Proceedings of The Institute of Acoustics

PROGRESS WITH NOISE ABATEMENT ZONES

W A UTLEY AND A C SALVIDGE

BUILDING RESEARCH STATION, GARSTON, WATFORD

Introduction

When Part III of the Control of Pollution Act came into force in England and Wales in January 1976 it gave to local authorities new powers to control noise from fixed premises. They could exercise these powers by creating areas of special control, to be called Noise Abatement Zones (NAZ). By August 1978, 12 local authorities in England had had a total of 14 noise abatement orders, setting up NAZs, confirmed by the Secretary of State for the Environment.

This paper describes the background to the recent legislation including the work undertaken by the Building Research Establishment to provide a basis for the technical regulations(1) and guidance(2) on NAZs. Procedures given in the Regulations are outlined. The paper then discusses the experiences of those local authorities who have set up the first Noise Abatement Zones. Finally, the paper indicates topics where further research might produce results which would aid those operating Noise Abatement Zones.

Background

When a Working Party of the Noise Advisory Council considered the operation of the Noise Abatement Act 1960 it recommended a number of changes(3). With regard to noise from industrial and commerical premises the main weaknesses of the existing procedures were found to be, first, that they could only be used after complaints had arisen and could not be applied to the prevention of nuisance. Second, that the noise environment could gradually deteriorate because a number of small increases in noise level could take place which did not individually constitute a nuisance. A third weakness was that it was not possible to deal with an unacceptable noise environment which was produced by a number of sources since it is inherent in the nuisance approach adopted in the 1960 Act that it can only be used against a specific and identifiable noise source. In order to overcome these weaknesses the Noise Advisory Council suggested that local authorities should be able to set up areas of special control, to be called Noise Abatement Zones. Provisions for setting up NAZs were included in Part III of the Control of Pollution Act which came into force in 1976.

The basis of noise control in a NAZ is a noise level register in which the noise levels round classified premises within the zone are entered. These registered noise levels can only be exceeded with the consent of the local authority. The local authority may seek a reduction in noise levels by issuing a noise reduction notice where they consider that the noise is 'unacceptable' and that a reduction in level is practicable at reasonable cost and would produce a public benefit. Furthermore, within a NAZ the local authority may determine and enter in the register the level of noise which will be acceptable from new buildings within specified classes.

PROGRESS WITH NOISE ABATEMENT ZONES

In order to identify and suggest solutions to some of the problems involved and to provide a basis for technical guidance the Building Research Establishment carried out investigations around the perimeters of a number of industrial and commercial premises(4). Noise measurements were carried out at 31 sites, almost all of which were factories. A major objective of the investigations was to devise a method for determining how many measurement positions should be used and where these positions should be. The equal angle method was developed and included in subsequent regulations.

Procedures

When the local authority has selected an area to be designated as a NAZ it must specify the classes of premises which will be subject to control. After the Noise Abatement Order has been confirmed by the Secretary of State the local authority can proceed to measure and register the noise levels around classified premises. Regulations(1) describe where, when and how to measure the noise. The noise level to be measured is the equivalent continuous noise level (L_{eq}) in dB(A). Where appropriate the maximum noise level may also be measured.

The aim throughout the regulations is to set down a general framework to ensure a degree of uniformity and to ensure as far as possible that measurements are accurate and reproducible. Nevertheless, some flexibility had to be incorporated since no detailed measurement method would be appropriate to all premises. For example, a zone might include a large complex industrial site which would require many measurement positions around the boundary in order to exert detailed control of noise emission and also a small concrete batching plant where a single measurement position might be sufficient. The temporal variation of noise might also differ markedly between one premise and another. In the example given above the noise from the industrial complex might be substantially constant throughout the working day but the noise level from the batching plant would vary as each lorry arrived, was filled and left. Thus the temporal variation in the noise level will determine when and for how long measurements should be carried out.

Another aspect of the measurement procedure where the regulations had to incorporate some flexibility was in the specification of measuring equipment. All local authorities who had made use of the earlier Noise Abatement Act or the British Standard method of rating industrial noise(5) would normally have the use of a sound level meter. In addition they might have a system for analysing variable noise such as that from road traffic. However equipment which would give a direct reading of L_{eq} was not generally available at the time that the new legislation was being drafted. Indeed, even today there is no British or International Standard covering this type of equipment. In order to permit existing equipment to be used where possible, minimum requirements were specified for different types of noise. Thus for steady noise a sound level meter meeting the requirements of BS 4197 and set to 'Slow' can be used. The noise is deemed to be steady when the meter fluctuations do not exceed $\pm$ 4 dB(A). When the noise fluctuates by more than this but is not impulsive, equipment providing a statistical analysis of the noise levels could be used to determine L_{eq}. An analogue or digital system might be used. When the noise has an impulsive characteristic or the levels fluctuate over a wide range it is only

possible to obtain accurate measurements by using a meter specifically designed to measure L_{eq}. This sophisticated equipment may, of course, also be used to measure less complex noise. For the measurement of maximum noise levels a response equivalent to the 'Fast' response defined in BS 4197 is specified.

