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OCCUPATIONAL HEARING LOSS

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HEARING CONSERVATION THROUGH REGULATION

by

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In the United States we have some governmental customs which are quite different from most British and European practice. One of these is that control of occupational safety and health conditions has been traditionally a function of the individual States since it is not one of the functions specifically assigned to the Federal Government. We have, consequently, had no uniform regulations for the control of occupational noise exposures. Twelve of our fifty-two State jurisdictions had some sort of law or regulation on the subject by 1968 but there was no uniformity among them either as to permissible levels or as to enforcement practices.

The Federal Government does have some responsibilities for employee safety through the Walsh-Healey Public Contracts Act which states about contracts for supplies sold to the government, "no part of such contract will be performed nor will any of the materials, supplies, articles, or equipment to be manufactured or furnished, under said contract be manufactured or fabricated in any plants, factories, buildings, or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of said contract." These words are made an explicit part of each contract for supplies. The Department feels that these words mean exactly what they say. That the contractor has an obligation to provide an environment which does not present unusual hazards to the safety or health of his employees. The corollary belief that the Department has an obligation to consider all of the hazards of the occupational environment is reflected both in the "Green Book" of the 1940's which contained guidelines for the first safety inspectors under the Act and in the more formal regulations which appeared in the Federal Register on December of 1960. You will see that our regulations are not the ordinary sort of labor law of equal application to all workmen but an expression of a contractual obligation. Because the government is a large scale consumer, they do apply to about 28 million of our approximately 41 million non-agricultural and non-governmental work force.

Our regulation of 1960 said, in full, "noise shall be reasonably reduced or eliminated as a means of preventing fatigue or accidents." In our amendment we wanted to make a statement that would be substantially more precise and, hopefully, more effective. We felt that we needed a definite threshold limit designed to prevent hearing loss. For ease of administration we preferred that the limit should be expressed as a single number and that it should be easily and quickly measurable with simple, portable equipment.

There has been little doubt for many years, and at least since the 1954 publication of the report of the Z24-X-2 Committee of the then American Standards Association, now American National Standards Institute that habitual exposure to excessive noise produces loss of hearing. The Committee did not choose to establish a standard for occupational noise exposure, largely because it could not decide what amount of hearing loss should be classified as significant or disabling. Since 1954 the medical profession, through its professional organizations, has defined disabling hearing loss as a loss which makes it difficult to understand speech in sentence form and, further, as starting at a loss in excess of 15 dB average (ASA 1951 Scale) in the octaves centered on 500, 1000, and 2000 Hz (cycles per second.)

On the basis of those definitions and of considerable data on hearing losses which has accumulated since 1953, the Intersociety Committee on Guidelines for Noise Exposure and Control developed some criteria without setting a threshold value. These criteria will soon be updated but at this moment they state, in part, "The upper curve in Figure 1 indicates that of 100 persons exposed to 85 dBA..... This is an increase of three persons per 100 population for the noise exposed group, or three percentage points. Because of the wide scatter of the data, so small a difference between groups cannot be attributed to differences in noise exposure with much certainty....."

Probably the most significant thing about this statement is that the Intersociety Committee had settled on a single number - the A-weighted sound level to represent the hazard of a noise. It is really not too surprising that it should be an index to the hazard since the A weighting was designed to be the inverse of the loudness levels at 40 sones. That is, it represents the level of sensory response to the energy in the sound which apparently has a direct relationship to the amount of damage which the energy can produce. The decision of the committee was based mainly on two studies, one in England by Robinson of the National Physical Laboratory and one in the U.S. by Baughn. Robinson, in particular, presented strong evidence for the A scale concept.

We accepted this evidence and adopted the A scale noise level as the basis for hazard evaluation and took another look at the data on the percent of the population impaired by long exposures to noise. It appeared to us to indicate that with thirty or thirty-five years exposure the number showing impaired hearing would be six to eight percent at 85 dBA and fifteen to seventeen percent at 90 dBA.

We felt confident enough of our interpretation that we published the 85 dBA as a proposed threshold limit with some other provisions and held a public hearing. Following the hearing, the Department eventually settled on a level of 90 dBA as the limit for eight hours per day habitual exposure and a permissible increase of 5 dB in intensity for each halving of exposure time up to a maximum of 115 dBA. We are aware of the evidence that there should be some allowance for intermittency and some allowance is built into the 5 dB allowance since the equal energy rule would allow only 3 dB for halving of the exposure time. This is also the rule both as

to peak exposures and as to allowances for less than full time exposure which was adopted at about the same time by the American Conference of Governmental Industrial Hygienists. The two actions were not interdependent but they also were not totally unrelated.

We also included requirements that impulse type sounds should not exceed 140 dB peak sound pressure and that when engineering and administrative measures are not sufficient to bring the noise levels within the prescribed limits, hearing conservation programs are mandatory. Our primary concern is the conservation of hearing but we feel very strongly that it must be done, in general, by noise abatement rather than by personal protection.

It is still too early to have any solid statistical evidence as to what is being accomplished by this regulation. We do have some qualitative impressions. We know that there has been a notable increase in the demand for the services of both audiologists and of acoustical engineers over the past several months. There has also been a notable increase in the number of manufacturers of equipment who call us about reduction of noise in their equipment. We have had a very few companies which have included noise specifications in their new equipment orders for years -- since 1956 in DuPont orders. Now we have many who are beginning to include such specifications. I do not expect miracles but I do think that we will see a rather prompt decrease in the production of noise induced deafness and a gradual decrease in industrial noise.