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# HEARING CONSERVATION - WHAT IS REASONABLY PRACTICABLE ?

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## The Problem

The Corporation's policy has been to meet the requirements of the Department of Employment's "Code of Practice for reducing the exposure of employed persons to noise" (1972). The majority of noisy processes and plant have been surveyed but if the industry were in the position of starting surveys, the proposals in the Consultative Document (paras. 24-32) are too rigid. More flexibility is required. Noise surveys require qualified staff to perform them and to interpret the results. There will be a continuing demand to deal with re-surveys, ad hoc problems and new developments. BSC would require 20 man-years of qualified staff time to carry out initial surveys. Staff involved are key figures in other work so that demands on their time must be based on a realistic appraisal of other equally important occupational hygiene matters. It is vital that discretion is left to industry on this question with the overriding provision that hazardous situations should be identified.

The second part of the problem is the Leq (8 hours) of 90 dB(A). It must be accepted that reduction of noise exposure to this level would in itself be a major step forward and the workload incurred in achieving this objective would be considerable. However, it must not be forgotten that the risk of noise-induced hearing loss does exist at levels below 90 dB(A) albeit the degree of risk is less. This was confirmed by Burns[1] et al (1977) when the hearing status of a group of steelworkers was assessed against an inferred lifetime exposure of 87 dB(A) Leq (8 hours).

When Figure 1 in the Consultative Document is examined, some interesting conclusions can be reached. Based on a lifetime noise exposure, the following percentages can be calculated (Table 1).

| Noise Level (dB(A)) | Handicap Threshold | Disability |
|---|---|---|
| 90 | 42% | 12% |
| 85 | 32% | 7% |
| 80 | 26% | 3% |

Table 1. Hearing loss in a typical industrial population at 65 years of age.

Clearly, the law of diminishing returns operates in this situation and there is no way in which all cases of noise damage are going to be prevented. Provided 90 dB(A) is treated as an action level and efforts made to reduce exposure to the lowest level reasonably practicable, this may be acceptable. If, however it is used as an endpoint in itself, a proportion of the working population will sustain some damage. This is the dilemma. Perhaps a

compromise solution may be to include a long-term commitment to reduce the action level to a lower figure.

The interpretation of the phrase "reasonably practicable" by the enforcing authorities will clearly be an important issue. The major problem will arise where noise reduction is technically feasible but the costs are disproportionately high. More assessment should be made by HSE on the economic impact of the proposals and some further indication of intent (in addition to that given on page 16 of the Consultative Document) would be valuable. The allocation of priorities within the "reasonably practicable" umbrella must take account of local circumstances, but there is also a case for discussion with National Industry Groups to examine the proposals against the overall financial position of industry. Certainly, the steel industry is in no position to establish elaborate control systems at the present time, let alone embark on major capital expenditure on existing plant.

Some of the other proposals are matters of detail but still give cause for concern. They include:-

1. Noise Advisers and Qualified Persons - difficult to justify such appointments dealing with noise in isolation.
2. Individual Monitoring - yields no additional information and personal dosemeters have definite shortcomings.
3. Hearing Protectors - approval by HSE should be a legal requirement and the individual must assume much of the responsibility for maintenance, etc.
4. Information, Instruction, etc. - requirements are too detailed and provision already exists under the Health and Safety at Work Act.
5. Records and Administration - proposals would require unnecessary resources for this purpose and would do nothing to reduce exposure to noise.

Audiometry

Recommendations[3] regarding audiometry are contained in an HSE Discussion Document (1978) which refers to "the practical issues in implementing the procedures and the availability of resources to introduce industrial audiometry". The costs and resources associated with an audiometric programme have been criticised mainly on the grounds of provision of equipment, manpower required to perform and interpret audiograms and the NHS workload dealing with men referred for investigation and assessment. Little account has been taken of the practical problems facing industry if the tests are performed in accordance with the Discussion Document.

The 1982 Consultative Document requires the employer to test employees exposed to 105 dB(A) Leq (8 hours) or more. This proposal is clearly made on the basis of costs and limited resources and although it may be politically expedient, it cannot be supported medically since it is known that lower noise levels damage hearing. It will merely quantify the hearing loss in approximately 1% of the population in UK industry (Figure 2 of the Consultative Document refers). The degree of deafness is likely to be profound and all cases are likely to be affected if the duration of exposure is at all significant.