It is important that the noise level register includes full details of the measuring procedure adopted and equipment used so that later monitoring can be carried out using the same procedures and equipment. One aspect of noise measurements which cannot in practice be reproduced exactly but which can affect the level measured is the meteorological conditions. In order to reduce variability due to changes in meteorological conditions the regulations specify wind conditions for measurements when the distance from source to measurement position is 25 metres or more. Where the distance between source and measurement position is greater than 50 metres a positive wind component is specified. The main reason for specifying 'downwind' measurements is that this results in a much smaller spread of measured levels than when the wind is blowing from receiver to source. It also has the advantage that the noise level will be near to the maximum and this may make measurements easier where there is extraneous noise.

While the aim should always be to measure typical levels of noise from the premises there may be situations where this is not possible because of noise from other sources. For example, many of the sites investigated by BRE(4) had quiet sides where there was no significant noise from the premises and where the noise level at the boundary arose from distant traffic. If no level were registered in these situations it could seriously weaken the future control of noise from the premises concerned. In fact it could be argued that it is on the quiet sides of premises that the addition of new noise sources could cause most problems. In order to permit a noise level to be registered in this type of situation the regulations specify a calculation procedure which can be used when it is impracticable to measure the level of noise from the premises.

Current Progress

18 in E, 2 in W.
13 submitted to DoE.

In the first 2½ years that local authorities had the power to set up Noise Abatement Zones the Secretary of State confirmed 14 noise abatement orders made by 12 local authorities. In order to examine how this new method of noise control is being operated and to obtain information about possible technical problems which are being experienced BRE are having discussions with these local authorities. By the end of 1978 all but two of the local authorities who had been contacted had started to measure and register levels around premises within their zones. Registers had been completed by two of the local authorities.

In most cases local authorities were using direct reading L_{eq} meters to make the measurements but in some cases sound level meters were used. In all cases the L_{eq} for a particular long period was established from short samples. Either a single sample was used or samples were taken every hour or 30 minutes. Sampling periods varied generally between 5 minutes and 30 minutes for single samples and 2 minutes and 10 minutes when repeated samples were used. A single sample of 5 minutes might seem rather short to be representative of a level

over 12 hours or more. However in many instances the noise from the premises was substantially constant. Moreover the local authorities who used single short samples tended to carry out their measurements under conditions of maximum noise emission. The local authorities seemed to have no problems in deciding where to carry out the measurements. Most tended to use the equal angle approach. Generally these positions were marked on a detailed map of the site but in some cases the positions were also described in the noise register.

Some of the local authorities had access to local weather data which was then included in the register. Others had to rely on an estimation of the wind speed around the site.

The number of classified premises included in the zones varied considerably from 24 to over a hundred. Most local authorities had a particular reason for choosing the areas of their first zones. For example, the area might be subject to general environmental improvement or it might include particular noise problems which other methods of control had failed to solve.

Two of the local authorities claimed to have had no technical problems in operating their zones. For the other authorities the most frequent problem was in carrying out measurements where there was significant extraneous noise; in particular where there was a heavily trafficked road alongside a site. There also seemed to be some difficulty in establishing a typical noise emission from certain premises. Despite these problems the local authorities intended to proceed with further zones in the future.

It appears that further research would produce information which should help to overcome the problems described above. In addition there is perhaps a need for quantitative information on the accuracy of noise measurements when carried out according to the regulations. This information will assist in the evaluation of the results of later monitoring. At present monitoring has only started in one zone although most of the local authorities intend to undertake regular monitoring around classified premises.

References

1 Statutory Instrument 1976 No 37. The Control of Noise (Measurement and Registers) Regulations, HMSO, 1976

2 Department of the Environment Circular 2/76. Control of Pollution Act, Implementation of Part III - Noise, HMSO, 1976

3 The Noise Advisory Council. Neighbourhood Noise, HMSO, 1971

4 M P Jenkins, A C Salvidge and W A Utley. 1976. Noise levels at the boundaries of factories and commercial premises. BRE Current Paper 43/76

5 British Standard Institution, 1967. BS 4142. Method of rating industrial noise affecting mixed residential and industrial areas. With amendment slip No 1, 1975