	☐	■
	Oregon	☐	☐	■	☐	☐	☐	☐	☐	☐	■
	Washington	☐	☐	■	☐	■	☐	☐	■	☐	■
	West Virginia	☐	☐	3	☐	☐	☐	☐	■	☐	☐
	Wisconsin	☐	☐	■	☐	■	☐	■	☐	■	■
COMPENSABLE—FEW OR NO CLAIMS	Alabama	■	☐	■	■	■	■	☐	■	☐	■
	Alaska	■	☐	☐	☐	☐	☐	☐	■	☐	☐
	Arizona	■	☐	☐	■	☐	☐	☐	■	☐	■
	Arkansas	■	☐	■	■	■	■	☐	■	☐	☐
	Colorado	■	☐	■	■	☐	■	☐	■	☐	■
	Delaware	■	☐	■	☐	☐	☐	☐	■	☐	■
	Georgia	■	☐	■	■	☐	■	■	■	☐	■
	Hawaii	■	☐	☐	☐	■	☐	☐	■	☐	☐
	Idaho	■	☐	■	■	☐	■	☐	■	☐	■
	Illinois	■	☐	☐	■	☐	☐	☐	■	2	2
	Iowa	■	☐	☐	■	■	■	☐	■	■	■
	Kansas	■	☐	■	■	☐	■	☐	☐	☐	☐
	Kentucky	■	☐	■	■	☐	☐	■	■	■	■
	Maine	■	☐	☐	■	■	☐	■	■	☐	■
	Maryland	■	☐	■	■	■	☐	■	■	■	■
	Mississippi	■	☐	■	☐	☐	■	☐	■	☐	■
	Missouri	■	☐	■	☐	☐	■	■	■	■	■
	Montana	■	☐	■	☐	☐	☐	■	■	■	■
	Nebraska	■	☐	■	☐	☐	☐	☐	■	☐	☐
	N. Hampshire	■	☐	☐	■	☐	■	■	■	■	☐
	N. Carolina	■	☐	☐	■	☐	■	■	■	☐	■
	N. Dakota	■	☐	■	■	☐	☐	☐	■	☐	☐
	Oklahoma	■	☐	■	☐	■	■	☐	■	☐	☐
	Rhode Island	■	☐	■	☐	☐	☐	■	■	■	■
	So. Carolina	■	☐	☐	☐	☐	■	☐	■	■	■
	So. Dakota	■	☐	☐	■	■	■	☐	■	☐	■
	Tennessee	■	☐	■	■	☐	■	☐	■	☐	☐
	Texas	■	☐	■	■	■	■	☐	■	☐	■
	Utah	■	☐	■	☐	☐	■	■	■	■	■
	Vermont	■	☐	☐	■	☐	☐	☐	■	☐	■
	Virginia	■	☐	■	☐	☐	■	☐	■	☐	■
	Wyoming	■	☐	■	☐	☐	☐	☐	■	■	☐
NON COMPENSABLE	Florida	■	■	■	☐	☐	■	☐	■	☐	■
	Indiana	■	■	■	■	■	■	☐	■	☐	■
	Louisiana	■	■	3	☐	■	■	☐	■	2	☐
	Mass.	■	■	■	☐	☐	☐	☐	■	☐	☐
	Michigan	■	■	3	☐	☐	■	☐	■	☐	■
	Nevada	■	■	■	☐	☐	☐	☐	☐	☐	■
	New Mexico	■	■	☐	■	■	■	■	■	2	■
	Ohio	■	■	■	■	■	☐	☐	■	☐	■
	Pennsylvania	■	■	☐	■	■	■	☐	■	☐	■

1 Above and below average benefits, based on fifty-state mean.
2 Undecided or unknown.
3 No fixed benefit levels; see Table 1.

LEGEND ■ Limits Claims
☐ Encourages/Does Not Discourage Rightful Claims

wages" or some other synonym for economic disability. Two of these States, Nevada and New Mexico, require permanent and total disability. The industrial States of Michigan and Indiana exclude hearing loss unless it has caused incapacity to work. Louisiana and Florida also seem to require economic disability. Massachusetts requires a medical opinion of total loss of hearing "for all practical purposes." Ohio and Pennsylvania require total impairment, which under the AAOO high fence of 92 dB would probably mean that the claimant is completely deaf. Unfortunately, with an average HL of 65-75 dB (re: ANSI -1969), at 500, 1,000 and 2,000 Hz, far below the present AAOO "high fence," nearly everyone's communicative abilities would be totally impaired (Kryter, 1973).

In Pennsylvania where the statute excluded hearing loss completely, a lower court allowed a negligence suit for occupational hearing loss and awarded $30,000 in damages to the claimant. However, this case was finally overruled by a higher court which held that the claim was covered by the worker's compensation act's ban on court suits (*John Shoop vs. U.S. Steel Corporation*, 1972).

Thus, for almost a third of our nation's industrial workers, living in the above nine States, the proof of total hearing impairment or substantial economic disability caused by the noise exposure is the standard of compensability. This severe test is almost never met. In these States, the other issues of waiting periods, impairment formulas and severe time limits are superfluous.

Previous Studies of Claims Criterion

Several previous researchers have studied hearing loss compensation criterion. Dr. Meyer Fox (1976, 1978) has published several useful surveys of the standards used by U.S. and Canadian compensation agencies. While Fox's data on claims criteria are useful, he has not reported on claims paid by the States. Thus, many of the States reporting that they compensate hearing loss have in fact paid few or no claims due to the obstacles discussed in this chapter. Thus, while the Fox study reports that 46 out of 50 States compensate occupational hearing loss, our study has found that only nine States pay more than a token number of claims. Thus, Fox's conclusion of a liberalizing trend to "recognize and provide greater coverage for occupational hearing loss" is true only to a limited extent.

It is important to look at the numbers of claims paid when comparing hearing loss rules. For example, 23 out of 36 States reporting in the Fox Survey that they have no waiting period for filing, either do not compensate hearing loss or have paid few or no claims. Eight of the 11 States responding that they deduct for presbycusis have few or no claims, whereas, only one of the high-claim States deducts for presbycusis. Eighteen out of 32 States reporting compensation for tinnitus (ringing in the ears) pay few or no claims.

Westerman (1975) recently compared compensation activities in foreign countries, provinces and U.S. States. His study also has little data on claims paid, but he does show that most foreign countries severely limit worker's compensation for hearing loss. Required proof of economic disability or failure to compensate high frequency loss are frequent obstacles abroad, as well as in the U.S.

Barth (1976) did a landmark study of occupational disease compensation for the U.S. Department of Labor. He surveyed statutes of limitations and special waiting periods as they affect heairng loss claims. He also tried to determine the number of claims in selected states. While his study only covered a minority of States, his data on few claims and filing restrictions agree with the findings of this study.

Hearing Impairment Formula

Table 4 shows the various hearing loss formulas in use and the States where they are used.

The FEC program uses the NIOSH formula with beginning impairment at 25 dB (re: ANSI-1969) averaged over 1,000, 2,000 and 3,000 Hz. The Longshore and Harbor Workers program has no agreed formula at this time; thus the decision is left to the examiner. Five of the nine States which compensate substantial numbers of claims include high frequency hearing loss to some extent in their compensation formula. New Jersey, the State with the most claims, uses several formulas. However, the most frequently used formulas in New Jersey, the 1947 AMA and the Berney formulas, both include 4,000 Hz and probably result in the approval of many claims which would not qualify under the 1959 AA00 formula. California simply adds 3,000 Hz to the 1959 AA00 formula for a 4-frequency average. The formula used in Wisconsin (35 dB low fence at 1,000, 2,000 and 3,000 Hz) was developed by the Committee on Hearing, Bioacoustics and Biomechanics (CHABA) working group of the National Academy of Sciences several years ago, as a way to include higher frequency loss, without increasing compensation costs. The Wisconsin experience to be discussed in Chapter VI indicates that this formula adopted in 1975, causes little change in claims or benefits from the previous formula, since the 10 dB increase in the low fence compensates for the inclusion of 3,000 Hz in the formula. Now that the AA00 has recently included 3,000 Hz in its formula, all formulas except the 1959 AA00 formula will cover some high frequency loss.

For the 32 States which pay few or no claims though they compensate hearing loss, none except Kansas include high frequency loss, although Arizona has a court case approving the NIOSH frequencies. Only 18 States use the 1959 AAOO formula. As discussed earlier and in Chapter IV, the 1959 AA00 formula restricts compensable claims by ruling out many cases where the individuals may experience a real handicap in personal and social situations. Twenty six states include "medical evaluation" as the criterion, which leaves complete discretion to the doctor. This may now mean the recently adapted (1979) AAOO formula in most cases.

Waiting Period

Otologists and compensation authorities have recommended various waiting periods in which the claimant must be removed from his noisy employment before qualifying to file a hearing loss claim. The waiting period was to some extent to allow for recovery of any temporary hearing loss. As will be shown in Chapter IV, it was principally an administrative control to avoid mass filing of claims. The rule excludes a large proportion of claims, since employees cannot file while still working, and many employees die or move away before qualifying for a claim.

Table 4
Hearing Loss Formulas Used in U.S., State and Federal Workers's Compensation Programs

Formula	Audiometric Frequencies Used (Hz)	Method of Calculation	Low Fence (ANSI-1969)	High Fence	Percent Per Decibel Loss	Better Ear Correction	States That Use Formula
AMA - 1947	500, 1,000, 2,000 4,000	weighted average	20 dB	105 dB	varies	7/1	KS, NJ
AAOO - 1959	500, 1,000, 2,000	average	25 dB	92 dB	1.5	5/1	AZ, CT, GA, HI, KY, MD, ME, MO, MT, NE, NH, NY, NC, RI, TX, VA, WA, WV
AAOO - 1979[1]	Same as California	average	25 dB	92 dB	1.5	5/1	CA
NIOSH Recommendation	1,000, 2,000, 3,000	average	25 dB	92 dB	1.5	5/1	FEC
CHABA Recommendation	1,000, 2,000, 3,000	average	35 dB	92 dB	1.75	4/1	WI
California Formula (Now 1979 AAOO)	500, 1,000, 2,000 3,000	average	25 dB	92 dB	1.5	5/1	CA
Oregon Formula	500, 1,000, 2,000 4,000, 6,000	average	25 dB	92 dB	1.5	5/1	OR
Berney Formula	500, 1,000, 2,000 4,000	average	25 dB	92 dB	1.5	5/1	NJ

Note: Data are from Table 1.

1. States with no formula listed leave decision to examining physician (medical evaluation), who will probably now use the 1979 AAOO.

As Table 3 indicates, neither of the two federal programs nor the two highest volume States use any statutory waiting period before filing (however, most audiologists will require the employee to be away from noise at least 16 to 72 hours before administering a hearing test). Only two of the nine highest volume States have a waiting period—New York with six months and Wisconsin with two months. On the other hand, of the 32 States which have few or zero claims, almost one-third have a waiting period—usually six months. There are some exceptions to the waiting period, if the worker is shown to have "transferred to non-noisy employment" for six months before filing. In some plants, when the employer reduces noise levels below 90 dBA, this is interpreted as transfer to non-noisy employment. More senior workers who suffered hearing impairment under former noisy conditions are urged to get hearing tests and file a claim where merited. Also some States (Maine, North Carolina) allow the wearing of proper hearing protection to serve as the waiting period. Hearing protection may not be a valid substitute for a minimum waiting period due to recent studies demonstrating the lack of effectiveness of hearing protectors for many workers (NIOSH, 1978).

Hazardous Exposure:

According to Fox (1976), 26 of the 50 States have rules defining "harmful noise" (see Wisconsin Rule 80.25 in Appendix 1), either as 90 dBA—the OSHA limit, or in some cases, 85 dBA—the NIOSH recommendation. Six of the nine States with considerable claims include a definition of harmful noise.

Hazardous noise exposure on the job is one element in proving that the hearing impairment is work connnected. A reasonable claimant burden to prove exposure is common in worker's compensation. Some States, like Oregon, do noise surveys where there is a question whether the occupational exposure was sufficient to cause hearing loss. Other States have recognized the noise exposure inherent in certain occupations—boilermakers, sheet metalworkers—and accept work history as evidence of exposure in the absence of specific noise exposure documentation or other evidence.

However, if the claimant's burden is too strong, e.g., such as the Utah requirement of a "professional" noise test showing exposure to noise exceeding 95 dBA, this may defeat many claims. For example, one Georgia claim was rejected because of an Occuaptional Safety and Health Administration inspection finding that noise levels in the workplace were below 90 dBA (*Georgia Board Ruling,* 1977).

Experts agree that neither the 90 dBA or even the 85 dBA exposure rules for 8 hours would completely eliminate hearing loss for a certain percentage of the population. According to Kryter (1975) exposures of 75 dBA over a 40 year worklife can increase the risk of hearing damage. The EPA Levels Document (1974) indicates that 8-hour exposure at 75 dBA is the level below which no individual would suffer any hearing loss due to the occupational noise exposure. In addition, impulse noise exposures have been shown to increase the amount of hearing loss due to continuous noise exposures alone (Hammernik, 1976). Whole body vibration has also been shown to add to the hearing damage caused by impulse noise (Henderson, 1979). Combinations of impulse noise, continuous noise and vibration occur regularly in industrial and military environments.

Another problem arises in the determination of noise exposure levels where no earlier measurements were taken. If present noise levels are below 90 dBA or even 85 dBA, how does the worker prove his earlier exposures where the work environment has been modified due to different machines in operation, different operating characteristics of these machines caused by wear and tear, modified or rebuilt machines in operation, and in general, different work conditions. The burden of proof on the claimant should not be excessive since he has little or no access to facts on past exposure.

Therefore, a specific compensation rule defining "harmful noise" at either 85 or 90 dBA is probably less valid than a reasonable presumption based on work history together with the specific medical testimony of the claimant's treating physician. It may also be appropriate for States to set a noise exposure floor where no hazard to hearing can be expected. Above this floor all exposures would be considered for more detailed examination of noise dose and hearing loss records during employment.

It should be noted that one side effect of hearing conservation programs is a history of noise exposure levels in the workplace. Thus, hearing conservation records could be used to provide factual documentation on workers noise exposure levels and noise doses. Unfortunately, in many cases, the employer records on noise levels or hearing tests may be incomplete, self-serving or inaccessible to the union or potential claimants. One way to overcome this would be to involve the union in testing and monitoring, and making all important records accessible. Under the present OSHA noise regulation, an employer is required to establish hearing testing and a noise monitoring program where employee's noise doses exceed a set value. This is still not effectively enforced.

Presbycusis Correction

Research indicates that hearing loss increases due to aging, even for persons not exposed to occupational noise. Such studies show a gradual decline in the hearing sensitivity of the population after 18 years of age. According to the 1962 U.S.Public Health Survey, less than 11 percent of all males at 60 years of age, and less than four percent at 50 years of age, have hearing sensitivity poorer than the 1959 AAOO criterion for impairment. It should be noted that the 1962 Public Health Survey did not exclude people exposed to occupational noise. Some compensation programs deduct for the loss due to aging.

However, the general worker's compensation principle is that aggravation or acceleration of pre-existing disability, is compensable. For the great majority of claimants, it could be argued that without the noise exposure, the decline in hearing threshold from age would still be below the 26 dB impairment minimum. As will be discussed in Chapter IV, a recent paper (Johnson, 1979) argues strongly that because most occupational hearing loss occurs in the first 10 years of exposure but most claims are not filed until retirement, there should be an *aging premium*. This premium would pay the young worker more to compensate for the longer duration of his impairment. Most States with substantial numbers of claims do not consider an aging factor. However, Wisconsin deducts one half percent per year from the claim after the age of 52. Connecticut and West Virginia allow the doctor to consider presbycusis in his rating, and New Jersey allows for aging to be brought into the case; however, the issue is rarely raised in these States.

Choice of Physician

The choice of physician is a major factor in claims activity. A physician chosen by the employee is more likely than a carrier chosen doctor to stand by his evaluation and be willing to testify or issue objective reports, even where the insurer is strongly contesting the claim. Just as important, when the claimant takes the first step to assert his compensation rights he is often unsure of his case and possibly fears the employer's reaction. Where there is free choice of medical care, the claimant can get an examination from a doctor he knows and trusts and will probably be encouraged to pursue a valid claim.

In systems where the insurer or employer chooses the physician, most specialists depend on insurer referrals for a substantial part of their income and are reluctant to testify for a claimant or take a strong position on disputed issues. A classic article by a student of the Texas compensastion system makes this point (Barton, 1968):

> The doctor selected by the underwriter to treat the injured worker plays a crucial role because his estimate of the nature, seriousness, and probable duration of the injury is the basis . . . of the Board's action in most cases. Selected and compensated by the underwriter, the doctor is under strong pressure to give the company the benefits of any uncertainties concerning the . . . injury. Those physicians who fail to favor the underwriter may lose a profitable relationship . . . insurance adjusters and doctors develop self-serving stereotypes—in their case, that of the "chiselling claimant," who is out to rob the insurance company of benefits to which he is not entitled. Of course, a few such individuals exist in fact. But to many adjusters and doctors, dedicated to serving the underwriter, claimants as a group become suspect and minimization of benefits becomes a standard goal.

In looking at Table 3 again, only one out of the nine high claim States allows the carrier to select the physician (New York uses an employer chosen panel), while seven States allow employee selection. Contrast this with the 32 States with few or zero claims, where only 14 allow employee selection, 17 allow carrier selection and one has a panel. In eight of the 14 States allowing employee selection, the law provides for the 1959 AAOO formula, limiting the doctor's discretion in measuring the hearing loss.

Filing Time Limits

These provisions define how long after the injury or last exposure the employee has to file his or her claim. In some cases, the State has a "discovery" rule which means that the statutory time limits for filing do not begin until the employee has become aware of his disability. In the nine States with substantial numbers of claims, *all* have discovery rules, with time limits after discovery ranging from 6 months to three years. In the 32 States compensating few or no claims, 27 have maximum filing times of two years or less from the date of injury or disability. (Some special statutes define "date of injury" as the last day of employment for the particular employer.) Eighteen States have *no* discovery rules. Even where there

is no discovery rule some State courts have developed special consideration for occupational diseases (e.g., "latent injury" rule). The "discovery rule" may not be the only answer because the worker may not be fully informed of work-relatedness or may not know his worker's compensation rights. Thus, even with discovery rules, many claims could be barred. In the majority of States without discovery rules, many workers could leave the job or retire without realizing the extent of their hearing impairment and within one year or two would be forever barred from a claim. To eliminate injustices which occurred when the statute of limitations was used to defeat otherwise valid claims, Wisconsin has removed the statute of limitations for occupational diseases.

Apportionment

Another issue which could confuse and block many claims is the problem of determining which employer should pay for a hearing impairment. This issue occurs when the responsibility for a compensable claim is disputed. The dispute can be between the insurance carriers involved and/or between the responsible employers concerning what portion of the hearing loss is attributable to each employer. Interestingly, of the nine States with significant claims, six legally allow apportionment of the claim between employers and insurers. California limits the apportionment to the last five years and Wisconsin charges the last employer unless he can show competent evidence (a pre-employment audiogram) of preexisting loss which few employers can do. Yet in conversations with the States it appears that the issue is rarely raised, either because most claims are from long-term employees where the last employer is clearly responsible or because the commission places a burden on the last employer to prove previous loss. Few of the low-claim States allow apportionment and it appears this is not a key factor in claims defenses.

Other Provisions

As Table 1 shows, 33 out of the 50 States deduct preexisting hearing loss from the last employer's liability. However in several States, the so-called "second injury" fund covers any preexisting loss which was aggravated by the present noise exposure. The worker's claim stays the same.

Tinnitus (ringing in the ears) and recruitment (abnormal perception to sound once it is heard) are other handicapping factors that should be considered in compensation. Yet few States compensate any hearing problems other than a pure tone audiometric hearing loss.