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An audiometric screening programme is no different to any other large-scale screening programme in industry. It should aim to separate the normal from the abnormal and the latter should proceed to further assessment. The objectives must include the detection of hearing loss before disability develops and counselling of individuals, i.e. an exercise in preventive medicine. Therefore, some form of audiometry should be offered to the population at risk at any level. To reconcile the problem of cost and resources, a simpler and more rapid test should be developed and offered to the workforce on a wider scale.

The Royal Air Force introduced a large-scale audiometric screening programme using a 3-frequency test in 1970 and the results were summarised by King[4] in 1978. Men whose hearing loss exceeded 20 dB at 1 kHz, 20 dB at 2 kHz and 30 dB at 4 kHz were referred for further assessment. The fact that referrals fell from almost 9% in 1970 to just over 2% in 1976 and that there was "an annual yield of aurally disabled in the region of 2 per thousand screened" indicates that this type of monitoring is more appropriate to industry than those recommended by the HSE.

Some of the problems associated with the HSE document on audiometry are:-

1. Preliminary medical examinations make unacceptable demands on medical and nursing resources. The "normals" require no action whereas the "abnormals" are investigated further.
2. In a shift-working industry, it is totally impracticable to achieve a noise-free period prior to the test. It is also unrealistic to ensure the wearing of protection. It may be an advantage that an individual presents with temporary threshold shift and is classified as "abnormal" before his temporary shift becomes permanent.
3. The difficulty in releasing men from work has been under-estimated. If subjects cannot or will not attend, the programme will fail.
4. Subdivision into five categories is time-wasting since all cases other than category 5 are referred to the designated medical practitioner.

The "Reasonably Practicable" Solution

The Consultative Document presents a package of controls which excludes some of the more extreme suggestions. Nevertheless, the implications are significant and any forms of control must be realistic and allow industry to make progress without imposing restrictions on operations or requiring major expenditure which is not available.

Noise control on existing plant falls naturally into two categories:-

1. Low cost methods, e.g. acoustic treatment of cabins, screening of processes, partial engineering redesign, etc. The cost of this action in the steel industry has been estimated at approximately £50m. and even if implemented would not necessarily preclude the need for hearing protection.
2. Capital expenditure, e.g. enclosure of large plant, major engineering changes based on known technology, etc. Estimate of cost is in the region of £90m. and is unlikely to be allocated since such modifications will not be wholly effective.

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The eventual solution lies with improved noise control on new plant.

The "regulatory package" should be modified to take account of the following points:-

1. The proposed Regulations should be simplified and deal with the principles rather than the means of achieving them. They should allow as much flexibility as possible consistent with the overall objective of protecting hearing.
2. The Approved Code of Practice should be limited in content and deal with matters where uniform interpretation of the Regulations is important. Other material should be incorporated in one or more appropriate Guidance Notes.
3. Less emphasis should be placed on the distinction between noise control and protection of hearing.
4. There may be a case for separate Regulations and Approved Code of Practice dealing with the duties of designers or manufacturers since noise control in new plant is likely to be most successful.

This suggested structure would enable industry to fulfil its responsibilities more easily without detracting from the impact of the proposed legislation.

Returning to the subject of audiometry, a modified version of the RAF procedure has been in operation in one steelplant. The major alteration has been a change in the level of hearing loss at which individuals are referred. The levels adopted are 10 dB at 1 kHz, 15 dB at 2 kHz and 20 dB at 3 kHz which take account of the category 3 "warning level" contained in the Discussion Document (where the sum of the loss at low frequencies (0.5, 1, 2 kHz) and high frequencies (3, 4, 6 kHz) exceeds 45 dB at 20-35 years of age. For screening purposes, no account has been taken of age, noise exposure, pathology, etc. and results to date are presented in Table 2.

| Total Workforce | No. Tested | Pass | Fail | Counselled |
|---|---|---|---|---|
| 2,350 | 1,475 (63%) | 655 (45%) | 810 (55%) | 613 (76%) |

Table 2. Results of 3-frequency test programme

It is worthy of note that the population was taken from re-rolling mills where noise levels are high so that this population is not representative of the industry as a whole. Even so, the number proceeding to in-depth assessment is reduced by almost 50%. Experience indicates that the number of false failures is high so that the referral levels are likely to be modified. If the levels were adjusted to a 20 dB(A) loss at 1, 2 and 4 kHz, then an additional 13% of the population would pass the test.

## References

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4. P.F. KING 1978. Journal of the Royal Society of Medicine, 71, 562-573.
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