Hearing aids are another potential complication. California has a rule where employers can ask that the claimant have a hearing test with a hearing aid. This test and the uncorrected one can be averaged to get a final figure. Yet when the employer asks for a test with hearing aid, the State will require lifetime replacement and maintenance of a hearing aid for the worker. This maintenance cost often exceeds that of the claim, and naturally few employers demand such a corrected exam. As shown, almost every State allows hearing aids as a medical appliance. Yet few hearing loss claimants demand one.

Impact of Special Statutes

At least a dozen States such as Wisconsin, New York, Missouri, Maine, North Carolina and Maryland have enacted special hearing loss statutes. The Wisconsin Statute and Administrative Rule, appearing in Appendix 1, is a good example.

The early statutes were passed as a way of restricting claims, in response to employer and insurer pressures (Ginnold, 1974). Some other States copied the early statutes even though there were few or no claims at the time, e.g., the North Carolina statute. By introducing restrictive criterion not present for other permanent disabilities—e.g., six month waiting period, 90-95 dBA hazardous noise definition, restrictive impairment formula or aging deduction—these statutes have severely reduced the number of potential claims. Even claims which qualify are much more likely to be contested by the carrier. Wisconsin and New York are the only States among the nine high claim states which have special statutes.

An example of an especially restrictive special statute is the Utah law. This law sets a 95 dBA hazardous noise exposure requirement which the worker must prove by a "professionally controlled sound test." One Utah claim was denied because the mining operation where the worker was exposed had been shut down and the test could not be conducted (Utah Compensation Commission, 1978). In addition, the hearing loss claim cannot be filed until six months after termination of exposure to noise levels of 95 dBA, but it must be filed within one year after termination of exposure to noise or employment to the last employer, whichever occurs first. Thus, in Utah the impaired worker has a six month period at the end of his working life when he can file a claim.

Trends in State Laws and Court Decisions

In spite of recent trends in hearing loss claims, there are only a limited number of statutory changes and landmark court decisions. Some of the principal ones are as follows:

- in 1978, Maine reduced the six-month waiting period to one month. The statute provides that this month can be spent working as long as the effective noise dose is reduced by wearing proper hearing protection.

- in 1975, the State of Illinois made permanent partial hearing loss compensable. However, the Illinois Industrial Commission has not yet issued any compensation criterion for determining impairment. Three years later, hundreds of claims have been filed by workers in large plants like the Caterpillar Works in Peoria. Illinois State worker's compensation arbitrators held hearings on several claims with extensive testimony by claimant experts and insurer experts. There are now a few arbitrators'

decisions on key claims, with awards exceeding the usual amount in most States. It appears that most insurers are holding off on voluntary payments or settlements. The Illinois Industrial Commission held a training seminar by an audiologist for its arbitrators in October, 1978, and is now considering the issues of decision guidelines and a hearing loss rule as opposed to the full discretion which individual arbitrators now have in interpreting the law.

- in the State of Washington, the Boilermaker's union and other labor groups complained about claims restrictions for hearing loss (the State uses the 1959 AAOO formula, with no waiting period). A medical committee was appointed by the state compensation administrator in early 1978 and has met and received public comments on rule changes. A final report is now being circulated and will probably support the new AAOO formula and a few changes in State claims procedures.

- both Kentucky and Tennessee are considering special statutes for occupational hearing loss compensation. In an attempt to prove the need for its statute, the State of Kentucky did a computer study of claims since 1972. They found 125 reports of permanent hearing loss, of which most had been dropped or denied, 45 were pending hearing and only six had been paid (Block, 1978).

- in a 1976 ruling, the Florida Supreme Court held that permanent injuries like hearing loss are payable under the injury schedule with no consideration of wage loss (*Mims and Thomas Manufacturing Co. vs. Ferguson*, 1976). This reversed a 1966 ruling which had virtually blocked hearing loss claims in the State; however, there is still so much litigation over the issue that it appears no claims have yet been paid.

- in a 1976 case, the Arizona Supreme Court ruled (*Adams vs Industrial Commission of Arizona*, 1976) that the NIOSH impairment criterion (25 dB averaged over 1,000, 2,000 and 3,000 Hz) could be used to determine hearing impairment for compensation purposes.

- in the State of Minnesota, the State law allows examiners broad discretion in choosing between hearing loss formulas and types of tests. The Worker's Compensation Court of Appeals ruled in 1976 (*Welshinger vs. Minneapolis Star and Tubing*, 1976) that claims could be awarded on the basis of speech discrimination tests, as well as audiometric tests.

- in Michigan, hearing loss compensation has been limited to the purchase of a hearing aid in cases of severe deafness. The reason for this is that the State's permanent disability compensation usually requires proof of economic loss and does not compensate impairment alone. However, in a growing number of precedents, the Michigan Compensation Board has awarded benefits where return to the previous employment would cause further injury. In a 1978 case the Michigan Board awarded a permanent disability pension to a worker who had suffered a hearing loss at work, because return to work would further damage his hearing (*Oscar Rhoton vs. Bower Roller Bearing, 1978*).

- in an Indiana case (*Martinez vs. Taylor Forge and Pipeworks*, 1977) the Court of Appeals held that occupational hearing loss was neither an injury nor disease, and set a standard requiring loss of earning capacity to receive permanent partial disability benefits.

The Role of Unions in Claims Development

One major influence on claims activity is the work of unions in informing and assisting members. When we look at Figure 4, there is no simple relationship between union organization and worker's compensation law. For example, several of the most highly unionized States, like Ohio and Pennsylvania, do not compensate hearing loss, while the least unionized State, North Carolina, has a statute and pays claims. However, there is some overall relationship. A majority of the high-claim States and federal shipyard workers have rates of union organization above the nationwide average of around 26% of the labor force in 1974. The great majority of the Plains and Southern States which have little or no hearing loss compensation are below the national average of unionization. When we look at some specific cases, the connection becomes clearer.

1) In Wisconsin, claims jumped from 80 to over 150 from 1974 to 1975, with no change in hearing loss rules or benefits. One factor was activity by the State Federation of Labor in demanding improvement in the hearing loss compensation rules. The University of Wisconsin School for Workers also held several programs on occupational hearing loss claims, including a two-day workshop in Milwaukee, in January of 1974, attended by over 100 union leaders. This information was well received by local unions. A review of claims shows that 75% of all claims were filed by employees in nine unionized Milwaukee metalworking firms (Ginnold, 1977). These unions had compensation committees whose leadership had attended these training programs. Another important factor was a revolving fund established by the United Steelworkers of America District 32 in Milwaukee, to pay for a hearing evaluation for any member. If a compensable loss is found and the claim is paid, the worker who has been awarded the claim repays the fund. This fund now pays for over one hundred evaluations annually.

2) In another case, under the FEC program, over 5,000 claims were filed by the employees of Long Beach Naval Shipyard (employment averaged 6,000). Their Boilermakers local union originally began filing claims, after management had ignored union demands to correct the problem, including refusing to provide hearing protection (Abbott, 1978). The union actively consulted with the local Federal Employee Compensation (FEC) office, held educational seminars on claims handling and retained top California labor attorneys and hearing specialists. A large proportion of their claims have been paid. The

local union considers service on compensation claims a very effective organizing tactic and reported that over 1,000 members joined because of the claims program.

3) One of the larger Chicago area unions, local 6 of the United Auto Workers at the International Harvester plant at Melrose Park has been working on noise problems for 10 years. They were among the unions fighting for hearing loss compensation and now are giving hearing tests to union members as their newsletter (*Union Voice*, 1979) states: "A hearing test was held . . . at the Union Hall . . . to determine the extent of hearing loss suffered in departments where the noise level is beyond tolerance . . . Everyone was audiogrammed before being hired and the percentage of loss is relatively easy to prove. This is a compensable injury and one of the easiest ways we have to make the environment in the working place more tolerable." In the same issue, the union reported on its participation in a hearing on an OSHA noise citation and stated: "Hopefully all members that work in areas which exceed the guidelines will return to work to the sounds of silence."
4) Another example of union activity was reported in the UAW paper *Solidarity* (1978). In this case, more than 250 claims have been handled by the UAW local representing Ford assembly plant workers in Metuchen, N.J., as a result of a campaign begun by their president, himself the victim of a hearing loss.

These are only a few examples of a growing union involvement in claims.

CHAPTER IV - SCIENTIFIC SUPPORT FOR COMPENSATION RULES

This chapter will summarize the scientific support for various hearing loss compensation rules mentioned earlier. To what extent do the rules covering such issues as definition of hearing impairment, waiting periods, and aging corrections have scientific validity?

Recent Changes in the AAOO Formula

While compensability depends on many factors, the inadequacies of the 1959 AAOO formula have dominated discussions of hearing loss compensation for some time. In response to a growing volume of research challenging the basis of the old formula, the American Academy of Otolaryngology in its 1978 meeting, approved a change in the formula to include the 3,000 Hz frequency. This change has been published by the AMA in the 1979 revised *Guide for the Evaluation of Hearing Handicap*.

The revised formula averages the frequencies of 500, 1,000, 2,000, and 3,000 Hz, and the low fence of beginning impairment remains at 25 dB (re: ANSI-1969). This formula is identical to the formula used by California worker's compensation authorities since the early 1960s. In explaining its change, the AAOO recognized the need to "reflect a more realistic degree of the understanding of speech, not only in quiet but in the presence of noise." The Guide states that "the Hearing threshold level at 3,000 Hz should be included in the calculation of hearing handicap to provide a more accurate assessment of hearing handicap in a greater variety of everyday listening conditions."

The new formula will show compensable impairment for a much larger percentage of the population than the old formula, according to Dr. Larry Royster (1978). Using a group of 10,000 industrial workers in North Carolina, Dr. Royster determined that 6.2% of the workers have impaired hearing levels under the new AAOO formula compared to 3.5% under the 1959 AAOO formula. If the NIOSH recommeded frequencies are used, 8.6% of the population is shown to have impaired hearing. It is not clear how the new AAOO formula will effect compensation claims. Some of the more active States and federal programs are already using the NIOSH frequencies or other formulas which recognize the importance of a high-frequency hearing loss component. A number of States have the AAOO (1959) frequencies written into law. If the hearing impairment formula in these States is changed to include the revised formula, many more workers will be eligible for filing claims. However, it should be noted again, that some of the main obstacles to claims in many States are independent of the basic formula.

Hearing Loss Formula—Question of Adequacy

Frequencies

Even though the 1959 AAOO formula has just recently been revised, the inclusion of the 3,000 Hz frequency simply makes the new AAOO formula one more among several which recognize high-frequency hearing impairment. Since the old 1959 AAOO formula is still being used by many States, it is important to review some of the reasons for the recent change.

The basis for the 1959 AAOO formula (AMA, 1961) was a definition of hearing impairment in terms of "ability to hear everyday speech under everyday conditions. The ability to hear sentences and repeat them in a quiet environment is taken as satisfactory evidence of the correct hearing of everyday speech." Averaging the pure-tone audiometric hearing levels at the frequencies of 500, 1,000, and 2,000 Hz was then assumed to be a valid index of hearing ability. This criterion is inadequate on several grounds. The AAOO formula is limited to pure tone *hearing* and hearing speech. It excludes the essential communication functions of *understanding* and *discriminating* speech. As Kryter (1973) shows, the pure-tone audiometric levels on which the 1959 AAOO formula is based drastically understate the communication difficulties of the hearing impaired. According to his estimates, an individual with an average hearing level of 25 dB (re: ANSI-1969) at 500, 1,000 and 2,000 Hz, which is the low fence or point of beginning impairment, would correctly understand but 90% of sentences and 50% of words spoken in a quiet background at a normal conversational level and a distance of 3 feet. At the same time, an individual with an average hearing level of 54 dB (re: ANSI-1969) which is rated as a "mild" handicap and 42% hearing impairment according to AAOO guidelines, would not be able to understand any words or any unpracticed sentences spoken at a distance of one meter at normal conversational levels in a quiet room. Yet, this "mild" handicap is far below the AAOO criterion for 100% impairment.

Secondly, speech discrimination in quiet does not simulate life-like conditions since people must also hear in an atmosphere with background noise, competing signals from different directions, accents, mumbling, poor position, distortions and other interferences (Kryter, 1973). Under these conditions which might be as often as 50% of the time, high frequency hearing is very important for an adequate understanding of speech.

A recent study (Suter, 1978) published jointly by the Environmental Protection Agency (EPA) and the U.S. Air Force Aerospace Medical Laboratory (AMRL) thoroughly reviews the justification for various impairment formulas and tests these formulas against speech discrimination scores obtained with babble noise at different levels in the background. The results of this important study confirm the significance of high frequencies (3,000 and 4,000 Hz) in understanding and discriminating speech under life-like conditions. In fact, the EPA/AMRL research found that the 1959 AAOO frequencies correlated the poorest with speech discrimination ability in noise. Furthermore, individuals whose hearing was termed normal according to the AAOO criterion, had considerable difficulties in speech discrimination when their high frequency thresholds were effected. The report concludes (Suter, 1978):

> ...frequencies above 2,000 should be included in any technique for assessing the ability of hearing-impaired individuals to understand speech in "everyday" listening situations. For the assessment of hearing handicap in a noise-exposed population similar to that of this experiment, the average of 1,000, 2,000 and 4,000 Hz appears to be the most appropriate simple average.

Many other scientific studies investigating the relationship between pure tone thresholds and speech discrimination abilities (Mullins, 1957; Harris, 1960; Kryter, 1962; Niemeyer, 1967; Acton, 1970; Lindeman, 1971; Murry, 1972; Anianson, 1973; Dickman, 1974 and Humes, 1978) provide substantive evidence to support the inclusion of frequencies above 2000 Hz when assessing the ability of hearing impaired persons to understand speech in everyday conditions with noise in the background.

Finally, the NIOSH Criteria Document published in 1972, proposed a new definition of hearing impairment for speech for the following reasons:

1. "The basis of hearing impairment should be not only the ability to hear speech, but also the ability to understand speech.

2. The ability to hear sentences and repeat them correctly in quiet is *not* satisfactory evidence of adequate hearing for speech communication under everyday conditions."

Based upon their review of the scientific literature, NIOSH defined beginning impairment for speech communication difficulties as average hearing levels at 1000, 2000 and 3000 Hz in excess of 25 dB (re: ANSI, 1969). This departure from the AAOO formula eliminated 500 Hz and incorporated 3000 Hz in its place. NIOSH thereupon stated that "hearing levels at these three frequencies predict hearing loss for speech under mild conditions of distortion better than the three frequency average at 500, 1000 and 2000 Hz..."

In view of the above and the recent AAOO formula change, it appears that the hearing impairment criterion used by the States that recognize the importance of high-frequency impairment are more realistic and scientifically based than those using the old AAOO formula. The reader desiring additional insight should read Suter's (1978) study for an excellent review of the scientific literature supporting high frequency impairment criterion.

Low Fence

Concerning the low fence, or beginning point of hearing impairment Kryter (1973) recommends that the fence for the 1959 AAOO frequencies be shifted to 15 dB (re: ANSI-1969) which corresponds to almost 100% intelligibility for normal speech. For the frequencies of 1000, 2000 and 3000 Hz, 25 dB is an equivalent figure. This coincides with the NIOSH formula. The Suter study (1978) has also shown that persons with average hearing levels of 26 dB at the frequencies of 1000, 2000, and 3000 Hz had "significantly more difficulty in understanding speech than the normal hearing group." In conclusion, Suter's report suggests fences of 19 dB (re: ANSI-1969) for 1000, 2000, and 3000 Hz, and 22 dB (re: ANSI-1969) for 1000, 2000, and 4000 Hz, based upon the specific research findings. The threshold values for the fence to be selected will vary depending on which frequencies are used.

Overall, there is no consistent agreement between hearing researchers on the exact level for the low fence, although recent research findings tend to support the NIOSH formula as a reasonable compromise for predicting speech difficulties based upon a simple pure tone average. There has been a substantial amount of research conducted in recent years in the area of speech discrimination of the hearing impaired. Data from these studies should be reanalyzed in a uniform manner and the results summarized and considered in hearing compensation policy. The Office of Worker's Compensation, U.S. Department of Labor, has begun to contract for a large literature review study in this area. Furthermore, a comprehensive study of the everday social handicap caused by occupational hearing loss is an area that deserves long overdue research. Such a study would determine the amount of speech discrimination ability necessary to carry out one's daily activities. Such a relationship would probably vary depending upon occupational factors and special interests.

High Fence

With respect to the high fence, there is evidence that the present AAOO level of 92 dB (re: ANSI-1969) for 100% loss is excessive. Under this standard, an individual would not have 100% loss until he could not detect audiometric signals at levels higher than the present eight-hour OSHA noise limit. Kryter points out that "the ability to hear 'everyday' speech is completely lost at much lower average levels than 92 dB." In fact, the AAOO criterion states that from 70 to 90 dB hearing levels, the person "can hear only shouted or amplified speech." This says nothing about speech discrimination scores which are essentially zero under listening conditions at normal conversational levels. One of the AAOO leaders, Hallowell Davis, admits that "we find a zone of uncertainty from 70 to 90 dB (ISO). . . within the zone some individuals are socially deaf..." (Davis, 1970). It appears that the AAOO chose the high fence for arithmetic simplicity without any empirical basis. This high fence also contradicts AAOO's own impairment criterion—the ability to hear "everyday" speech. A more reasonable high fence might be the point at which an individual cannot understand any sentences or words spoken at a normal conversational level with noise in the backgroud. Research needs to be initiated in this most important area to determine the high fence of impairment for communication purposes and the corresponding social handicap.

Impairment Rate of Growth

Another area in which the AAOO formula is not adequately documented is the impairment rate of growth. Very little work has been done to determine the effect of an auditory impairment on communication ability beyond the low fence. Historically the AAOO has assumed a linear progression between the low and high fences, but there is virtually no social communication research supporting this position. Instead the 1.5% per decibel rule seems a matter of convenience. The subject deserves some serious research.

Better Ear Correction—Weighting Ears

Another provision which lacks justification is the 5/1 better ear correction still used by the AAOO. There seems to be no scientific proof that the "better" ear can make up for the worse ear by a factor of five, and no support is given in the AAOO guidelines. This correction substantially reduces awards where one ear is 10-20 decibels worse than the other. A sizable difference in hearing ability between ears especially limits the ability to determine the location of a signal. This causes safety problems when the hearing-impaired person mistakes the direction of alarms or alerting signals. In addition, two ears are better in detecting faint signals in a quiet room and in a background of noise (Davis, 1970). It is also easier to separate a voice from the background noise thus reducing the potential auditory confusion and increasing discrimination ability. Unless some proof for differential weighting can be produced, it appears that the traditional 5 to 1 weighting is not justified. Further research in this area is also needed.

Aging Factor

More than 10 States reduce the hearing loss compensation award for the effects of aging. For example, Missouri makes a deduction from calculated hearing impairment of one-half decibel for each year over 40 years. The rationale for this is the desire to subtract "the average amount of hearing loss from non-occupational causes found in the population at any given age" (Missouri Statutes, 287.197(6)). It is true that persons lose hearing ability as age increases, even when they are apparently not exposed to hazardous noise at work. But, there are large differences in individual susceptibility to hearing loss. Thus an average correction may not be appropriate, since "age corrections for an individual are probably in error the majority of the time" (Johnson, 1979). There is some disagreement as to how much of this loss is due to the aging process alone (presbycusis) and how much is due to environmental noise exposures (sociocusis). It is also not known how the aging process interacts with the growth of occupational hearing impairment.

The aging factors mentioned above could reduce the compensation award by well over 50%, since waiting periods and inertia cause most workers to file claims when they are past the age of 60. The average State claim is around 20% (a 13 dB loss under the 1959 AAOO formula). The Missouri law would subtract 10 decibels from the claim by the age of 60. This would reduce the award from 20% to 5%. Furthermore, small claims of 5-10% (a hearing threshold of 28-31 dB (re: ANSI-1969) under the 1959 AAOO formula) would be virtually eliminated by the aging reduction of Missouri, Kentucky, Maryland and other similar states.

Is the aging factor justified? There are a number of points against it but most important is that most workers suffer the great majority of noise-induced hearing loss at the higher frequencies in the first 10 years on a noisy job assuming the noise exposure remains fairly constant from year to year. Thus, as a recent paper discusses (Johnson, 1979), a worker 30 years old may have a substantial hearing loss—all due to noise and none due to aging—and may have to live with it 30 years longer than the older worker. He usually is not able to file a claim at the earlier age and when he reaches retirement age, much of his claim might be eliminated

by the "aging reduction." Thus, where the law delays filing claims until retirement, an aging factor simply further undercompensates the hearing impaired worker.

Apart from the above, even the most careful studies indicate that only a small percentage of the non-noise exposed population will have hearing thresholds poorer than existing impairment criterion. It is also true that none of the studies have been able to fully control for non-occupational noise exposure (Kryter, 1975). The 1960-62 National Health Survey has shown that only 11% of all adult males at the age of 60 have poorer hearing ability than the 1959 AAOO criterion, from all causes. This figure is probably higher than aging alone would reveal due to the inclusion and contamination of persons exposed to occupational noise.

For most people, the presbycusis losses in the AAOO frequencies will be absorbed in the 25 dB range between the median hearing levels of normal hearing young adults (approximately 0 dB re: ANSI-1969) and the "low fence" of compensation at a hearing level average of 25 dB (re: ANSI-1969). In the latter cases, no aging reduction would be justified, since a loss in the impairment range would be due to noise exposure.

Even for those people whose hearing would normally be poorer than 25 dB (re: ANSI-1969), at the 1959 AAOO frequencies, the noise increases the severity of the hearing impairment. In worker's compensation language, occupational noise exposure "accelerates and aggravates" the underlying physical condition. It is analogous to someone predisposed to arthritis or with weak lungs who develops an impaired back function or lung disease due to their work. Usually in worker's compensation the entire impairment is compensable as long as an occupational factor in any way increases the impairment caused by the physical condition. It is not clear why hearing loss should be treated differently. Thus there appears to be a strong argument against aging deductions and some argument for increasing awards for workers who lose hearing at a young age.

Waiting Periods

There is a need to eliminate any potential temporary threshold shift before testing a person for their permanent hearing threshold. There is scientific disagreement on how long this takes. Ward states that "two weeks is mandatory" (Ward, 1969). Other studies show that the time required varies greatly with the noise exposure and individual factors. In most cases the temporary loss at 4,000 Hz is completely eliminated within seven days after exposure (Miller, 1974). Another study using chinchillas found that permanent thresholds were reached within fifteen days (Mills, 1973).

While there is still some disagreement on how long temporary threshold shift lasts, there is no doubt that the six-month waiting periods found in ten States have no medical justification. Supporters of the six-month waiting periods, have admitted in the past that the six-month waiting period is not based on a proven medical need. For example, Dr. Aram Glorig stated twenty-five years ago: ". . . At present the necessary time is stated as six months . . . agreed upon . . . because we felt that the evidence was not enough to support another

number and being physicians we wished to be conservative." In response to a question during the same meeting, Glorig admitted that he knew of no case that had ever improved after 24 hours *(Noise in Industry and Its Effect on Loss of Hearing*, 1958). In 1956, Hallowell Davis stated:

> I am personally skeptical about the need of waiting as long as six months in order to establish the plateau for the kind of hearing loss that is induced by noise . . . the really important thing is to consider the various reasons why it may be desirable to have some period . . . We should be a little cautious in calling it a waiting period for medical reasons . . . that particular ground for it might be withdrawn (*Symposium on Noise in Industry*, 1956).

As Ward pointed out after recently supporting a period of two weeks as a minimum:

> . . . little further recovery occurs after a month, although occasionally following trauma from a single incident (such as a firecracker exploding near the ear) slight additional recovery may occur in the second month. In Wisconsin, a six-month noise free period is required, but this regulation is based more on political than scientific grounds (Ward, 1969).

Finally, the fullest discussion of the real basis for the six-month waiting period was by Dr. Carl Zenz, Medical Director of Allis-Chalmers Corporation, writing for the *Foundrymen's Guide* (1972), Dr. Zenz first stated that:

> . . . temporary threshold shift is an effect from which the worker recovers after absence from noise exposure for one day or less. Recovery periods vary between individuals. Because of uncertainties, it is suggested that hearing not be tested until at least 24 hours after the last exposure. Wherever possible, a longer period (up to one week), would be desirable . . .

Then, in discussing the six-month rule, Zenz says:

> . . . the working population includes millions of people with less than normal hearing. These hearing losses have accumulated through the years and no financial provision has been made for settlement of the claims that could develop if all were free to file claims and collect benefits at any desired time. The six-month waiting period has been recognized generally as the most satisfactory method of ***avoiding mass filing of claims***. . . no claim may be filed until six consecutive months after the worker's last exposure to injurious noise . . . It therefore spreads out the filing of claims but protects the workers's right to establish a claim upon retirement or when he is no longer employed in a noisy occupation.

Several States like Wisconsin and Maine have reduced their six-month periods (Wisconsin to two months and Maine to one month). The States and federal agencies now using a rule of 16 hours to 72 hours should probably be somewhat more conservative by making sure the

employee has the least possible noise exposure during the two weeks prior to the test. Where there is a possibility of temporary loss, the audiologist might retest the patient a few hours later. This would tell whether a temporary loss was present. Fair administrative measures such as those above would give reasonable standards without preventing impaired employees from filing valid claims without delay.

Beyond Audiometric Testing

At present audiometric hearing levels are the principal measure of hearing impairment. Rarely is subjective evidence of impairment considered in compensation claims. Yet there is substantial research indicating that some individuals may have cochlear damage which severely affects hearing, in spite of normal or near-normal audiograms (Lipscomb 1975). Lipscomb, for example, showed that persons with slight audiometric loss and good speech discrimination scores in quiet, "broke down considerably" when tested in noise. Tinnitus (ringing of the ears) can also be a severe aggravating condition (Vernon, 1978), but is rarely rated by examining doctors. This brings up the need for impairment guidelines which consider all types of interference with everyday communication and functioning and allow physicians more discretion in considering subjective impairment.

Finally, though it is beyond the scope of this report, there is increasing evidence (EPA, 1978; National Academy of Sciences, 1979) of a possible association between excessive occupational noise and other health conditions such as hypertension and cardiovascular problems. A recent National Academy of Sciences, CHABA working group draft report recommends that additional studies of nonauditory effects caused by long term exposure to high noise levels are definitely needed to determine whether there are other "undesirable health effects from excessive noise such that standards should be set to protect workers in industry." Insurers report that occupational hearing loss is being brought in jointly with heart problems, lung disease and other ailments as a contributing factor in "omnibus" permanent total disability claims filed in Michigan and other States. Thus far, medical guidelines have not considered these interactions.

CHAPTER V — FEDERAL HEARING LOSS COMPENSATION: AN ANALYSIS OF CLAIMS ACTIVITY AND PROCEDURES

As discussed earlier, federal hearing loss claims have risen very rapidly and now exceed any single State except New Jersey. The main factors in this rapid increase are a backlog of claims from retiring World War II and Korean era shipyard employees, a present lack of noise control and hearing conservation in many federal facilities, and changes in the compensation formula by the Department of Labor. Under the FEC Program (Committee on Government Operations, 1978), the principal noise-exposed group includes approximately 65,000 federal shipyard workers and less than 100,000 airbase workers. Claims filed with the FEC have totalled more than 30,000 since 1970. Annual claims filed rose from 500 in 1969 to a peak of almost 9,000 in 1976. Under present procedures greater than 50% of the claims filed are being denied. Records show that during the March 1976 to March 1978 period, the FEC Hearing Loss Task Force approved 3,625 claims totalling $27.7 million in benefits. There are still almost 8,000 claims pending.

Recent Government Accounting Office (GAO 1978) audits have indicated a need for tighter administration and more scrutiny of claims by the Department of Labor (DOL). Partially in response to their audits, the DOL Office of Workers Compensation Programs (OWCP) has established a Hearing Loss Task Force in the FEC as a central processing unit for hearing loss claims. With a staff of examiners, medical and audiological experts and central recordkeeping, they have made the claims processing much more thorough and uniform, with detailed investigations of problem claims. Under a 1978 directive, all FEC hearing loss cases are now channelled through the Task Force.

The Longshore and Harbor Workers program (LSHW) covers up to 50,000 workers in private shipyards. They are only now beginning to experience a rise in hearing loss claims, largely because insurers and employers have been successful in preventing the official adoption of the NIOSH formula, and because they have a larger role in disputing individual claims. Lower worker awareness in smaller, private shipyards is a further factor.

Federal Employee Compensation Program

Hearing Loss Benefits Under the FEC

The Federal Employees Compensation Act covers all federal and wage-board employees (including blue-collar workers in federal installations). This Act has provisions for "schedule" compensation payments for "loss of a member or function of the body" (Committee on Government Operations, 1978; Frazier, personal interview, 1978). Compensation is paid for physical impairment without consideration of loss of earnings. However, where there is a proven loss of earnings, an award can be made beyond the schedule. Complete loss of hearing is rated at 52 weeks of compensation for one ear, or 200 weeks for binaural loss, with partial loss calculated on a proportional basis. The compensation rate for each week for loss of hearing and other diseases is calculated at 66 2/3% of the weekly wage as of the date of the

scheduled award (75% for a person with one or more dependents). The maximum rate is now $678 weekly, amounting to total maximum benefits of $135,600 for 100% loss.

The Bureau of Federal Employees Compensation (FEC) within the Department of Labor is responsible for investigating each claim, determining whether an award is justified, and issuing a compensation order. Compromise agreements are not permitted. The employing agency is not a party in an occupational disease claim. The injured employee submits a claim to the FEC accompanied by medical evidence from his treating physician, and the FEC is responsible for investigating the claim and making a ruling on all evidence, including facts provided by the employer. The employer has no right to have the employee examined or to have a hearing or appeal. The only way the employer can question the employee's evidence is by presenting related facts to the FEC examiner. If the examiner has questions about the facts presented by the claimant and/or employer, a further investigation may result or the case can be sent out for an independent medical opinion. Prior to the establishment of a central processing unit for hearing loss claims, the FEC Hearing Loss Task Force, few hearing loss claims were fully documented.

In determining compensability the FEC examiner has two basic criteria:

— work exposure to noise exceeding 85 dBA. The program directives do not require a certain period of exposure or a time-weighted noise dose.

— Calculation of impairment by a formula using the average hearing level at the frequencies of 1,000, 2,000, and 3,000 Hz with a low fence at 25 dB (re: ANSI-1969).

The FEC is allowed to issue administrative provisions for awarding compensation without consideration of normal rule-making procedures. Since the FEC program is funded by general revenue, employers do not have standing to challenge administrative rules or awards in individual cases. Examiner's awards can only be appealed by the *employee* to the Employee Compensation and Appeals Board (ECAB) within the Labor Department. Thus, interpretations favorable to the employee are never challenged by an outside body. This freedom from independent scrutiny and rising federal employee awareness of occupational hearing loss presented FEC with a number of issues it could not handle adequately. Most of the problems arose prior to 1977, when claims were being processed by FEC district offices without specific guidelines or policy from the national office.

In the early 1960s, there were few claims and the basis for compensation was the 1959 AA00 formula. However, in the late 1960s claims volume increased and many more cases of noise-induced hearing loss were identified. In 1969, some Air Force employees suffering high frequency hearing losses were transferred to other jobs as a result of the Air Force's periodic hearing tests. They filed claims but could not be compensated because their injury was not severe enough using the 1959 AA00 formula. The FEC then issued a program directive changing the hearing loss impairment fromula to 25 dB (re: ANSI-1969) at 1,000, 2,000, and 4,000 Hz. The number and dollar volume of claims processed under this formula are not known. However, the new formula substantially increased the number and severity of claims, including many previously noncompensable high-frequency hearing losses (GAO Audit, 1978).

In 1972, NIOSH published a document in which the average hearing level of 25 dB (re: ANSI-1969) at 1,000, 2,000, and 3,000 Hz was recommended to be the beginning benchmark for hearing impairment for speech (NIOSH, 1972). Soon after, in 1973, the FEC adopted the NIOSH frequencies while retaining the rest of the 1959 AA00 formula. This 1973 change is still in effect.

The only other change since that date has been a reversal in the former FEC practice of subtracting the 25 dB "low fence" separately from the claimants hearing levels at each frequency, instead of averaging the claimants hearing levels at these three frequencies before substraction. The previously used subtraction method was in conflict with the concept of the three frequencies as a composite and interrelated measure of hearing impairment. It also resulted in compensating some claims where the three-frequency hearing level average was less than 25 dB (re: ANSI-1969), but the loss at one or more of these frequencies was above 25 dB. The change back to subtraction of the "low fence" from a three-frequency average was done in response to GAO audit recommendations (to be discussed later in this chapter).

Another problem is the procedure by which examiners investigate and process claims. The FEC program directives require examiners to obtain a considerable amount of data from the employee and the employer concerning causation and extent of impairment. Below is an example (**FEC Procedure Manual**, 1973) of the data to be obtained from the employer before making an award:

"a) employee's complete work assignment record, work sites and layout, noise exposure, length of exposure time

b) sound level surveys of work area (should be made if none are available)

c) hearing conservation and noise control measures taken

d) any other complaints of hearing problems from fellow employees

e) pre-employment and periodic medical exams and audiometric tests

f) lst exposure of employee to noise

g) whether employee was removed from noise 16 hours before his hearing was tested.

The employee is also required to provide a narrative description of noise exposure and an audiogram." In many cases, FEC district office examiners did not obtain or use this information.

Past Problems—Government Accounting Office Findings

The Government Accounting Office (GAO, 1978) audits mentioned earlier reviewed various aspects of FEC compensation policies and procedures, particularly in the area of hearing

loss. Specific criticisms of FEC administration and recommendations for change were made in a 1978 GAO report.

Failure to determine the claimant's noise exposure was one issue cited by the GAO in its critical report to Congress. The FEC requires that the claimant show noise levels of 85 dBA or higher to establish work-related impairment. No exposure duration is specified. In most cases, employing agencies provided information showing a range of noise levels for a job, but data in some cases was not sufficient to show a time-weighted average or the actual noise dose received by the claimant. In the GAO study of FEC claims, the 50 cases from the FEC Washington and Jacksonville offices were found to lack the time-weighted exposure information needed to establish the total noise dose received (e.g., that the employee has received more than a full workday equivalent dose at 85 dBA). In San Francisco, where data on time-weighted exposure was available, the auditors found only two of forty-eight compensated cases where the employee had received less than an 85 dBA daily noise dose.

As mentioned above, audits of the FEC program found that in some past cases (*Federal Worker's Compensation Program*, 1976), an award was made without the required noise exposure information in the file. In various cases, employer-presented facts questioning the claims were ignored. In one example provided by the Navy and cited by the GAO, the employer presented evidence that the employee had no hazardous noise exposure, and was hired with a monaural hearing impairment of 10% in 1965, with a 2.5% increase in five years. Although this information indicated a pre-employment loss, it was ignored. The employee's total impairment was then compensated. In another case, a training director, with no noise exposure according to the employer's records, was awarded $35,000 for a 52% loss.

Because agency examiners failed to require adequate documentation and question each claim, a problem of claimant misrepresentation developed. Congressional committee hearings reported that a government industrial hygienist and his supervisor collected awards of $25,776 and $3,243, respectively. Medical and lay opinion in the claim files indicated that neither person had any hearing loss (the hygienist's claim was held in abeyance by OWCP for four years, during which he picked up six cost-of-living adjustments).

As an outgrowth of the above-mentioned investigations, a Norfolk shipyard employee was convicted of falsifying his responses to a hearing test presented as evidence for a compensation claim. The employee convicted received a 71% award and was later shown to have zero loss. Six others with large awards and evidence that they misrepresented their losses are awaiting trial (*Norfolk Virginia Pilot*, 1978). Because of the concern that some awards were obtained under false pretenses, the FEC is retesting around 300 Norfolk claimants who received large awards. If this turns up a substantial number of cases where present hearing levels are better than hearing levels at the time of the award, the retesting will be expanded.

One of the main problems is that the FEC district office claims examiners relied almost entirely on data presented by the employee and his attorney. Because of case backlogs, items were rarely investigated and there was generally no personal contact with claimants, employers, or medical personnel. The FEC's option of requesting an independent medical evaluation was rarely exercised and there was no policy on requiring special diagnostic tests in

cases of discrepancies between audiograms. In one reported case, even after a university speech and hearing center and an otologist both indicated that the audiograms were unreliable and the claimant was malingering (the audiologist saw the employee communicating normally at a distance of five feet), he was awarded $44,000. In both the House Government Operations Committee Hearings and the GAO Report, these deficiencies were discussed, with recommendations for improved investigation and case preparation by the agency.

One problem brought out by the House Committee hearings was the lack of special training or qualifications for FEC examiners, even though examiner decisions are quasi-legal rulings involving large monetary sums and unlikely to be appealed. The House hearings cited the promotion of clerical and secretarial personnel to examiner positions, use of lateral entry from unrelated fields, and a policy of "on-the-job" training, rather than specific education in compensation law, investigative techniques, and evaluation of evidence (House Hearings, 1976). This method of selecting examiners resulted in problems with more complicated occupational disease claims.

GAO Conclusions and Recommendations

In addition to specific cases, the GAO report covered a number of general conclusions and recommendations mentioned below:

1) The FEC modifications of the 1959 AA00 hearing loss formula and adoption of the NIOSH recommendations were critized. The GAO recommended that the FEC return to the 1959 AA00 formula.

2) The FEC standard for hazardous noise exposure of 85 dB did not specify the time-weighted average or duration of exposure needed to produce a hearing loss. The GAO noted that many of the case files did have enough information to judge whether the NIOSH time-weighted average of 85 dBA for eight hours was exceeded. They recommended that the FEC employ the NIOSH standards for hazardous noise exposure in determining work-relatedness of hearing loss.

3) In 20 out of 98 claims files, the GAO found evidence suggesting that the audiograms used for compensation did not reflect true hearing loss. The GAO cited lesser hearing impairment found by university speech and hearing centers, as opposed to private otologists.

Evaluation of GAO Recommendations

Concerning the GAO recommendations, some comments are in order:

— The GAO recommended the return to the 1959 AAOO formula since it is the one "used most often in state worker's compensation programs" and by the "Veteran's

Administraton." GAO also criticized the FEC formula for being adopted without "scientific study." As shown earlier in this report, only a minority of Statesuse the 1959 AA00 formula. The States with the most claims use formulas with high frequency components. Also, even the AA00 has now revised its formula, as discussed in Chapter IV.

While the FEC formula may have been adopted without scientific study, the 1959 AA00 formula was adopted as an "interim" formula twenty years ago without any real empirical study. As Chapter IV discusses, a number of recent studies support the selection of frequencies included in the FEC formula and demonstrate the inadequacy of the 1959 AA00 formula which GAO has recommended. Furthermore, AA00's new formula has less supporting technical evidence than does the formula now used by the FEC.

—The GAO is probably correct in urging a time-weighted dose as a noise exposure guideline, rather than just including evidence that the worker was exposed to 85 dBA or higher. However, the GAO recommendation tries to apply this too rigidly. As the NIOSH document states, the 85 dBA figure for eight hours "permits . . . a certain amount of hearing loss in a small percentage of workers over a working lifetime." Since worker's compensation is set up to protect the most hypersensitive individual and not just the average population, each case must be evaluated individually. There is evidence that exposures to levels of 75 dBA and above over a working lifetime will result in an increase in the percentage of these workers who exceed the NIOSH hearing impairment criterion compared to the non noise exposed population (Kryter, 1975). These percentages increase as the noise exposure levels increase.

Also, the 85 dBA eight-hour dose involves continuous noise and does not consider situations involving impulse noise and whole body vibration, which might substantially aggravate a moderate exposure. In addition, the worker usually leaves the job or retires before he files a claim, and is in no position to do professional noise surveys or produce hard evidence of the exact noise levels he worked under during a 20-30 year period, since this information is usually not available. Thus the worker's burden of proof of noise exposure should not be excessive, once he has shown evidence of working in a normally noisy employment. In most high-claim States, the burden is on the employer to produce evidence that noise levels were *not* hazardous. Only then does the burden shift to the worker. From a recent study by this researcher, most FEC claim files appear to have enough noise exposure information to enable the examiner to make an informed decision.

—The GAO comments on audiometric testing are more than met by present Hearing Loss Task Force procedures. It appears that in past cases studied by the GAO, the problem was much more a function of careless or out-of-date testing by medical professionals, than in conscious malingering by claimants. A new FEC policy requires each hearing loss claimant to have a medical and audiometric exam at a clinic approved by the FEC with a complete set of hearing tests based on the American Speech and Hearing Association (ASHA) procedures. This is a thorougher medical and audiological workup than that required by almost any State.

Present FEC Program—Hearing Loss Task Force

Because of the House Committee and GAO concerns, the FEC set up a special Hearing Loss Task Force at the central office in March 1976. This Task Force was initially responsible for adjudicating all unprocessed hearing loss claims for overloaded offices like Washington, D.C. and New York. It has now been assigned all FEC loss cases.

The Task Force began with six examiners and support staff. It has gradually added examiners and has set up an in-house medical unit, with an otologist as director supervising three audiologists. The Task Force thoroughly reviews all claims coming before it, requests needed evidence on noise exposure from employing agencies, and reviews the adequacy of medical evidence (audiograms) presented to support each claim. As mentioned above, in all cases the Task Force sends claimants to clinics it selects for an examination. Once the claimant has completed all procedures, the claim is reviewed and if it qualifies for an award, the Task Force then issues a compensation order.

As seen in Table 5, since the Task Force was set up, it has handled almost 7,000 cases, with more than 7,800 still pending. The Task Force has rejected almost 50% of the claims filed. The average award is around $7,600, based on a weekly compensation rate of $203.00. The average 37.7 weeks of compensation awarded, amounts to a 19% hearing loss on a binaural basis. FEC records also show that around 60% of the claimants have legal representation. The average legal fee requested is $312, and the "reasonable and necessary" fee awarded after agency review is $206.

FEC Denials

As part of this research project, a study was done of a representative sample of claims processed by the Task Force. The study included 150 approvals and 936 denials. As Table 6 shows, 540 of the 936 denials were due to a failure to meet the claimant's burden of proof. Other important reasons for denials were failure to meet statutory filing requirements and absence of a compensable loss according to the audiogram presented.

Following is a discussion of the various issues in claims denials partly based on decisions of the appeal board. In some cases, the claims were originally processed by district offices and may reflect less thorough procedures than the present Task Force.

Burden of Proof: The claimant is required to prove his case under the FEC Act. Denials in this category include principally the following:

—failure to submit audiograms

—medical evidence of non-occupational disease

—no evidence of *hazardous* noise exposure.

Table 5
Operations of Hearing Loss Task Force
March 1976—March 31, 1978

Claims Pending	7,856 (as of 3/31/78)
Adjudicated	6,951
Approved	3,625
Rejected	3,328
Monaural Awards	667
Binaural Awards	2,954
Average Weekly Compensation Rate	$ 204
Average No. Weeks	37.5
Average Total Award	$7,655

Source: Hearing Loss Task Force Operations Report, March 31, 1978.

Table 6
Claims Denials
Federal Hearing Loss Task Force Case Files

Reason	Number of Denials
Failed to meet burden of proof	540
Audiogram fails to show compensable loss	137
Failure to make claim within statutory time	169
Miscellaneous	90
Total	936

Source note: Tabulation of closed denials for selected offices from files of FEC Hearing Loss Task Force in Washington, D.C. in March 1978.

Many claims were denied because the claimant did not submit an audiometric test. In other cases, there was medical evidence of non-occupational ear disease (otosclerosis), or the claimant failed to prove exposure to noise levels of 85 dBA or above. The burden of proof category also includes claims that were suspended because the claimant failed to respond to the agency's request for supporting evidence.

The following are examples of cases from the Hearing Loss Task Force files resulting in burden of proof denials.

*Burden of Proof—Case Summaries**

> This 54-year old claimant filed for compensation in August of 1974. He was employed in the Washington Navy Yard as a molder from 1948-54, and 1 year in 1959. He was reinstated as a molder in the Research Lab from 1967 to 1974. He was exposed to electric furnaces, gas furnaces, air hammers, air chisels, etc., for an average of six hours per day and up to 95 dBA.
>
> He states he has tinnitus and has experienced earaches occasionally.
>
> He was tested for hearing loss annually, but was never issued ear protectors. His latest audio in the records was dated in 1973. This shows a 55 dB drop at 3k, 30 dB at 4k, and 40 dB at 6k. Normal hearing in the lows for the left ear. The right ear is essentially normal. However, the claimant failed to submit a medical report according to the standards of the filing office. He was given 60 days to file such a report. He failed to do so.

Another case rejected for lack of proof is summarized:

> This 55-year old claimant worked for the Boston Naval Shipyard as a welder from 1942 to 1973. He filed in 1975.
>
> His job was not considered a noise-hazardous job, but he worked in close proximity to drillers, chippers, etc., where noise levels rise as high as 124 dBA.
>
> In 1975 the claimant was asked to submit factual information in support of his claim. This information was submitted. In March 1976, the claimant was asked to submit a medical report (audiogram and doctor's opinion as to probable cause of loss). No reply was received. In September 1976, the office

*All cases summarized by Marilyn Nieder and Richard Ginnold from case files.

again requested the information: again, no reply. On September 8, 1977, the claimant was asked to submit time and factual information. Finally, the attorney informed the office that the claimant had died in 1975. Therefore, no compensation can be awarded to the surviving dependents because a medical report, time and factual information can no longer be obtained.

Here it appears that the claim was one of many being submitted by an attorney on a mass production basis, and it took two years for the attorney's office to learn of the claimant's death. Under present procedures, there is no claimant burden to present medical evidence since all claimants are referred to an approved audiologist by the FEC.

Some of the more recent denials are due to claims submitted under the agency's 1969 formula—25 dB (re: ANSI-1969) low fence, averaged at 1,000, 2,000, and 4,000 Hz—or the old averaging method. These claims were then denied under more stringent existing criterion. For example, one claim was submitted under the old averaging method but denied under the new method:

A 59-year old claimant filed in November 1974. He was employed as a machinist for 34 years at the Portsmouth Naval Shipyard. He was furnished with earplugs in the 1960s and claims to have worn them at all times while at work.

He was exposed to pneumatic tools; chipping hammers, scaling hammers, riveters, etc. (100-130 dBA).

He was tested in 1975:

	Frequencies (Hz)				
	500	1,000	2,000	3,000	4,000
Right ear (dB)	10	10	20	25	55
Left ear (dB)	10	10	15	40	55

Under the rule in effect before 1977, the 25 dB fence would be subtracted from *each* frequency for each ear and if *any* frequency was above 25 dB, there would be some award (e.g., in this case the left ear hearing level of 40 dB at 3,000 Hz would amount to a binaural loss of 2.5 weeks of binaural loss, or $500-600). Under the AMA method of averaging the three frequencies *before* deducting the fence, more acute hearing in lower frequencies balances off the one frequency above 25 dB and results in noncompensable hearing levels of less than 25 dB in each ear.

Statute of Limitations: The FEC statutory time limits were more strict than most States until 1974. The pre-1974 FEC provisions applied to injuries or illness occurring prior to

September 7, 1974 (for hearing loss, the date of injury is the date of last exposure to the noise before termination or transfer to non-noisy employment). This law allowed the claimant one year to file a claim from the date the employee had reasonable knowledge that he was suffering a work related hearing loss. The agency could waive the time limit up to a maximum of five years from the date of injury. However, this was limited mainly to cases where the *employer* did not know that hearing loss was compensable and did not inform the employee. Where the *employer* didn't tell the employee but knew the hearing loss was compensable, the Act makes the employee responsible for knowing his rights and asking the employer (Frazier, 1978).

For injuries occurring after September 7, 1974, there is no time limit for filing, if the employee notifies the employing agency of his work-related loss within 30 days after becoming aware himself. Otherwise, the filing limit is three years. The pre-1974 statute of limitation was quite severe, but the new requirement is much less restrictive than most State programs.

In one recent Employee Compensation Appeals Board (ECAB) ruling, the effect of the old time limit is seen clearly. A shipyard rigger filed a written claim with the FEC, and in written information requested by the agency, stated that he "first noticed a loss of hearing" and "found it difficult to hear approximately in the year of 1970 and 1971." He stated that he was given ear plugs "in 1960" and assumed that they were issued "because the nature of my job was noise-related." He also stated " . . . after a period of time on the job, the excessive noise began to affect my hearing."

He was retired on disability in 1973, and filed his hearing loss claim in 1976. He explained that he didn't file within one year of retirement because "I wasn't aware that I could file a claim." The FEC denied his claim on the ground of the one year time limit. The Board, in upholding the FEC, stated that "the claimant was aware or should reasonably have been aware of his hearing loss and its possible relationship to his job not later than March 15, 1973, the date of his retirement . . . " The claimant's only excuse was "that he was not aware that he could file a claim for hearing loss . . . According to the Board, this type of excuse is unacceptable as sufficient cause or reason to file in time" (*Alonzo Smalls and Charleston Naval Shipyard*, 1978).

In one case an employee had a 30-40% loss established by Navy audiograms while at work (*Sammie Berman and Naval Air Station*, 1978). In his written submission he admitted that he knew of the work-related nature of his loss. He explained his failure to file a claim until two years after his 1973 retirement because "I was not told or aware that I was eligible to file for my hearing." Again the Board found that lack of knowledge is not sufficient cause for an extension.

Interestingly, in many cases where the employee submits the kind of written submission above, he is not represented by counsel and is trying to give specific facts which might prove his exposure to hazardous noise. His own statements then become the basis for denial. In cases where employees are represented by an experienced attorney, the written statements in the file appeared to include "boilerplate" language for the purpose of assuring that the statute of limitations is met. For example: "I did not know the loss of hearing I had was due to my occupation."

Non-occupational Loss: Another major reason for denial of claims is loss which was present prior to federal employment, occurred after termination, or was caused by ear disease or by some other non-occupational factor. In one case, the employee retired on disability in 1973, and submitted a 1975 audiogram showing a 10% bilateral hearing loss which the doctor attributed to "cause undetermined." The office reviewed the file and granted the claimant a 10% award. The claimant was not satisfied and went to another otologist, who obtained an audiogram showing a 21% loss in 1976. The office refused to increase his award on grounds that his noise exposure ceased in 1973 and any further loss was non-occupational. The decision was upheld by the ECAB (*Sabatini and Philadelphia Navy Yard*, 1978).

In another case, a Navy operating engineer employed from 1966 to 1972 submitted a 1975 audiogram showing a severe hearing loss in each ear, which the doctor felt was "job-related." The FEC office found a 1960 audiogram showing a severe loss in his right ear prior to employment. It also found that according to the 1960 audiogram, a second test in 1972, and a new examination ordered in 1977, the claimant had no loss in his left ear. The FEC selected the latest audiogram and denied the claim, on grounds that the right ear loss was present prior to employment. This decision was upheld on appeal (*Moore and Philadelphia Navy Yard*, 1978).

Even when there is evidence of non-occupational loss, if the office grants the claim there is no appeal, except by the claimant. For example, an FBI agent with a long history of middle ear disease and major ear surgery filed a claim. His audiogram showed no loss in the right ear and a 33% loss in the left ear. In spite of his doctor's statement relating the loss to "middle ear disease," the FEC medical advisor approved the monaural award. The claimant appealed the case for a binaural award. The Appeals Board recognized that the evidence indicated his loss was caused by middle ear disease, but could not rule on the issue. As the Appeals Board said:

> . . . the case record contains substantial medical evidence that the applicant's hearing impairment was caused by his middle ear disease. However, the Office granted him a schedule award, so that the only question here involved is whether he had a greater hearing loss than that found by the Office (*Chapman and FBI, San Antonio*, 1978).

Questions Concerning the Hearing Loss Formula: Various decisions of the Appeals Board have upheld the right of the FEC to use the present NIOSH standard for its compensation formula. The revised FEC averaging formula for calculating loss has been upheld even for cases initially submitted under the old method (Beggs, 1977).

Study of FEC Hearing Loss Task Force Claims Approvals

As mentioned earlier, a study was made of 150 recently approved claims from the Hearing Loss Task Force files. Claims were reviewed from all district offices under the task force. Table 7 shows a summary of data from those 150 cases. Employees had a mean age of almost 54 years, with approximately 20 years of exposure to hazardous noise, and the same period of

Table 7
Profile of FEC Approved Hearing Loss Claims Closed July, 1978—March, 1978
Study of Hearing Loss Task Force Files

Number of Claims Studied	150
Mean Age (At Time of Close)	53.8
Mean Number of Years Employed in Noisy Employment	20.3
Mean Number of Years Employed by Federal Government	20.5
Mean Weeks Compensation Received	28.9
Mean Benefits	$4,578.00

Mean Audiometric Readings	Hearing Levels in dB (re: ANSI-1969)
Right Ear	
500 Hertz	21.9
1000	23.5
2000	33.2
3000	51.1
4000	59.4
Left Ear	
500 Hertz	21.6
1000	23.0
2000	33.9
3000	52.2
4000	60.0

Source: Computer study of 150 FEC claims from Hearing Loss Task Force files.

employment with the federal government. In this study the mean number of weeks compensation was approximately 29, equivalent to more than 14% binaural loss, with average benefits of $4,578.

The audiometric averages in Table 7 show that the average hearing levels for the FEC claimants exceed the 1959 AAOO hearing impairment criterion. Thus, many of the claims should have been compensable even using the AAOO formula. However, since the average audiometric readings at 3 KHz were over 50 dB, the size of the hearing impairment using the NIOSH criterion was substantially larger than would have been obtained using the 1959 AAOO criterion.

The average claim in the pilot study was substantially smaller than the average claim of around $7,600 found in the GAO study and FEC compensation records over the past two years. In part, the results of this small investigation may show more conservative audiometric findings, and greater agency scrutiny of large claims by the Task Force. For example, FEC records show that in the month of March 1978, 380 hearing loss claims were handled, of which almost 70% were rejected, far above the overall 48% rejection rate of the Task Force.

In the pilot investigation conducted for this report, a graduate audiologist examined the claims and noted cases where audiograms appeared to be unreliable or insufficient to make a valid award. In most cases, the record of hearing levels and noise exposure was complete. Out of 150 cases, only nine cases had somewhat questionable audiograms. In every case but one, the claimants were sent for additional exams by the FEC until discrepancies were resolved. In the single exception, a claim was filed by a shipyard worker in 1971, and he was sent for two tests in 1972 and 1974. Because of the discrepancies between exams, the doctor from the Hearing Loss Task Force ordered another audiogram. Before the claimant went for another test, he died. The widow pursued the claim and was awarded $17,000, in spite of the fact that the case was unresolved as to the precise hearing level of the claimant. In a few other cases, our researcher noted, even though claimants were sent for other tests, the audiologist did not perform all the standard tests, e.g., speech reception threshold and speech discrimination, or failed to do any one of several tests commonly used to counter possible malingering. The 150 cases investigated for this report were processed prior to the Task Force hiring of three audiologists in April 1978. One duty of the audiologists is to prescribe diagnostic testing practices for such purposes.

Possible Influence of Hearing Conservation in Claims Activity:

Another point examined in this Study is the extent to which the employing agency provided records of hearing exams and hearing protection worn. As Table 8 shows, over 70% of the approved claims were from shipyard workers. Around 75% of these claims had employer audiograms in the file. Almost as high a percentage had worn hearing protection for at least some time prior to the claim. Over 80% of air base workers (the next largest group) showed hearing exams and proof of hearing protection worn at work. This is an example of the variety of employer/employee information available from which to document the validity of a claim.

Table 8
Federal Hearing Loss Claims by Occupation and
Employer Hearing Conservation Programs

	Employer Hearing Exams			Hearing Protection Worn		
Occupation	Yes	No	Total	Yes	No	Total
Shipbuilding	82	28	110	75	36	111
Air Base Workers	21	3	24	20	4	24
Treasury Agents	1	1	2	1	1	2
Other	10	3	13	9	4	13
TOTAL	114	35	149	105	45	150

Interestingly, the study data shows that the 114 claims with employer hearing tests in the file averaged $4,232, whereas the 35 claims with no employer hearing information averaged $5,617. For each age group, the claims with no employer test information averaged around 20% higher, with a major difference for the small number of claims approved for employees under 40 years. For the claims filed by employees under 40 years the three without employer hearing tests averaged $71,000, while the five with employer tests averaged $5,400. Interpretation of these figures is difficult without looking further into the cases.

In part, these limited results may mean that the employers who have hearing conservation programs and do audiometric testing are also reducing the noise exposure and eventual hearing loss of exposed employees through hearing protection, job transfer, and noise control. It might also mean that employer hearing tests in the file give the FEC a better basis for evaluating the employee's medical information and in some cases allow rejection of exaggerated claims.

Longshore and Harbor Workers Program

The other federal compensation program is under the Longshore and Harbor Workers Compensation Act. This program is also under the Office of Workers Compensation Programs (OWCP) and covers longshoremen, maritime workers, and private shipyard workers. In contrast to the FEC program it is an adversary program, where covered employers must either have compensation insurance or meet standards of self-insurance. The employer is a party to every claim. The Longshore program has higher benefits and less restrictive standards than most State programs. Employee choice of physician, more adequate impairment standards and definitions of disability are examples. However, the employee must still prove his claim. The employer has a right to controvert the claim, have a formal hearing, and to present related evidence. The employer does not have a right to have the employee examined by his physician, although the OWCP may have the claimant examined by an independent specialist of their choice.

In terms of hearing loss criterion, the Longshore program once used the 1947 AMA formula (weighted average of 500, 1,000, 2,000, 4,000 Hz), which was revoked in 1961 and replaced by the 1959 AAOO formula. While the 1947 AMA formula was officially in effect until 1976, the Longshore program was affected by the changes going on in the FEC program. In contrast to central office policy, it was found in 1976 that nine out of 14 District Offices of the Longshore program were using the NIOSH formula adopted by the FEC (*GAO Audit 1978; and Shelton vs. Washington Post Co.*, 1977). An example of a lack of agreed standards is shown in one case where an Administrative Law Judge, hearing a private shipyard case, ruled that it was proper for the District Office to apply the State standard, in this case California's four-frequency standard (*Robinson vs. Bethlehem Steel*, 1976). The Benefit Review Board (BRB) responsible for longshore appeals upheld the judge, commenting that there was no legal provision or administrative rule fixing the hearing loss standard to be used. In December, 1976, the OWCP issued a bulletin (*LHWCA Bulletin*, 1976) for the Longshore program, directing district offices to use the NIOSH formula in determining hearing impairment. This guideline was issued without usual rule-making procedures, and was opposed by the American Mutual Insurance Alliance, which had been strongly objecting to the federal policies on hearing loss compensation.

The NIOSH formula was used informally by District Offices and has been applied in many agreed settlements and compromises. However, in the latest precedent-setting award, the BRB upheld an Administrative Law Judge who used the 1959 AAOO criteria in awarding a *Washington Post* pressman's claim. In this decision (*Shelton vs. Washington Post Co.*, 1977), the BRB chided the OWCP for not establishing a formula in accordance with the rulemaking process under law and suggested that the OWCP Director "conduct hearings and/or invite comments in response to proposed regulations" and "provide an opportunity for all interested parties" to participate in developing an appropriate standard. The BRB threatened to do this itself in "an appropriate future case" if the Director failed to "promptly" carry out its instruction. In a later *Washington Post* case, the Administrative

Law Judge reviewed several alternative formulas and finally issued the claimant an award for a 40% loss, two percent in excess of the loss shown according to the NIOSH formula. This case is on appeal to the BRB (*Swift vs. Washington Post Co.*, 1978).

CHAPTER VI — COMPARISON OF FEDERAL AND WISCONSIN CLAIMS

In order to better understand the differences between resulting claims awards at the federal level and in a major State program, similar data were coded and tabulated from 431 Wisconsin claims from 1975-77 and the 150 federal claims mentioned earlier. The Wisconsin claims illustrate a typical adversary system with a two-month waiting period holding most claims until retirement, compared to the FEC program where claims can be filed at any time. There is also a comparison between four formulas: the NIOSH formula used by the FEC; the 1979 AAOO formula; the 1959 AAOO formula which was used by Wisconsin until late 1975; and the CHABA criterion (1,000, 2,000, and 3,000 Hz at 35 dB (re: ANSI-1969) adopted by Wisconsin in September, 1975, which is presently in effect.

Table 9 shows a breakdown of 164 Wisconsin claims paid under the AAOO formula and 237 paid under the CHABA formula. The average percentage losses are very similar for both formulas. This has been confirmed in a study conducted by Dr. Larry Royster of North Carolina State University (1978) analyzing the audiometric records of over 10,000 workers exposed to noise. He determined that the 1959 AAOO formula produced a comparable number of claims to one where a 34 dB (re: ANSI-1969) low fence was used averaged at 1,000, 2,000, and 3,000 Hz.

The average loss for both the AAOO and the CHABA group in the present study is approximately 17-19 percent, based on a maximum of 216 weeks of benefits and around $14,000 in total payment for total binaural loss. The average payment of $2,395 for the CHABA group is approximately 6% higher than the average payment of $2,246 for the AAOO group. This shows that the addition of the 3,000 Hz frequency and elimination of 500 Hz in the CHABA formula is almost completely offset by the increase in the low fence of beginning impairment from 25 dB to 35 dB (re: ANSI-1969), so that in effect, compensation costs remain almost the same. This of course is what the Navy requested when it contracted with the CHABA group to develop this formula. The speech discrimination and speech reception scores in Table 9 show that the Wisconsin claimants were suffering sizable handicaps in communication. On the average, claimants scored only 65% in speech discrimination testing and had speech reception thresholds of 40 dB or greater, far below normal performance.

Table 10 shows Wisconsin claims by type of settlement and test results. The data indicate that many hearing loss claims are paid without litigation. Out of 425 cases where data were available, only 58, or 14%, went to a hearing and award. Around 29% were paid without contest by the employer, and another 39% were paid upon the filing of a petition for hearing by the claimant. In these latter cases, there was no hearing and the cases were settled by a simple stipulation of fact by the two parties. Around 18% were compromise settlements.

In several tables, we can compare Wisconsin and federal claims. Table 11 shows the age breakdown of both groups.

Table 9
Comparison of Wisconsin Hearing Loss Claims Under 1959 AAOO and CHABA Criterion 1975-1977

Category	Old Formula (AAOO)	New Formula (CHABA)	Total
No of Claims	164	237	401
Mean No. of Wks Compensation	36.4	19.6	26.6
Mean Benefits	$2,246.00	$2,395.00	$2,334.00
Mean Audiometric Findings - Hearing Levels in dB (Re: ANSI-1969)			
LE - 500 Hz	28.6	27.4	27.9
1000	37.6	34.0	35.5
2000	57.0	53.9	55.2
3000	67.7	66.1	66.7
RE - 500 Hz	29.5	27.8	28.5
1000	38.8	34.0	36.0
2000	55.8	51.7	53.4
3000	66.5	64.6	65.3
Mean Speech Discrimination Scores (in percent correct response)			
RE	65.0	66.5	65.9
LE	63.5	64.4	64.0
Mean Speech Reception Thresholds (in dB)			
RE	43.2	40.4	41.5
LE	43.6	42.4	42.9

Source: Computer study of Wisconsin Claims. 1959 AAOO formula used until September 11, 1975 when new rule providing for CHABA recommendation went into effect. See Table 4 for discussion of formulas.

Table 10
Wisconsin Hearing Loss Claims Closed, 1975-77
By Settlement Type and Claim Characteristics

Category	Uncontested	Stipulation	Compromise	Hearing Award	Total
Number of claims	121	166	80	58	425
Mean Benefit	$2,255.00	$2,880.00	$2,403.00	$2,194.00	$2,518.00
Mean Audiometric Findings - Hearing Levels in dB (Re: ANSI-1969)					
LE - 500 Hz	28.9	27.1	31.5	26.3	28.2
1000	34.7	35.2	39.4	36.5	36.0
2000	54.4	55.2	55.9	58.6	55.5
3000	67.0	66.6	66.5	68.7	67.0
RE - 500 Hz	29.2	28.0	31.6	26.5	28.8
1000	36.5	36.0	39.4	33.9	36.5
2000	54.1	52.4	56.6	54.1	53.8
3000	66.2	65.2	66.1	64.0	65.5
Mean Speech Discrimination Scores (in percent correct response)					
RE	65.0	66.5	69.0	62.8	65.6
LE	65.1	63.6	66.2	57.6	63.7
Mean Speech Reception Thresholds (in dB)					
RE	40.3	42.7	43.9	40.9	42.0
LE	42.4	43.6	43.4	43.6	43.2

Source: Computer study of Wisconsin Claims.

—As shown, over two-thirds of Wisconsin claimants are over 60 years old, compared to 20% of the federal claimants. Twenty-nine percent of federal claimants are under 50 as compared to 9% for Wisconsin. The federal employees are filing at a much younger age than the Wisconsin claimants. This is probably a direct outgrowth of the two month waiting period in Wisconsin.

—Table 12 compares the audiometric readings of Wisconsin and federal claimants, at 1,000, 2,000, and 3,000 Hz. The Wisconsin cases have by far the most severe losses, with three-quarters or more exceeding 40 dB hearing levels (re: ANSI-1969), compared to approximately 30% of federal claimants. Similarly, only 6% of the federal claimants have hearing levels poorer than 56 dB in either ear, whereas, 33% of the Wisconsin claimants have significant hearing losses of this magnitude. This reflects the fact that under the FEC formula federal claimants can file when they suffer beginning impairment, while Wisconsin claimants, because of the CHABA formula and the two-month rule, can file only after they have developed a fairly severe loss.

It might be theorized that the Wisconsin impairment criterion and waiting period may account for the more severe losses and the reduced likelihood of employers implementing stricter noise control measures and administering stricter hearing conservation programs. The employer does not feel the costs of compensation until the employee retires which in Wisconsin is usually after the age of 60. At the federal level the costs are realized sooner. The Wisconsin formula allows more severe hearing loss before the worker is eligible to file.

Some claimants in both systems have hearing levels below 25 dB (re: ANSI-1969). The percentage of federal claims with losses under 25 dB (re: ANSI-1969) is approximately twice the percentage of Wisconsin claims due to the old FEC averaging formula and large differences between ears (where the better ear might have an HL under 25 dB) for both Wisconsin and Federal claims.

—Table 13 shows audiometric readings at 500, 1,000, and 2,000 Hz.Once again the Table illustrates the poorer hearing levels of Wisconsin claimants versus federal claimants. Also, it may demonstrate that many federal workers are filing claims for mild to moderate high frequency losses, whereas the Wisconsin worker usually cannot file unless the high frequency loss is more severe. If these federal employees were to file under the 1959 AAOO criteria, many would probably not be eligible for compensation.

—Table 14 shows differences in dollar benefits. The maximum allowable benefit in the federal government for hearing loss compensation is $135,000 compared to $14,000 in Wisconsin, a ratio of almost 10 to 1. Because of the difference in benefit rates, even though the Wisconsin average impairment is more severe, the average claim is much smaller. Half the Wisconsin claimants receive less than $2,000, and 92% less than $5,000. On the other hand, almost 40% of FEC claimants received over $5,000, and 12%were awarded over $10,000. Only one-half of one percent of Wisconsin claimants received over $10,000. This brief overview dramatizes the substantial monetary inequities in two different compensation systems.

Table 11
Comparison of Claimant Age for Wisconsin and
Federal Hearing Loss Claims

Age Groups	Federal		Wisconsin	
	Number	Percent	Number	Percent
Under 40 years	8	5	9	2
41 - 50	35	24	32	7
51 - 60	76	51	105	24
over 60	31	20	270	67
TOTAL	150	100	416	100

Source: Computer study of FEC and Wisconsin claims

Table 12
Comparison of the Severity of Federal and Wisconsin Hearing Loss Claims
For Selected Frequencies: 1,000, 2,000, 3,000 Hz

	Federal			
	Right Ear		Left Ear	
	Number	Percent	Number	Percent
Total Claims	150	100%	150	100%
Mean Hearing Level in dB (re: ANSI-1969)				
Less than 25 dB	30	20	24	16
26 - 40 dB	79	53	79	53
41 - 55 dB	32	21	40	27
56 - 75 dB	7	5	7	4
76 - 99 dB	2	1	0	0

	Wisconsin			
	Right Ear		Left Ear	
	Number	Percent	Number	Percent
Total Claims	431	100%	431	100%
Mean Hearing Level in dB (re: ANSI-1969)				
Less than 25 dB	39	9	35	8
26 - 40 dB	69	16	51	12
41 - 55 dB	191	44	202	47
56 - 75 dB	121	28	128	30
76 - 99 dB	11	3	15	3

Source Note: Mean Hearing Levels are averaging of the 1,000, 2,000, and 3,000 Hz frequencies. Data are coded from Wisconsin and Federal hearing loss claims.

Table 13
Comparison of the Severity of Federal and Wisconsin Hearing Loss Claims
Using Average of 500, 1,000, and 2,000 Hz Hearing Levels

	Federal			
	Right Ear		Left Ear	
	Number	Percent	Number	Percent
Total Claims	150	100%	150	100%
Mean Hearing Level in dB (re: ANSI-1969)				
Less than 25 dB	93	62	83	55
26 - 40 dB	42	28	53	35
41 - 55 dB	12	8	11	8
56 - 75 dB	1	1	3	2
76 - 99 dB	2	1	0	0

	Wisconsin			
	Right Ear		Left Ear	
	Number	Percent	Number	Percent
Total Claims	431	100%	431	100%
Mean Hearing Level in dB (re: ANSI-1969)				
Less than 25 dB	39	9	72	17
26 - 40 dB	69	16	182	42
41 - 55 dB	191	44	131	30
56 - 75 dB	121	28	43	10
76 - 99 dB	11	3	3	1

Source Note: Data are coded from Wisconsin and Federal hearing loss claims.

Table 14
Comparison of Dollar Benefits For
Wisconsin and Federal Hearing Loss Claims

Dollars in Benefits	Wisconsin No. of Claims	Wisconsin Percent	Federal No. of Claims	Federal Percent
$2,000 and less	212	49.2	57	38.0
$2,001 - 5,000	185	42.9	34	22.7
$5,001 - 10,000	32	7.4	41	27.3
$10,001 - 20,000	1	.3	16	10.7
$20,001 - 40,000	1	.2	2	1.3
TOTAL	431	100.0	150	100.0

Source: Data coded from study of Wisconsin and FEC-approved claims.

—Table 15 shows the average percentage impairment and the audiometric hearing losses for Wisconsin claims calculated according to the four main formulas. There is little difference between the percentage losses using either the 1959 AA00 and CHABA formulas, but the NIOSH formula results in a mean percentage loss of approximately 37%, or 12-13% higher than the other formulas would yield. The 1979 AA00 formula results in a 7% increase in percentage loss over the 1959 AA00 formula, even though it is still 6% below the percentage impairment computed using the NIOSH criterion.

Table 15
Comparison of Mean Hearing Loss for Wisconsin
Hearing Loss Claims, 1975-77, By Formula Used

Category	Compensation Formula Used Old (AA00)	New (CHABA)	Total
Number of Claims*	164	237	401
Mean Hearing Levels in dB (re: ANSI-1969)			
'59 AA00 - L Ear	40.4	37.6	38.7
'59 AA00 - R Ear	51.0	48.1	49.3
NIOSH - L Ear	51.4	59.8	50.5
NIOSH - R Ear	51.0	48.1	49.3
'79 AA00 - L Ear	47.7	45.4	46.3
'79 AA00 - R Ear	47.6	44.5	45.9
Mean Hypothetical Binaural Hearing Loss (In Percent)			
'59 AA00	25.5%	22.8%	23.9%
NIOSH	39.1%	35.1%	36.8%
CHABA	28.1%	23.5%	25.4%
'79 AA00	33.1%	29.6%	31.0%

*AMA = 500 + 1K + 2K/3 - 25 for each ear; better ear correction of 5/1; each 1 dB loss = 1.5%

NIOSH = 1K + 2K + 3K/3 - 25 db for each ear; better ear correction of 5/1; each 1 dB loss = 1.5%

CHABA = 1K + 2K + 3K/3 - 35 for each ear; better ear correction of 4/1; each 1 dB loss = 1.75%

Source: Computer study of Wisconsin and FEC claims.

CHAPTER VII — CONCLUSIONS AND RECOMMENDATIONS

Study Conclusions

This report has examined individual State and federal hearing loss compensation programs and claims activity. The scientific information on various key hearing loss compensation rules has been reviewed. Finally, a specific study was made of Wisconsin and FEC claims.

A number of conclusions can be drawn:

1) Since the first claims for occupational hearing loss were brought 30 years ago, eligibility for hearing loss compensation has expanded considerably and claims have increased. However, the great majority of claims paid are from just two States, California and New Jersey, and the Federal Employee Compensation (FEC) program.

2) Only nine States compensate more than a token number of claims. These states include less than 30% of all manufacturing workers. Hearing loss is non-compensable in nine other States with 29% of the industrial workers. Thirty-two States with around 41% of the U. S. manufacturing employment compensate few or no claims. Thus 70% of the country's most severely noise-exposed workers live in States where hearing loss compensation is not normally paid.

3) The major obstacle to hearing loss compensation in nine States is the requirement to prove economic loss or total impairment. Since most hearing-impaired workers continue on their jobs without direct wage loss and since present hearing formulas set total impairment at a level almost never reached (92 dB re: ANSI-1969), no one qualifies for compensation.

4) In the States in which hearing loss is legally compensable but there are few or no claims, the factors which limit claims are more complex. In some cases, the States have special statutes with six-month waiting periods, restrictive hearing loss formulas, a difficult burden of proving noise exposure, and deductions for aging. These all combine to make the filing of claims difficult. Short filing time limits and employer choice of physician are other negative features.

5) The nine States which compensate the most hearing loss claims differ from the low-claim States in major ways. They generally have hearing loss formulas which include a high frequency element, they allow employee choice of physician and their filing time limits are usually less restrictive. Only two of these States have a hearing loss waiting period.

6) The FEC program has experienced rapid growth in claims for many of the same reasons as the California and New Jersey programs. They have used a formula compensating high-frequency loss, they have no statutory waiting period, and they allow employee

choice of physician. A further factor is that the FEC program is a non-adversary system where employers have no role in defending themselves against claims and the agency has wide discretion in what evidence to accept and the extent of investigation of the claim. Because FEC procedures were reviewed and criticized by the GAO and Congressional committees, a Hearing Loss Task Force was set up to handle hearing loss cases. While they are using the same compensation criterion, there is a more thorough investigation and medical review of all claims. The rejection rate is now running at 50-70% and the number of claims paid has slowed down, though new claims are still at a fairly high level.

7) The annual number of claims paid is now around 6,000 for all State programs and over 2,000 for the two federal programs. This figure is still considerably below the peak potential, even by conservative estimates. The rise should continue in the State programs, with increases in worker awareness and State reforms which allow easier filing. The federal claims are closer to their peak. This is due to tighter administration, more employer attention to noise control and hearing conservation and decreasing federal shipyard employment. In Chapter II, a 10-year estimate of claims shows State claims rising to 16,000 and federal claims to 6,000 by 1987. The 10 year totals are 107,000 claims for the States and 40,000 claims for the federal sector.

8) In our projections of claims growth, annual benefits are estimated to rise from $13 million in 1977 for State programs to $66 million in 1987. For federal programs the rise is from $18 million to $90 million. At a minimum, cumulative benefits are projected to be more than $835 million over the next ten years. However, the 1977 total State claims benefit figure of $13 million for hearing impairment is only two to three tenths (.2 to .3) of one percent of *all worker's compensation cash benefits* of around $6 billion, a minute factor in worker's compensation costs.

9) The study's review of scientific evidence indicates that the States which have adopted high frequency formulas including at least 3,000 Hz are much more in line with current research than the 1959 AAOO formula. Although the AAOO recently revised their formula to include 3000 Hz, the NIOSH criterion has more supportive evidence in representing the actual hearing handicap. Other program features which are not supported by scientific evidence are the lengthy waiting periods for some States and the aging correction used by a few States.

10) A comparison of Wisconsin and Federal claims showed that Wisconsin claimants are older than federal claimants and have much lower hearing levels, but receive only half the average benefits. The study also showed that the CHABA formula produced almost the same average benefits as the 1959 AAOO formula. The NIOSH and the new 1979 AAOO formula result in substantially higher percentages of hearing loss than the 1959 AAOO formula.

11) In a sample of federal claimant records, the average claims award was shown to be reduced by 20% where employer hearing conservation/hearing test records were available. Hearing conservation programs may be responsible for this difference.

Recommendations

Worker's compensation must be more responsive to the hearing-impaired worker. Approximately 15 million Americans are exposed to hazardous noise levels at work, yet over 70% of them have no effective rights to hearing loss compensation due to restrictive State laws and rules.

Compensation is not only just but is a potentially important economic incentive for employers to control workplace noise. The cost of hearing loss compensation and the fear of future increases should encourage employers to introduce noise control and hearing conservation programs. However, as long as hearing loss compensation represents only .3 of 1 percent of total worker's compensation costs and does not affect most employers, this incentive effect will not be important.

To overcome the above limitations, there is an urgent need to adopt compensation rules and policies which reflect current research and do not discourage rightful claims. Some of the following recommendedations should be given serious consideration.

1. A hearing loss formula which considers high frequency loss (3,000 Hz and 4,000 Hz). The 18 States presently using the 1959 AAOO formula should consider at a minimum, adopting the revised 1979 AAOO formula. The new AAOO formula is a long overdue step in the right direction, but there is evidence that the NIOSH formula more adequately reflects the degree of impairment experienced by the hearing impaired.

2. The high fence of 92 dB (re: ANSI-1969) now in use is too high and should be lowered to reflect the point at which practical hearing ability is lost for adequate speech communication.

3. The better ear correction of 5/1 has no empirical justification. An equal weight for each ear may be more appropriate unless some justification for the 5/1 correction can be provided.

4. Attention should be given to discontinuing the practice of correcting for aging. Most workers suffer the largest component of their hearing impairment during the first ten years of their work exposure to hazardous noise levels. Penalizing these claimants at the time of retirement will not make up nor correct for their reduced hearing sensitivity over the previous 20-30 years.

5. Lengthy waiting periods (2 mo., 6 mo.) under various State laws are unjustified if the concern is contamination by a temporary threshold shift. The time away from noise necessary to eliminate temporary threshold shift should be approximately 2 weeks.

6. Short filing time limits in many States are frequently used to bar otherwise rightful claims. To avoid this, States should consider eliminating statutes of limitations, including minimum and maximum exposure requirements for hearing loss (and other occupational diseases), where the claim is otherwise proven. There should be a requirement of perhaps 1-2 years to begin the claim, but only after the worker has been informed by a qualified person, both of his hearing impairment and his specific duties and claim rights under the compensation law.

7. States should consider giving compensation claimants the full right to choose their treating physician/ audiologist from any licensed professional in the state. Licensed audiologists should have the same right to present testimony and evaluate the worker's hearing impairment as a physician. In general, audiologists have more reliable testing facilities to conduct the necessary diagnostic tests and better understand noise induced hearing impairment. In the case of ear disease or other medical ailments where a physician's testimony or advice is needed, the audiologist could arrange for his involvement. This would greatly increase the worker's opportunity to secure a fair evaluation of occupational hearing problems.

8. Most States provide compensation claimants with the medical care needed to cure and relieve them from the effects of the work-related disability. Because sensorineural hearing loss cannot be reversed, some States have failed to provide medical care, even where it is potentially helpful. States should consider providing to all claimants an opportunity to receive the most effective hearing aids and aural rehabilitation; e.g., speech reading training. While this does not remove the claimant's impairment, he will be in a better position to cope with his handicap and conduct his daily responsibilities.

9. The definition of hazardous noise should consider including at a minimum, continuous noise at 85 dBA or above for 8 hours, and should allow for special risks such as overtime shift exposures, combinations of impulse and continuous noise and especially sensitive ears. Once the worker proves a lengthy period of employment in noise, the employer should have the burden of showing an absence of hazardous exposure through his own records of noise monitoring. If the employer does not have this evidence, the claim should be allowed. For individuals with especially sensitive hearing, as discussed in Chapter 3, a 75 dBA floor for hazardous exposure might be used.

10. The report shows that even in the States with many claims most are filed by a small group of unionized claimants, usually with the assistance of the union or attorneys. The great majority of hearing-impaired workers know little or nothing about their compensation rights and how to file a claim because neither the State Worker's Compensation Agency nor insurers have public information programs. Each State Agency should consider beginning a program to make workers aware of their hearing loss compensation rights. This can be accomplished through:

a. Simple brochures which spell out the causes of occupational hearing loss, how to tell the symptoms, how to get a hearing exam and what it means, how to file a compensation claim, explanations of the compensation law and benefits, and where to obtain further information.

b. Awareness posters to be placed in high noise plants, unions and public places, with brief information on what occupational hearing loss is and a worker's right to compensation.

c. Seminars with unions and public groups to build awareness of the issue.

11. In view of the great disparity between the compensation provisions at the State level and increasing information about the adequacy of various hearing loss criteria, attention

should be given to creating a uniform federal standard for hearing loss. This is similar to the presumptions and standards being studied in the Department of Labor for other occupational diseases. Since federal worker's compensation standards are not likely in the near future, there is a place for a Model State Hearing Loss Statute. This Statute should incorporate the basic information on hearing impairment mentioned in earlier recommendations, including a scientifically supportable formula, more appropriate waiting periods, statutory filing limits, definitions of hazardous noise and recommended benefit ranges. The Model Statute would be useful for States considering law changes and for the Council of State Governments guidelines.

12. Workshops would be a very useful technical assistance method to allow State compensation officials to compare the adequacy of various State statutes and to provide a technical basis for reform. Very little technical support and guidance has been given to State officials in developing State compensation policies for hearing loss. Workshops on a regional basis should be conducted with trade union officials lobbying for State programs to exchange information on worker's compensation laws, including hearing loss.

13. It is recommended that the Bureau of Labor Statistics (BLS) consider extending to all 50 states, the Computerized Supplemental Data System which has already been initiated in over 30 States. Records of previous claims should be included in the data base. Furthermore, the BLS should develop a single code to distinguish between traumatic conductive hearing losses and sensorineural hearing losses caused by long term noise exposure.

14. In addition to the areas mentioned above, a large scale research program should be given serious consideration to improve our knowledge of the social handicap caused by hearing loss. The relationship between the percentage of audiometric impairment and the speech discrimination and social difficulties faced by the hearing impaired worker should be more definitively established. Then as the costs of compensation increase, the investment made in this area would be minimal.

Administrative Considerations

This study reviewed the FEC program in more detail than any other. In general the FEC program has been far ahead of the States in recognizing the severity of occupational hearing loss and developing fair and effective provisions. FEC has also taken some major steps to deal with the claims processing problems mentioned earlier. *The present discussion of recommendations to improve the FEC system is also applicable in part to States facing increases in the number of claims.* A number of administrative considerations are noted below:

1) Because of the GAO audit criticisms and the appeals board demands to come up with a single agreed formula, the Department of Labor is issuing research type contracts to develop criteria for hearing loss compensation. However, no new field studies will be

undertaken. The research will consist of reviewing the scientific literature and in depth analysis of the data from previous studies. Additional research is recommended where pending technical issues cannot be resolved using existing data. In addition to the technical research, the agency should consider developing an administrative rule supported by the interested parties. One suggestion would be that a Hearing Loss Standards Advisory Committee, with participation by federal employers, federal unions representing key employee groups, and medical experts be set up to follow ongoing research and to discuss and comment on proposed OWCP hearing loss rules and procedures as the results of related research become available. Labor and management input on rules and procedures would reduce litigation and allow any rules to become operational much sooner.

2) In the FEC program, the liberalization of the statute of limitations for post-1974 claims will probably result in more claims filed years after the disability. Problems caused by the aging factor, postemployment impairment growth, and difficulty in proving hazardous noise exposure can be predicted to add complications. Since the employer has no right to a hearing, the open-ended nature of claims rights seems to place an undue burden on claims examiners to adequately investigate the claim. To tighten up administration, several changes in the rules might be considered:

   a. Requiring federal agencies to carry out pre-employment and follow-up audiograms as well as workplace noise monitoring and making it clear that pre-employment and post-employment impairment will not be compensated, based on these examination results.

   b. Giving employers the right to effectively present evidence and challenge facts with which they disagree.

   c. Making examiner decisions reviewable at the request of the employing agency, or at least on issues relative to whether they made the decision on a consideration of all evidence presented.

   d. Setting higher qualification standards for examiners, including more legal and audiological training and more specialization.

   e. Having an OWCP certification program for otologists and audiometric clinics, and follow-up inspections to see that equipment and personnel are competent and that test procedures are adequate.

3) Once a claim is awarded, it is important to have periodic cost-of-living raises to maintain the purchasing power of a long-term benefit. However, the present policy of basing compensation on the loss at time of award allows greater increases in benefits and may discourage rapid pursuit of settlement by the claimant and his attorney. Where delays occur due to claimants failure to provide required evidence or pursue the claim, compensation might be based on the loss at the initial date of filing. This would encourage rapid settlement.

4) Under the present system, the employing agency does not pay any part of a permanent award and has no economic incentive to provide documentation on claims or to abate the hazard. One option to be reviewed might be for employing agencies to pay at least 50% of a permanent award from their current operating budget. This might have to be adjusted for some highly hazardous operations, but would stimulate spending for hearing conservation and noise control.

5) In a few cases reviewed in Task Force files, the employing agency knew of hazardous noise exposures or increasing hearing loss on the part of the claimant, but refused to introduce noise control or transfer the claimant to quiet employment. Where a responsible program manager or supervisor knows of a serious hazard, and through his negligence causes injury or aggravation, the law might provide for individual negligence suits against the agency and/or the official, not limited to the maximums of the FEC or Longshore program, but covering all damages.

6) Present FEC and Longshore data collection is very sparse. Apparently data processing efforts now underway will only cover accounting functions like check payment. The new system will not establish a retrievable record of claims data which can be used in claims management, or as a statistical tool for reviewing the program. The OWCP could consider a simple computerized record. For example, a one-card record of approved Hearing Loss Task Force Claims with more employee data, audiometric and other test information, codes for noise exposure and hearing conservation data from the employer would help examiners. This information would give the agency a much better knowledge of its claims handling. It could be done with very little manpower patterned after ongoing systems used in Wisconsin, Washington, Colorado, Kentucky, and a number of other States which have computerized their worker's compensation data.

APPENDIX I
HEARING LOSS STATUTES AND ADMINISTRATIVE RULES

I—A WISCONSIN STATUTE (102.555) AND ADMINISTRATIVE RULE 80-25

102.555 Occupational deafness; definitions (1) "Occupational deafness" means permanent partial or permanent total loss of hearing of one or both ears due to prolonged exposure to noise in employment. "Noise" means sound capable of producing occupational deafness. "Noisy employment" means employment in the performance of which an employee is subjected to noise.

(2) No benefits shall be payable for temporary total or temporary partial disability under this act for loss of hearing due to prolonged exposure to noise.

(3) An employee who because of occupational deafness is transferred by his employer to other noisy employment and thereby sustains actual wage loss shall be compensated at the rate provided in s. 102.43 (2), not exceeding $3,500 in the aggregate from all employers. "Time of injury," "occurence of injury," "date of injury" in such case shall be the date of wage loss.

(4) Subject to the limitations herein contained and s. 102.53 (2) there shall be payable for total occupational deafness of one ear, 36 weeks of compensation, for total occupational deafness of both ears, 216 weeks of compensation; and for partial occupational deafness, compensation shall bear such relation to that named herein as disabilities bear to the maximum disabilities herein provided. The reduction of the periods for which indemnity is paid made because of age under s. 102.53 (2) shall apply in cases for occupational deafness under par. (a); such reduction shall not apply in claims for occupational deafness under pars. (b), (c) and (d), and in lieu thereof a reduction shall be made at the rate of one-half percent for each year that the age of the employee exceeds 52. In cases covered by this subsection "time of injury", "occurrence of injury", or "date of injury" shall, at the option of the employee, be the date of occurrence of any of the following events to an employee:

(a) Transfer to nonnoisy employment by an employer whose employment has caused occupational deafness;

(b) Retirement;

(c) Termination of the employer-employee relationship or

(d) Layoff, provided the layoff is complete and continuous for one year.

(5) No claim under sub (4) may be filed until 2 consecutive months of removal from noisy employment after the time of injury except that under sub . (4) (d) such 2 consecutive months' period may commence within the last 2 months of layoff.[67]

(6) The limitation provisions in this chapter shall control claims arising under this section. Such provisions shall run from the first date upon which claim may be filed, or from the date of subsequent death, provided that no claim shall accrue to any dependent unless an award has been issued or hearing tests have been conducted by a competent medical specialist after the employee has been removed from the noisy environment for a period of 2 months.

(7) No payment shall be made to an employe under this section unless he shall have worked in noisy employment for a total period of at least 90 days for the employer from whom he claims compensation.

(8) An employer is liable for the entire occupational deafness to which his or her employment has contributed; but if previous deafness is established by a hearing test or other competent evidence, whether or not the employee was exposed to noise within the 2 months preceding such test, the employer is not liable for previous loss so established nor is he liable for any loss for which compensation has previously been paid or awarded.

(9) Any amount paid to an employee under this section by any employer shall be credited against compensation payable by any employer to such employee for occupational deafness under subs. (3) and (4). No employee shall in the aggregate receive greater compensation from any or all employers for occupational deafness than that provided in this section for total occupational deafness.

Ind 80.25 Loss of hearing; determined. The report of the medical committee which has revised and updated the report of 1954 is adopted. Such report is as follows:

(1) HARMFUL NOISE. Hearing loss resulting from hazardous noise exposure depends upon several factors, namely, the overall intensity (sound pressure level), the daily exposure, the frequency characteristic of the noise spectrum and the total lifetime exposure. Noise exposure level of 90 decibels or more as measured on the A scale of a sound level meter for 8 hours a day is considered to be harmful.

(2) MEASUREMENT OF NOISE. Noise shall be measured with a sound level meter which meets ANSI standard S1.4-1971 and shall be measured on the "A" weighted network for "slow response." Noise levels reaching maxima at intervals of one second or less shall be classified as being continuous. The measurement of noise is primarily the function of acoustical engineers and properly trained personnel. Noise should be scientifically measured by properly trained individuals using approved calibrated instruments which at the present time include sound level meters, octave band analyzers and oscilloscopes, the latter particularly for impact-type noises. See Wisconsin Administrative Code sections Ind. 11.03-11.06, inclusive. Register, July 1971, No. 187.

[67]See Rule Ind 80.25 infra for determining loss or impairment of hearing. See sec. 102.52 (17) and (18) for deafness due to trauma or accident.

(3) MEASURE OF HEARING ACUITY. The use of pure tone air conduction audiometry performed under proper testing conditions is recommended for establishing the hearing acuity of workers. The audiometer should be one which meets the specifications of ANSI standard 53.6-1969 (4). The audiometer should be periodically calibrated. Preemployment records should include a satisfactory personal and occupational history as they may pertain to hearing status. Otological examination should be made where indicated. See Wisconsin Administrative Code section Ind. 11.10. Register, August 1972, No. 200; Ind. 11.11. Register, July 1971, No. 187; and Ind 11.12. Register, August 1972, No. 200.

(4) FORMULA FOR MEASURING HEARING IMPAIRMENT. For the purpose of determining the hearing impairment, pure tone air conduction audiometry is used, measuring all frequencies between 500 and 6,000 Hz. This formula uses the average of the three speech frequencies of 1,000, 2,000, and 3,000 Hz. Audiometric measurement for these three frequencies averaging 35 decibels or less on the ANSI calibration does not constitute any practical hearing impairment. A table for evaluating hearing impairment based upon the average readings of these three frequencies follows below. No deduction is made for presbycusis.

(5) DIAGNOSIS AND EVALUATION. The diagnosis of occupational hearings loss is based upon the occupational and medical history, the results of the otological and audiometric examinations and their evaluation.

(6) TREATMENT. There is no known medical or surgical treatment for improving or restoring hearing loss due to hazardous noise exposure.

(7) ALLOWANCE FOR TINNITUS. In addition to the above impairment, if tinnitus has permanently resulted due to work exposure, an allowance of 5% loss of hearing impairment for the affected ear or ears shall be computed.

(8) HEARING IMPAIRMENT TABLE

Average Decibel Loss ANSI	Percent of Compensable Hearing Impairment	Average Decibel Loss ANSI	Percent of Compensable Hearing Impairment
35	0	66	54.25
36	1.75	67	56.00
37	3.50	68	57.75
38	5.25	69	59.50
39	7.00	70	61.25
40	8.75	71	63.00
41	10.50	72	64.75
42	12.25	73	66.50
43	14.00	74	68.25
44	15.75	75	70.00
45	17.50	76	71.75
46	19.25	77	73.50
47	21.00	78	75.25
48	22.75	79	77.00
49	24.50	80	78.75
50	26.25	81	80.50
51	28.00	82	82.25
52	29.75	83	84.00
53	31.50	84	85.75
54	33.25	85	87.50
55	35.00	86	89.25
56	36.75	87	91.00
57	38.50	88	92.75
58	40.25	89	94.50
59	42.00	90	96.25
60	43.75	91	98.00
61	45.50	92	99.75
62	47.25		
63	49.00		
64	50.75		
65	52.50		

(9) METHOD FOR DETERMINING PERCENT OF HEARING IMPAIRMENT. (a) Obtain for each ear the average hearing level in decibels at the three frequencies, 1,000, 2,000 and 3,000 Hz. (b) See Table for converting to percentage of hearing impairment in each ear. (c) To determine the percentage of impairment for both ears, multiply the lesser loss by 4, add the greater loss and divide by 5.

Example: Hearing levels in dbs (ANSI reference level):

Frequencies	250	500	1000	2000	3000	4000	6000
Right ear	20	25	40	50	60	65	70
Left ear	30	40	45	55	65	65	70

Right ear—	1000 - 40		Left ear—	1000 - 45
	2000 - 50			2000 - 55
	3000 - 60			3000 - 65
Total	Total - 150		Total	Total - 165
150 ÷ 3 =	50 db		165 ÷ 3 =	55 db

50 db = 26.25% impairment, right ear
55 db = 35% impairment, left ear

To determine bilateral percentage of impairment:

Multiply the less loss 26.25% by 4 = 105%
Add greater loss 35% impairment, left ear
140%
Divide 140 by 5 = 28% bilateral impairment

History: 1-2-56; am. Register, January, 1960, No. 49, eff. 2-1-60; am. Register, October, 1965, No. 118, eff. 11-1-65; r. and recr. Register, September, 1972, No. 201, eff. 10-1-72; am. (1) to (4), r. (5), renum. (6) and (7) to be (5) and (6), cr. (7) and am. (8), Register, September, 1975, No. 237, eff. 10-1-75.

I-B. SELECTED EXAMPLES OF STATE AND FEDERAL STATUTORY PROVISIONS ON HEARING LOSS

The State and federal statutes covering hearing loss vary tremendously. Some of the States which compensate the most claims have the simplest statutes:

FEC - The Federal Employees Compensation Act (Sec. 8107) defines disability to include loss of function (impairment). If there is permanent disability involving the loss of use of a member or function of the body or involving disfigurement, the employee is entitled to basic compensation for the disability."...

The Act then provides benefits for total loss of hearing in one or both ears and allows "proportionate" benefits for permanent partial loss of the member.

New Jersey - The law has a general permanent disability schedule with benefits for loss of hearing but no further reference to hearing loss.

New York - Law very similar to the old Wisconsin law with the six-month rule.

Missouri - The Missouri law is similar to the older Wisconsin Law, except for an aging deduction as follows:

"The amount of the hearing loss shall be reduced by the average amount of hearing loss from non-occupational causes found in the population at any given age, according to the provisions hereinafter set forth. ...

...In order to allow for the average amount of hearing loss due to non-occupational causes found in the population at any given age (including presbycusis) there shall be deducted from the average hearing level one-half (1/2) decibel for each year of the employee's age over 40 at the time of his last exposure to industrial noise. The result shall be termed the corrected average hearing level."

North Carolina and Maine - The unique features of these laws provide that wearing of hearing protection constitutes removal from exposure for purposes of the six-month waiting period:

NC 97-53 (28) (1): "No claim for compensation for occupational hearing loss shall be filed until after six months have elapsed since exposure to harmful noise with the last employer. The last day of such exposure shall be the date of disability. The regular use of employer-provided protective devices capable of preventing loss of hearing from the particular harmful noise where the employee works shall constitute removal from exposure to such harmful noise." (Maine has a similar provision with a one-month waiting period.)

Pennsylvania-This State does not compensate partial hearing loss. Its occupational disease statute states clearly:

"For the purpose of this clause (on permanent partial compensation), partial hearing loss shall not be considered an occupational disease."

New Mexico - another non-compensable State. This State's permanent disability schedule includes "Total deafness" in one or both ears. However this only covers "accidental injuries." Under the State's occupational disease act, benefits are only paid for "disablement," which means "total physical incapacity by reason of an occupational disease."

APPENDIX 2
HEARING LOSS CLAIM DOCUMENTS

2-A. Claimant's Application for Hearing — Wisconsin

APPLICATION FOR HEARING
FORM WC-7 3/77
WORKER'S COMPENSATION ACT
SEND ORIGINAL AND TWO COPIES TO

STATE OF WISCONSIN
DEPT. OF INDUSTRY, LABOR
AND HUMAN RELATIONS
WORKER'S COMPENSATION DIVISION
P.O. BOX 7901
MADISON, WISCONSIN 53707

BE SURE TO NOTIFY THE DEPARTMENT OF ANY CHANGE IN ADDRESS. NOTIFY AT ONCE IF NOT FULLY PREPARED FOR HEARING.

APPLICANT'S NAME AND ADDRESS	APPLICANT'S ATTORNEY (IF ANY) NAME AND ADDRESS
Paula Bronowitz 1012 Mohave Street Paradise, Wisconsin	Applicant represented by Boot & Shoe Workers
EMPLOYER'S NAME AND ADDRESS	**INSURANCE CARRIER**
Weyenberg Moccasins Paradise, Wisconsin	Employers Mutual
EMPLOYER'S NAME AND ADDRESS (IF MORE THAN ONE)	**INSURANCE CARRIER**

EMPLOYEE'S BIRTHDATE	AGE WHEN INJURED	MARITAL STATUS	NUMBER OF CHILDREN	SOCIAL SECURITY NO.
2-12-21	57 now	☒ MARRIED ☐ SINGLE	2	533-41-2436

TIME OF INJURY	DATE OF INJURY	EMPLOYE WAS EARNING WHEN INJURED
	Last day worked 4-16-78 (plant closed)	..... PER DAY $176 PER WEEK ..... PER MONTH

DESCRIBE HOW INJURY OCCURED (WHAT HAPPENED)

Worked as shoe cutter on Intl. Shoe Machine equipment for 25 years. Over past 10 years have had progressive difficulty hearing in groups, listening to TV and severe problems in telephone communication.

NATURE OF DISABILITY (DESCRIBE PART OF BODY INJURED AND KIND OF DISABILITY, AS STRAIN, FRACTURE, *BACK, HEAD, BODY, ARM, LEG.*

Loss of hearing in both ears.

DISABILITY FOR WHICH COMPENSATION IS CLAIMED – STATE HOW LONG DISABLED (GIVE DATES). STATE WHAT PERMANENT DISABILITY EXISTS. IF INJURY RESULTED IN DEATH, GIVE DATE.

Permanent disability benefits and payment for hearing aid.

DATE ON WHICH NOTICE OF INJURY WAS GIVEN TO EMPLOYER	MANNER IN WHICH NOTICE TO EMPLOYER GIVEN
Various times over past few years	Supervisor was informed that I was having hearing problems.

DOCTORS WHO TREATED INJURED (NAME AND ADDRESS)

Dr. E. Wolf, Milwaukee, Wisconsin

WAS MEDICAL TREATMENT SUPPLIED BY EMPLOYER
☐ YES ☒ NO ☐ PARTIALLY
IF NO, WHAT EXPENSE WAS INCURRED FOR DOCTOR $..... FOR HOSPITAL AND MEDICINE $.....

HAVE YOU PAID SUCH EXPENSE	HAS EMPLOYE RETURNED TO WORK?	IS COMPENSATION BEING PAID?
☐ YES ☐ NO ☐ PARTIALLY		No

WHAT QUESTION HAS ARISEN AS TO LIABILITY

Insurer and employer refuse to recognize claim.

WHERE SHOULD HEARING BE SCHEDULED

I WILL BE READY FOR FULL HEARING AT ANY TIME AFTER: (GIVE DATE) IF NOT FULLY PREPARED FOR HEARING, PLEASE SO STATE

DATE	SIGNATURE OF APPLICANT
	Paula Bronowitz

ANSWER THIS SET OF QUESTIONS IF CLAIM IS MADE FOR DEATH BENEFIT

NAME OF DECEASED	RELATION OF DECEASED TO APPLICANT
WAS APPLICANT DEPENDENT ON DECEASED	APPLICANT LIVED WITH DECEASED AT TIME OF ACCIDENT ☐ YES ☐ NO

2-B. Claimant's Medical Report - WC-16B - Allowed in Lieu of Oral Testimony -Wisconsin

WC-16-B
7/76

State of Wisconsin
Department of Industry,
Labor and Human Relations
Worker's Compensation Division
P.O. Box 7901
Madison, Wisconsin 53707

PRACTITIONER'S REPORT ON ACCIDENT OR INDUSTRIAL DISEASE IN LIEU OF TESTIMONY

FILED ON BEHALF OF ☐ EMPLOYE ☐ EMPLOYER OR INSURANCE CARRIER

1. Name of Employe: PAULA BRONOWITZ

2. Name of Employer: WEYENBERG MOCCASINS

3. Date of accident or first illness:

4. State in patient's own words the accident or work exposure to which he attributes the condition for which he saw you.

The patient states that she was exposed to various noisy shoe machinery as a shoe cutter for 25 years and has noticed increasing hearing impairment. She states that the company advised its employees in this area to wear ear protectors 2 or 3 years ago. The patient has worn the protectors since that time.

5. Give complete account of the nature and extent of disability, including subjective complaints, objective findings and your diagnosis.

The general ear, nose and throat examination was essentially within normal limits. Audiometric studies revealed a severe bilateral sensorineural hearing loss with poor speech discrimination. A copy of the audiogram is enclosed.

6. Did you treat patient? If so, between what dates?
☐ YES ☒ NO

7. Date of last examination: 6-24-78

Date disability from work began:

8. Date injured was or will be able to return to full time work subject only to his permanent limitations.

The patient is not working at present.

9. Date injured was or will be able to return to a limited type of work

What limitations? Uncertain. The hearing loss is not totally correctable with a hearing aid though it could be improved.

10. In your opinion, did the accident or work exposure described in Item 4 directly cause the disability?
☐ YES ☐ NO

11. If not directly, did the accident or work exposure in Item 4 cause the disability by aggravation or acceleration of a pre-existing condition?
☐ YES ☐ NO

12. Has accident or industrial disease resulted in any permanent disability?

☐ YES ☐ NO ☐ By aggravation of the following preexisting condition

13. Estimate percentage of disability to the member, eye, or ear involved, or compare to permanent total disability if injury is to torso or head, caused by the accident or work exposure described in Item 4?

The audiogram shows the following loss:

	500	1000	2000	3000	4000
RE	15	25	45	60	75
LE	25	30	50	65	75

14. What elements constitute disability (such as limitation of motion, deformity, weakness, pain, lack of endurance, etc.)? If limitation of motion, describe nature and percentage of limitation of each part of each member affected (Make estimates on voluntary, not passive motion) If amputation, state exact point bone was amputated and whether stump is tender or hardy.

Based on the Wisconsin Hearing Loss Rule 80.25, the percentage of disability is 44.3%. This correlates well with speech discrimination scores of 50% and speech reception thresholds of 50 db in both ears.

15. Do you expect that the above permanent disability will increase or that the condition will in any way improve? Please explain.

The loss is permanent and will increase with aging.

16. Do you expect that any further treatment will be necessary to cure or relieve from the effects of this injury?

☐ YES ☒ NO If YES, explain However, the patient should be considered for a beneficial medical appliance.

17. Previous to this injury, did employe have any permanent disability?

☐ YES ☒ NO If YES, explain

18. I am a practitioner licensed in and practicing in Wisconsin

Year of graduation 1943

College University of Wisconsin Medical School

Practitioner's typed or printed name

Gene Harriman, M.D.

Practitioner's address

101 Wisconsin, Milwaukee, Wisconsin

CERTIFICATION

I hereby certify, subject to the penalty of fine and/or imprisonment, as provided in Sec. 943.39 of the Wisconsin Statutes, that the above report truly and correctly sets forth the history, my findings, diagnosis and opinion.

Gene Harriman, M.D.
(Signature of Practitioner)

Date

Section 102.17 (1) (aa) provides that the contents of verified or certified medical and surgical reports presented by claimants for compensation shall constitute prima facie evidence as to the matter contained therein. Reports must be filed with the commission in duplicate fifteen days prior to the date of hearing to be acceptable as evidence. If not so filed, it will be necessary to produce the doctor to give oral testimony at the time of hearing.

2-C. Example of Full Medical and Audiological Evaluation - Wisconsin (Dr. Meyer Fox)

MEDICAL REPORT — DRS. FOX AND FRIEDMAN, S.C. 2040 W. WISCONSIN AVE., MILWAUKEE, WIS. 53233

-1-

Re: Mr. Harold Minmann Date: 3-29-76

HISTORY, PROGRESS, AND COMPLAINTS:

Mr. Harold Minmann was seen in consultation at my office on March 26, 1976, at which time he was given an otological examination and a series of audiometric hearing studies. The purpose of these studies was to determine whether or not Mr. Minmann had a hearing impairment and its relationship to his employment at the Johnson Controls Company

When questioned regarding his hearing difficulty, Mr. Minmann informed me that he has been having hearing trouble for a long time, but that i has become progressively worse during the past five years. He is not particularly troubled with ear noises (Tinnitus). Mr. Minmann stated, "I have difficulty in understanding. I can hear people talk, but I have trouble making out what they are saying. I can not enjoy Televis because I don't understand it, and I must turn up the volume loud. I also have trouble with using the telephone."

Mr. Minmann states that he did not see any physician regarding his ear or his hearing, until January of 1976 when he was seen by Dr. Charles Finn. Mr. Minmann did not have any hearing tests made while employed at the Johnson Controls Company. Mr. Minmann states that he did wear earplugs the last year or two when they became available at the plant.

His general health is stated to be good. Mr. Minmann was in Military Service between 1942 through 1945, but was not in combat. He does not do any hunting.

PAST OCCUPATIONAL HISTORY

Retired on October 17, 1975. He began employment at Johnson Controls on December of 1945. He worked mostly on automatic screw machines in an area, which he claims was very noisy. Prior to that he was in the Army and previously worked at a Box Factory for two years. There is n history of any injury to the head or ears.

MILITARY HISTORY Stated Above. EXPOSURE TO GUNFIRE Stated Above.

MEDICAL AND SURGICAL HISTORY:

Usual childhood ailments.

Surgery for Hemorrhoidectomy.
Hospitalization for Hemorrhoidectomy.

HEARING IMPAIRMENT IN FAMILY: None

PREVIOUS HEARING TESTS: Charles Finn, M.D.

MEDICAL REPORT — DRS. FOX / FRIEDMAN, S.C. 2040 W. WISCONSIN AVE., MILWAUKEE, WIS.

Re: Mr. Harold Minmann Date: 3-29-7

EAR, NOSE AND THROAT EXAMINATION

Clinical Observations: Mr. Minmann is a 62-year-old male. STATED HEIGHT & WEIGHT: and 180 lbs. Could hhar conversational voice at a distance of four feet HEAD: No deformities or abnormalities.

EARS: Both ear canals were clear.
The left ear drum is somewhat thickened and retracted.
The right ear drum is somewhat dull, but intact.

EYES: Pupils round and equal, react to light and accommodatic FACIAL movements normal.

NOSE: Anterior Rhinoscopy: Septal subluxation. Mucous membrane is dry.

Posterior Rhinoscopy: no discharge.

MOUTH: Wears upper plate. Few lower teeth in questionable cor ion.

HEARING STUDIES: ISO 1964

PURE TONE AIR CONDUCTION AUDIOMETRIC TESTS: Threshold level in decibels for each ear.

Date:	Frequency	250	500	1000	1500	2000	3000	4000	6000	8000 cps
	Right Ear	--	40	50	--	60	70	85	85	80
	Left Ear	--	40	45	--	65	70	80	80	85
	Right Ear									
	Left Ear									

SELF RECORDING PURE TONE AUDIOMETRY: Copy enclosed.

TUNING FORK TESTS:

Right Ear		Left Ear
Not Heard	Weber	Not Heard
Positive	Rinne	Positive
Greatly Decreased	Schwabach	Greatly Decreased

CALIBRATED SPEECH TESTS:

Speech reception threshold

Right Ear ..... 45 ..... Decibels

Left Ear ..... 45 ..... Decibels

Discrimination Scores

Right Ear ..... 40 ..... %

Left Ear ..... 65 ..... %
75

ADDITIONAL TESTS:

MEDICAL REPORT — DRS. FOX AND FRIEDMAN, S.C. 2040 W. WISCONSIN AVE., MILWAUKEE, WIS. 53233

Re: Mr. Harold Minmann Date: 3-29-76

SUMMARY:

This case concerns a 62-year-old retired employee of the Johnson Control Company, who complains of difficulty in hearing, which he attributes to the nature of work he performed at the Johnson Controls Company over a period of some 30 years. Mr. Minmann claims that he had good hearing ability when he began working at the Johnson Controls Company. There is no history of any injury to the ears or previous ear disease.

Mr. Minmann claims that his greatest difficulty is in making out what people are saying, particularly when several people are in the room. He does not complain of any ear noises (Tinnitus).

The results of the otological examination revealed that both ear drums were dull and thickened, with slight retraction of the left ear drum. The remainder of the nose and throat examination was not particularly significant.

The principal findings in this case were the results of the hearing stu which included pure tone air conduction audiometry, tuning fork tests, and speech audiometry. The results of these tests indicated that Mr. Minmann has a bilateral sensori-neural hearing impairment, involving the speech zone range as well as the higher frequencies. In addition it is noted that there is poor discrimination ability which explains why Mr. Minmann has difficulty in making out what is being said.

The above pure tone air conduction audiometric studies when calculated for percentage of hearing impairment using the formula which has been adopted by the Wisconsin Workmen's Compensation Division amounts to a hearing impairment on each ear of 43.75 percent.

Based upon the history as given to me by Mr. Minmann, the results of th otological examination, and the various audiometric hearing studies, it is my opinion that the hearing impairment in this case is primarily the result of occupational noise exposure.

Should you have any questions relative to this examination, findings, o opinion, please feel free to contact me.

Sincerely,

Meyer S. Fox, M.D.

MSF:cs

2-D. Report of Noise Survey on Hearing Loss Claim Taken By State Insurance Fund -Oregon

SAIF
State Accident Insurance Fund
Salt Building
Salem, Oregon 97310

REPORT OF INVESTIGATION

HEARING: _____ WCB Case No. _____

Claimant Emil Jay Thoms Claim No. [illegible]

Address 80105 Delight Valley School Road, Cottage Grove, Ore.

Employer Bohemia, Inc. 2280 Oakmont Way Eugene, Ore. 97424 97401

Requested by Inger Aarnas

Investigator Dave Bonnek Date Oct., 25, 1977

HISTORY: The claimant, Emil Jay Thoms, allegedly sustained hearing loss while at work at the Saginaw plant of Bohemia. The claimant has been employed as a planer grader for the past 17 years, 15 years of which were spent at the Saginaw plant of Bohemia. Claimant advised that the only doctor that has treated him for hearing loss is Christopher L. Hiatt, M.D., and the only treatment he received was September 6, 1977 which was an audiogram.

Claimant; Emil Jay Thoms: 80105 Delight Valley School Road, Cottage Grove, Oregon 97424. Phone, 942-8625. On October 12, 1977 a visit was made to claimant's home. Claimant advised that he has been a planer grader for the past 17 years. For the past 22 years he has worked in mills. The claimant has worked seven years for Guistina Bros. in Eugene, the last two years of which he worked as a planer grader. Claimant started to work for Bohemia in 1962 at the Saginaw mill and has worked as a planer grader for the past 15 years. Claimant contributes a great deal of his hearing problem to the hog which ran all day from about 1967 to 1972 without the aide of a muffler. The muffler was added around 1972, which went through the roof piping the noise outside.

Claimant advises he works by a Stetson Ross high speed planer which runs at 800 to 850 feet per minute. Claimant advised the planer has been enclosed in a building 30 feet square with an eight to ten foot high ceiling for the past few years, but previously had been in the open. Claimant advised he has worn ear muffs sound silencers for about the past eight years. Claimant indicated he helped initiate the use of these because of his own hearing problem. Claimant indicated he noticed problems with his hearing approximately ten years ago when he would have to ask his wife to repeat what she had said and also noted ringing in his ears. Claimant indicated he has trouble listening to movies and television as the sounds are garbled. Claimant's wife has forced him to get a hearing aid because of this and also because their daughter has a speech impediment and failure of claimant to hear his daughter may cause her to talk less.

Claimant advised he has had yearly audio exams at the plant for the past six to eight years. (Audiograms attached) The first time he has seen a medical doctor about his hearing problem was in September, when he saw Doctor Hiatt. Claimant indicated both his ears are affected about the same.

RECEIVED

Claimant denies a family history of hearing problems or head trauma. Claimant advised he has had a normal childhood diseases including measles, chicken pox and mumps. Claimant indicated he may have had

68 - 11/75

scarlet fever, but is not sure of this.

Claimant denies use of motorcycles, racing cars, musical instruments, gun club participation or the use of chainsaws in cutting wood.

Claimant's hobbies consist of woodworking. He has built his bedroom set and makes other household furniture. Claimant indicated he has not done much of this in the last year however. The tools he uses include; 1. tablesaw, which he would run only one hour at a time, 2. belt sander, which would be run one half hour at a time or less, 3. electric drill, which may run one half hour at a time, 4. jointer, which may run one half hour at a time. Claimant advised he would use these tools mainly on weekends, but sometimes after coming home from the mill. Claimant probably has used his tools approximately 100 hours in the last year.

Claimant advised that he spent two years in the US Army spending one year of his time in the honor guard. Claimant denies exposure to excessive noise in the military. Claimant indicated his service was toward the end of the Korean war.

Claimant advised he told Orin Hollet, his supervisor, about this hearing problem and that he filed this claim so he may be provided with a hearing aid.

A recorded statement and medical release authorization were obtained from the claimant.

Employer; Bohemia, Inc. 220 Oakmont Way Eugene 97401 Phone; 342-6262

On October 6, 1977 a sound level survey was conducted by Leon Davis, safety consultant, for SAIF. The sound level for graders scaled out at 94 decibels on the A scale and 98 decibels on the C scale. (Attached is the sound level survey, dated October 6, 1977.) Also obtained on this date was the industrial hearing conservation log for claimant which shows test dates of June 20, 1972, February 9, 1973, March 7, 1974, March 7, 1975, September 3, 1975 and October 9 1976. (See copy attached)

Ferd Wilkins, safety director for Bohemia, was contacted regarding this claim. Wilkins indicated that claimant had other exposure to noise besides working at the mill and requested that a sound level survey be taken regarding claimant's hobbies at home. Wilkins was advised that this survey would be conducted and that the Eugene Hearing & Speech Center would be asked to evaluate and give their opinion as to how much hearing loss resulted from claimant's exposure to noise from his woodworking hobbies at home. (See attached sound level survey dated October 19, 1977).

Medical; Christopher L. Hiatt,MD

Address: 188 West B Street, Springfield, Oregon 97477, phone; 746-9511. On September 13, 1977, contact was made with Doctor Hiatt's office and medical records were obtained regarding claimant's September 2, 1977 visit regarding a hearing loss problem. Doctor Hiatt's impression was of a sensorial neural hearing loss. (Audiogram and chart notes are attached)

THOMS, Emil Jay
Claim No. WODD 2722

Page -- 3

Attachments;
Medical
Release Form
Medical Records
from Christopher
Hiatt, M.D.
Sound Level Surveys;
August9, 1971,
March 20, 1973,
May 16, 1974,
August 26, 1975,
October 6, 1977,
October 19, 1977.
Industrial Hearing
Conservation Log
for period June 20,
1972 through October 9,
1976.

DB:lr
10-28-77

JAN 19
RECEIVED
WCB

DATE March 20, 1973 PLANT Rickini

SOUND LEVEL READINGS TAKEN BY Leon L. Davis LOCATION Planer

WHEN INSTRUMENT LAST CALIBRATED 8:30 a.m. - 3-20-73 INSTRUMENT USED B & K 2205

TIME OF TEST	TEST LOCATION	ESTIMATED EXPOSURE TIME (hrs)	NOISE LEVEL (slow response DB-A)	O.S.H.A. NOISE LEVEL LIMIT (HRS.)	NOISE SOURCES	FORMULA OR COMMENTS
2:05PM	Breakdown	8 hrs.	98 to 100	2 hrs.	Planer Trim saws Lumber movement	
2:09	Planer Feeder	8 hrs.	106 to 108	½ hr.		
2:15	Hula Trimmer	8 hrs.	98 to 104	1 hr.	Planer Trim saws Lumber dropping	
2:19	Grader's Area	8 hrs.	94 to 100	2 hrs.	Lumber dropping	
2:24	Stamper	8 hrs.	92 to 94	4 hrs.		
2:27	10 ft. Down chain from stamper	8 hrs.	92 to 94	4 hrs.		
2:30	20 ft. Down chain	8 hrs.	91 to 93	4 hrs.		
2:32	30 ft. Down chain	8 hrs.	90 to 92	6 hrs.		

JAN 1974 RECEIVED

STATE ACCIDENT INSURANCE FUND
Safety Services Section

SOUND LEVEL SURVEY

FIRM NAME Bohemia Inc. 10-19-77

ADDRESS 2280 Oakmont Way B & K 2205

REQUESTED BY Dave Boneck 10-19-77

Continuous & Intermittent noise readings in decibels at A scale.
Impact or impulsive noise readings in decibels at C scale.

Location & Remarks			
The following are sound level surveys of Claimant's			
own equipment used in his shop at home, 80105			
Delight Valley School Road, Cottage Grove, Or 97424			
Belt Sander		½ hour	99
Table Saw (cutting)	intermittent	1 hour	94
" " (not cutting)			82
Jointer		½ hour	88
Drill (electric)		½ hour	91
Sabre Saw		infrequent	94
Router		infrequent	90

Note: During the past year Mr. Thoms advised he has probably used his home power equipment aproximately 100 hours. The times of useage varied. At times use of the equipment would be on the weekends and at other times equipment useage would be after returning from the mill.

SIGNATURE

2473
SS-20.

APPENDIX 3
TERMINOLOGY GLOSSARY

ANSI-1969-Measured hearing levels are referenced to the 1969 Standard published by the American National Standards Institute (S3.6) specifying audiometric threshold values for normal hearing young adults.

A-weighted sound level - sound pressure level in decibels as measured on a sound level meter using an A-weighted network. This network attempts to reflect the human ear's decreased sensitivity to low frequency sounds.

audiometer - instrument used to measure hearing sensitivity using pure tones.

dB - abbreviation for decibel.

dBA - abbreviation for decibels measured on the A scale of a sound level meter; used in OSHA noise regulation and most environmental noise regulations. (See A-weighted Sound Level)

decibel - a unit for measuring the level of a sound. The decibel is based on a ratio expressing how much greater a sound pressure is above a specified reference level. pressure

frequency - The rate at which a sound source vibrates or makes the air vibrate determines frequency. The unit of time is usually one second and the term Hertz (Hz) is used to designate the number of cycles per second. Frequency is related to the subjective sensation of pitch. High frequency sounds (2000, 3000 and 4000 Hz) are high pitched. In terms of speech, consonants are usually high frequency in nature and vowels are low frequency.

hearing level - amount in decibels by which the threshold of audition for an ear differs from zero decibels (dB) for each frequency—a standard audiometric threshold derived from normal-hearing young adults.

Hertz - unit of frequency.

HL - hearing level.

Hz - abbreviation of Hertz.

impulse noise - sound of short duration, usually less than one second, with an abrupt onset and rapid decay.

noise dose - an auditory exposure of a listener over a defined period of time.

noise exposure - instantaneous auditory exposure of a listener measured at the ear.

Noise-induced permanent threshold shift - a permanent reduction in hearing level caused by noise.

NIPTS - abbreviation of noise-induced permanent threshold shift.

presbycusis - deterioration in hearing caused by the process of aging.

pure-tone audiogram - a set of measures that compares the hearing sensitivity of an individual in detecting faint pure tones in a quiet test room, to the corresponding ability in a normal hearing young adult population. Usually shown as a graph or table depicting hearing thresholds in decibels at the frequencies of 500, 1,000, 2,000, 3,000, 4,000 and 6,000 Hz.

recovery - the principle by which removal from noise allows the inner ear hair cells to regain their pre-noise exposed condition.

temporary threshold shift - temporary reduction of the hearing level, usually caused by exposure to high level noise. The hearing level usually returns to pre-exposure hearing following a period away from noise. Frequently used to predict potential for permanent threshold shift.

TTS - abbreviation of temporary threshold shift.

Worker's Compensation Terms

AA00 - American Academy of Ophthalmology and Otolaryngology - the association of hearing specialists who developed the hearing formula used by the AMA Guides. The 1959 AA00 formula averages hearing levels at 500, 1,000 and 2,000 Hz using a low fence at 25 dB (re: ANSI-1969) as the beginning point of impairment, a high fence at 92 dB as the point of total loss, and each decibel reduction between 25 and 92 dB represents a 1.5% impairment rate of growth (totalling 100%). The 1979 revision adds 3000 Hz to the formula.

AMA - American Medical Association - has produced guides to hearing impairment.

Berney formula - I.V. Berney, a New Jersey otologist, has developed a formula used frequently in New Jersey worker's compensation claims. It averages hearing levels at the frequencies of 500, 1,000, 2,000 and 4,000 Hz using a beginning point of impairment at 26 dB (re: ANSI-1969).

CHABA - Committee on Hearing, Bioacoustics, and Biomechanics of the National Academy of Sciences, studying various hearing loss issues. CHABA was asked by the Navy to recommend a compensation formula which would include the 3,000 frequency but would result in

same compensation costs as the 1959 AA00 formula. The CHABA working group recommended a formula with a beginning impairment at 35 dB (re: ANSI-1969) averaged over the 1,000, 2,000 and 3,000 Hz frequencies. This recommendation was the basis for a 1975 revision in the Wisconsin Compensation Rule.

California formula - This formula was agreed on by industry and labor and incorporated into the California Compensation Code in 1961. It averages the 500, 1,000, 2,000 and 3,000 frequencies with 25 dB (re: ANSI-1969) as the beginning point of impairment. This formula has recently been adopted by the AMA.

compensation criterion - provisions in the worker's compensation law-waiting period for filing, hearing impairment formula, deduction for presbycusis—which affect the amount of compensation received.

compensation formula - the method of calculating a percentage of hearing impairment. It includes a low fence, high fence, averaging method of levels at specific frequencies, percentage per decibel impairment rate of growth, and better ear correction. There are several different methods for calculating the percentage impairment in use at the present time (See Table 4).

high fence - point of 100% hearing impairment using a specific compensation formula.

low fence - minimum compensable hearing impairment using a specific compensation formula.

NIOSH - National Institute for Occupational Safety and Health - the federal research arm in safety and health. NIOSH, in its criteria document published in 1972 recommended a formula averaging 1,000, 2,000 and 3,000 Hz with 25 dB (re: ANSI-1969) as the point of beginning impairment.

1947 AMA - the AMA in 1947 published a formula for hearing impairment which was widely used until replaced by the 1959 AAOO formula. The AMA 1947 formula weighted frequencies from 500 to 4,000 Hz.

Freq. Hz	% Weight
500	15
1,000	30
2,000	40
4,000	15
	100%

BIBLIOGRAPHY

Articles, Books, and Reports

AAOO - 1959 American Academy of Ophthalmology and Otolaryngology. . Committee on Conservation of Hearing: Guide for the Evaluation of hearing impairment. *Trans. Am. Acad. Opthalmol. Otolaryngol, 63*: 236-238.

AAOO - 1979 American Academy of Otolaryngology. Committee on Hearing and Equilibrium and the American Council of Otolaryngology Committee on the Medical Aspects of Noise. Guide for the evaluation of hearing handicap, *J. American Medical* Association, 241 (19): 2055-2059

Abbott, A. Personal Interview, July 1978.

Acton, W.I. 1970. Speech intelligibility in a background noise and noise induced hearing loss. Ergonomics, *13* (4): 546-554.

AMA - American Medical Association. 1961. Committee on Rating of Physical Impairment: Ear, nose and throat and related structures. *J. American Medical Association,177*: 99-108.

Aniansson, G. 1973. Binaural discrimination of everyday speech. *Acta Otolaryngol*; *75*: 334-336.

Barth, P., and Hunt, H.A. 1976. *Worker's compensation and work-related diseases.* Prepared for Federal Task Force on State Workers Compensation.

Barton, S.B. 1968. Workmen's compensation. *Texas Business Studies.* Texas: North Texas State.

Baughn, W.L. 1973. *Relation between daily noise exposure and hearing loss based on the evaluation of 6,835 industrial noise exposure cases.* Joint EPA/USAF Study. 6570th Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio: AMRL-TR-73-53.

Bilger, R.C., and Wang, M.D. 1976. Consonant confusions in patients with sensorineural hearing loss. *J. of Speech and Hearing Research, 19*: 718-748.

Block, B. 1978. *Noise Condition Data.* Kentucky Department of Labor Report.

Burns, W. 1973. *Noise and man.* Philadelphia: Lippincott.

Burns, W., Robinson, D.W., Shipton, M.S., and Sinclair, A. 1977. *Hearing hazard from occupational noise: Observations on a population from heavy industry.* England: National Physical Laboratory. NPL Acoustics Report.

Carideo, T. June 12, 1976. Rock music: Can our ears survive it. *The Milwaukee Journal, Insight*: 5-13.

Central Institute for the Deaf. 1956. *Symposium on noise in industry.*

Cooper, J.C. Jr., and Cutts, B.P. 1971. Speech discrimination in noise. *Journal of Speech and Hearing Research*, *14*(2): 332-337.

Cooper, J.C. Jr., and Owen, J.H. 1976. Audiologic profile of noise-induced hearing loss. *Archives of Otolaryngology*, *102*: 148-150.

Corso, J. 1976. Presbycusis as a complicating factor in evaluating noise induced hearing loss. In Henderson, D. (Ed.), *Effects of noise on hearing*, New York: Raven Press.

Davis, H., and Silvermen, S.R. 1970. *Hearing and deafness*. New York: Holt, Rhinehart and Winston.

Davis, H. 1971. A historical introduction. In D.W. Robinson (Ed.), *Occupational hearing loss*. New York: Academic Press.

Dickman, D.M. (1974). The effects of three noise backgrounds on the sentence intelligibility scores of hearing impaired listeners. Doctoral disseration, University of Maryland.

Discher, D., et al. 1975. *National occupational hazard survey: Pilot study for development of an occupational disease surveillance method*, Cincinnati: NIOSH.

EPA - Environmental Protection Agency. 1971. *Effects of noise on people*. Washington, D.C.

EPA - Environmental Protection Agency. 1974. *Information on levels of environmental noise requisite to protect the public health and welfare with an adequate margin of safety.* Washington, D.C.

EPA - Environmental Protection Agency, ONAC. 1978. *Noise: A health problem.* Washington, D.C.

Findlay, R.C. 1976. Auditory dysfunction accompanying noise-induced hearing loss. *Journal of Speech and Hearing Disorders*, *51*: 374-380.

Fowler, E.P. 1947. The percentage of capacity to hear speech and related disabilities. *Laryngoscope*, *57*: 103-113.

Fox, M. 1976. *Workmen's compensation hearing loss statutes in the United States and Canada*. Cleveland: Forging Industry Association.

Fox, M. 1978. Workmen's compensation and medical legal aspects of the occupational noise problem. *Proceedings of the Technical Program NOISEXPO 1978.*

Frazier, J., Chief of Hearing Loss Task Force. 1978. Personal interview.

Ginnold, R. 1974. Workmen's compensation for hearing loss in Wisconsin. *Labor Law Journal*, 25 (1): 682-694.

Glenn, P.K. 1977. *Generation of a data base from a survey of the noise environment at federal facilities*. El Segundo, California: Wyle Research Report for EPA.

GAO - Government Accounting Office Audit Report. 1978. *Department of Labor needs to change hearing impairment criteria to ensure proper payment under the Federal Employees' Compensation Act*. Washington, D.C.

Hammernik, R.P., and Henderson, D. 1976. The potentiation of noise by other ototraumatic agents. In *Effects of Noise on Hearing*. New York: Raven Press.

Henderson, D. (Ed.). 1976. *Effects of noise on hearing*. New York: Raven Press.

Harris, J.D., 1965. Pure tone hearing acuity and the intelligibility of everyday speech. *J. Acoustical Society of America*, 37, 824-830.

Harris, J.D., Haines, H.L., and Myers, C.K. 1956. A new formula for using the audiogram to predict speech hearing loss. *A.M.A. Archives of Otolaryngology.*, *63*: 158-176.

Harris, J.D., Haines, H.L., and Myers, C.K. 1960. The importance of hearing at 3KC for understanding speeded speech. *Laryngoscope*, *70*(2): 131-146.

Henderson, D., Hammernik, and Coling, D. 1979. *The influence of whole body vibration on asymptotic threshold Shift induced by impulse noise*. Paper presented at Acoustical Society of America Meeting, Boston, Mass.

Hershey, R.L. 1978. Workers compensation claims for hearing loss. *Sound and Vibration*, *12*(9): 17-19.

Humes, L.E., Schwartz, D.M., and Bess, F.H. Unpublished paper. Performance of high frequency impaired listeners with conventional and extended high frequency amplification.

Humes, L.E., Schwartz, D.M., and Bess, F.H. Unpublished paper. Two experiments on subtle mid frequency hearing loss and its influence on word discrimination in noise-exposed listeners.

International Association of Industrial Accident Boards and Commissions. 1958. *Noise in industry and its effect on loss of hearing.*

Kell, R.L., et. al. 1971. Social effects of hearing loss due to weaving noise. In D.W. Robinson (Ed.), *Occupational hearing loss*. New York: Academic Press.

Kraak, W., Ertal, H., Fuder, G., and Kacht, L. 1974. Risk of hearing damage caused by steady-state and impulsive noise. *J. of Sound and Vibration*, *36*(3): 347-359.

Kryter, K. 1973. Impairment to hearing from exposure to noise. *J. Acoustical Society of America, 53(5): 1211-1234.*

Kryter, K. 1975. *Hearing impairment and damage risk from noise exposure.* Testimony presented in support of OSHA Noise Standard.

Kryter, K.D., Williams, C., and Green, D.M. 1962. Auditory acuity and the perception of speech. *J. Acoustical Society of America*, *34*: 1217-1262.

Johnson, D. Unpublished paper, January, 1979. Investigation of the use of an age correction for purposes of compensation of a noise-induced hearing loss.

Lindeman, H.E. 1971. Relation between audiological findings and complaints by persons suffering noise-induced hearing loss. *J. American Industrial Hygiene Association,32*: 447-452.

Lipscomb, D. 1975. What is the audiogram really telling us. *Maico Audiological Library Series*, *XIII*: 5.

McCurdy, H.W. 1979. Uniform standard for evaluating hearing handicap. The American Academy of Otolaryngology.

Miller, J. 1974. Effects of noise on people. *J. Acoustical Society of America*, *56*, 3.

Mills, J. 1973. Temporary and permanent threshold shifts. *J. Speech and Hearing Research*, *16*(3): 426-438.

Mullins, C.J., and Bangs, J.L. 1957. Relationship between speech discrimination and other audiometric data. *Acta Otolaryngology,47*: 49-157.

Murry, T., and Lacroix, P.G. 1972. *Speech discrimination in noise and hearing loss at 3000 Hz*. Nav. Sub. Med. Res. Lab. Report No. 719, Groton, Conn.

National Academy of Sciences. 1979. CHABA Working Group 81, Draft Report. *The effects of long term exposure to noise upon human health.*

National Commission on State Workmen's Compensation Laws. 1973. *Compendium on workmen's compensation*. Washington: Government Printing Office.

Niemeyer, W. 1967. Speech discrimination in noise-induced deafness. *International Audiology*, *6*: 42-47.

NIOSH - National Institute for Occupational Safety and Health. 1972. *Criteria for a recommended standard . . . occupational exposure to noise.* HSM 7311001. Washington, D.C.: HEW.

NIOSH - National Institute for Occupational Safety and Health. 1975. *Survey of hearing conservation programs in industry*. Cincinnati: NIOSH.

New York Journal American. 1951.

New York Worker's Compensation Board. 1953. Report of consultants on occupational loss of hearing.

Norfolk Virginian Pilot. 1978. Yard employee guilty in hearing loss fraud. B4.

Petrysbym, W.A. 1977. Occupational hearing loss. *J. of the Medical Society of New Jersey*, *74*(1): 21-24.

Plomp, R. 1978. Auditory handicap of hearing impairment and the limited benefit of hearing aids. *J. Acoustical Society of America*, *63*(2): 333-549.

Quinn, R. and Staines, G. 1978. *The 1977 Quality of Employment Survey*, Ann Arbor: Survey Research Center, University of Michigan.

Quist-Hanssen, S., and Steen, E. 1960. Observed and calculated hearing loss for speech in noise-induced deafness. *Acta Otolaryngology*., Suppl. 158.

Robinson, D.W., (Eds.). 1971. *Occupational hearing loss*. (British. Acoustical Society Special: Vol 1) New York: Academic Press.

Royster, L.H., Thomas, W.G., et. al. 1978. Potential hearing compensation cost by race and sex. *J. Occupational Medicine*, *20*, (12) 801-806.

Solidarity. 1978. Detroit: United Auto Workers.

Suter, A. 1978. *The ability of mildly hearing-impaired individuals to discriminate speech in noise*. Joint EPA/AMRL Report. Washington: E.P.A.

Union Voice. 1979. Melrose Park, Illinois: Local 6, United Auto Workers.

United States House of Representatives, Committee on Government Operations. 1976b. *Administration of the Federal Employees' Compensation Act, 39th Report*. Washington, D.C.: Government Printing Office.

United States House of Representatives, Committee on Government Operations. 1976b. *Federal workers compensation programs*, 141-153. Washington, D.C.: Government Printing Office.

U.S. Department of Health, Education and Welfare Public Health Service. 1965. *Hearing levels of adult by age and sex, United States - 1960-1962*. Series 11, No. 11, Washington, D.C., National Center for Health Statistics.

Vernon, J. 1978. The other noise damage: tinnitus. *Sound and Vibration, 12* (5): *26.*

Ward, W.D. 1969. Effects of noise on hearing thresholds. *Noise as a public health hazard.* Washington, D.C.: American Speech and Hearing Association.

Westerman, T. 1975. Noise pollution: Practical aspects concerning workers worldwide. *The Eye, Ear, Noise, and Throat Monthly, 54*: 42-52.

Wood, M. 1953. *Occupational deafness--real or imaginary.* Kansas City: International Brotherhood of Boilermakers, Blacksmiths, Forgers, and Ironshipbuilders, 21.

Zenz, C. 1972. Occupational hearing loss compensation. *American foundrymen's* **manual.** American Foundrymen's Society.

Statutes and Administrative Rules

Federal Employees Compensation Act, as amended, 1977.

Longshore and Harbor Workers Compensation Act Bulletin, 13-76 (1976).

Longshore and Harbor Workers Compensation Act, Claims Regulations, 20 CFR, 701-704.

Missouri Statutes, Chapter 287.

Missouri Statutes 102.555 and Rule 80.25: Loss of Hearing.

Workmen's Compensation and Rehabilitation Law, 1963 Model Statute, Council of State Governments, Lexington.

Federal Court Cases and Board Decisions

Beggs, ECAB, Docket 77-310 (1977).

Berman and Naval Air Station, Norfolk, ECAB, Docket 78-248 (1978).

Chapman and FBI, San Antonio, ECAB, Docket 78-227 (1978).

Hinkle vs. H.J. Heinz, 337 Pa *2nd* 907 (1975).

Moore and Philadelphia Navy Yard, ECAB, Docket 78-227 (1978).

Robinson vs. Bethlehem Steel, BRB, 175-241 (1976).

Sabatini and Philadelphia Navy Yard, ECAB, Docket 78-0227 (1978).

Shelton vs. Washington Post Co., BRB, 76-358 (1977).

Shoop vs. U.S. Steel Corporation, Docket 3615, Court of Common Pleas, Allegheny Cty. (1972).

Smalls and Charleston Naval Shipyard, ECAB, Docket 78-293 (1978).

Swift vs. Washington Post Co., OWCP 40-70992 (1978).

State Court Cases and Board Decisions

Adams vs. Industrial Commission of Arizona, 12681 PR, Arizona Supreme Court, Arizona (1976).

Allied Products Corporation vs. Esgro, IRC Order 2-3420, Florida (1978).

Green Bay Drop Forge vs. Wisconsin Industrial Commission and Albert Wocjik, 265 Wisconsin 38 (1953).

Martinez vs. Taylor Forge and Pipeworks, Indiana Court of Appeals, Indiana (1977).

Mims and Thomas Manufacturing Company vs. Ferguson, 340 So 2d. 920, Florida (1976).

Rhoton vs. Bower Roller Bearing, Michigan WC Board Decisions, p. 302 (1978).

Siebert vs. North Point Cottage Owners Association, 378 Mich 661 (1978).

Slawinski vs. J.H. Williams and Co., 298 New York 546 (1948).

Welshinger vs. Minneapolis Star and Tribune, Workers Compensation Court of Appeal, Minnesota (1976).

Winkleman vs. Boeing Airplane Company, 203 P. 2nd 171, Kansas Supreme Court, Kansas (1949).

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report investigates the status of State and federal workers compensation programs for noise induced hearing loss and the equity and effectiveness of their hearing loss claims provisions. Presented is a detailed examination of State and federal hearing loss claims activity, existing compensation claims procedures, their scientific and technical basis, and some of the background judicial decisions and medical, social, political, and economic forces historically influenced in the development of compensation programs for noise induced hearing loss. Included as well are recommendations and suggestions for further research and the incorporation of less restrictive and more technically appropriate compensation provisions and criteria to improve the technical basis of State and federal compensation programs.

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