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A NOISE CONTROL PROCEDURE FOR OPEN-AIR POP CONCERTS

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Introduction

It seems that there is now almost unlimited amplification available for pop concerts. In the 20 years since very powerful amplifiers have been used at major outdoor events the problem of loud noise for the neighbours has grown with the expectation of loud music for the audience. These conflicting requirements can be dealt with provided systematic and authoritative action is taken early enough in the planning of the concert. There follows a brief discussion of the background to the subject and critical steps needed to satisfy both the licensing authorities, the audience and, of course, the neighbours.

Background

Whilst noise is the cause of nuisance the scale of the problem is exacerbated by the tensions that can arise between the many interested parties who all have different objectives or needs. There are the promoter and the licensee (not necessarily the same person) who want to satisfy the audience (30,000 or more people as a rule), and the mixer engineer who wants a good quality sound from the band. Then there is the licensing authority who permitted the event to take place and the environmental health authority who received the complaints about it. These days those two authorities tend to be the same but sometimes the responsibility lies within different departments. Finally there are the residents who occasionally enlist the support of their local councillors (and sometimes their MP) to apply pressure on their officers to alleviate the nuisance (which usually means stop the noise or even the concert).

If those with the statutory powers, i.e., under either the relevant licensing act or the Control of Pollution Act try to exercise them, practical difficulties interfere. The only person who controls the noise level at a concert is the mixer engineer and that person at any reasonably attended event is usually isolated at the mixer by the crowd. If the official succeeds in arriving there the ambient noise level is probably greater than 100 dB(A) rendering normal conversation impossible. If the mixer engineer chooses to

ignore the request to turn the volume down, the serving of a notice is unlikely to have much impact and subsequent court appearances will probably be no more than a formality with any resulting conviction and fine hardly constituting a penalty or deterrent.

The situation though is not hopeless: it is possible to hold a large scale open air concert at venues which at first sight seems to be environmentally totally unsuitable by using the procedure set out below.

1 **Establish the criteria that will determine the noise limits to be used.**

The criteria that have been used successfully at many events are set out in the GLC Code of Practice for Pop Concerts[1]. Within this code two noise criteria are described: one is used to minimise the risk of hearing damage to the audience and is based on the duration of the concert. The other is concerned with minimising the effect on those living nearby and states:

> To minimise annoyance to occupiers near the site at which an outdoor concert is held on no more than 3 days per year:
>
> (a) The Leq noise level measured for any 15 minute period of the concert or rehearsals outside the windows of their premises should not exceed the Leq noise level measured during a comparable period when no pop concert or rehearsal is in progress by more than 10 dB(A) between 0700 and 2000 hrs and by more than 6 dB(A) between 2000 hrs and 2300 hrs.
>
> (b) No sound from the premises should be audible within any other premises between 2300 hrs and 0700 hrs.

The change at 2000 hrs was included partly to reflect the likely increase in sensitivity of people that occurs as the evening passes but also as a deterrent to the licensee from planning the concert to continue for too long. In practice it is totally impossible to change the noise limits at 2000 hrs as it is usually in the middle of a concert and it has been found that the 10 dB(A) increase can be permitted beyond 2000 hrs without much difficulty, providing the concert finishes by 2230 - 2300 hrs. It has also been shown that by limiting the increase to 10 dB(A) the number of complaints is kept to a minimum. If the increase exceeds 13 dB(A) then the number of complaints rises significantly[2].

Recent work has also begun to show why complaints arise when the increase is less than 10 dB(A). It seems that if the frequency spectrum being perceived is very low frequency biased then complaints can arise and it may be that the criteria need extending to include a limit on the linear increase of 10 dB[2].

The number of events at any one venue being limited to 3 is an attempt to distinguish between events that occur only every now and again and those which occur regularly, e.g., once a week or once a month. It has been found, though, that allowing four or even five concerts during a summer period does not significantly alter the reaction of those living nearby as long as reasonable controls are exercised.[5,6] For more frequent events, the Code only allows a 1 dBA increase over the background noise level.

The Code of Practice also gives guidance about the maximum permissible noise levels within the concert arena in order to minimise the risk of hearing damage. The limit is expressed in terms of an Leq for the period of the concert and its value depends on the concert duration.

2 Determine the background noise level against which the criteria can be assessed.

This may seem obvious but sometimes can be overlooked. It is important that not only the level at the nearest sensitive dwellings is measured, but also the level at other locations around the venue, even if the nearest housing in a particular direction is a mile or so away. For example, temperature inversion and wind effects can cause the noise from the concert to travel large distances and should complaints arise from a location where no background data are available there is no means of assessing objectively the extent of the problem.[4]

It is important also to attempt to measure as closely as possible the level that would occur without the concert. For example, near a football ground with a summer concert the background noise during a match in winter is invalid - there would not be a game in the summer, hence no crowd noise.

Usually one average value is used to describe the background over the planned duration of the concert. In most locations this is satisfactory but where the level falls greatly, say after 2000 hrs, then a degree of judgement and discretion is required when determining the value.

3 Make sure that the propagation characteristics of the venue are understood.

If a new venue is proposed, it is important to use prediction techniques to determine whether a concert could be held with realistic limits. Great difficulties will arise if a licence is granted for a concert where, in order to meet the environmental criteria, the limit level within a stadium has to be set very low. For a concert to be an effective form of entertainment a certain minimum noise level has to be achieved. This has been found to be 96dB(A) at the mixer position (ie approximately 40m from the main speakers and at a height of 2.5m). A prediction method can then be used to estimate the noise levels in the local community by using this minimum source level, propagation rates and the effect of angle of view from the loudspeakers to the residential area. If, with this minimum level and with using the techniques described later to maximise the sound attenuation between the arena and the nearby housing, the increase in level over the background is likely to be of the order of 15 to 20 dB(A), then the licence should be refused. There is no point in granting a licence with unrealistic conditions that cannot be met. Of course licences will be granted when environmentally they probably should not have been, in which case, the prediction method will provide an estimate of the likely scale of the problem. It is then a matter of using the procedure described here to minimise it.

4 The licence should stipulate that the sound system should be available for testing at a reasonable time before the event.

This condition will enable the sound attenuation between the stadium and the nearby dwellings to be assessed. Most systems operated at these concerts include a pink noise generator, this could be used, but a shaped noise spectrum is far better to establish what level at the mixer position is permissible before the increase over the background level previously established is greater than 10 dB(A). If the level within the stadium is below the minimum value discussed earlier then altering the speaker orientation may improve the situation.[4] It has been found that angling the speakers towards the audience by 20° can give an additional 4-6 dB(A) for the audience without increasing the noise outside[3].

The frequency spectrum of pop music is not 'flat' and as dB(A) reduction depends on the source spectrum shape, the attenuation actually achieved may differ from that measured

during a pink noise test. The appropriate shaped spectrum depending on the type of concert (e.g., rock, reggae, etc.) should be used and again the loudspeaker array should be adjusted if more attenuation is required. At a recent concert it was found that the attenuation according to the flat spectrum was approximately 4 dB(A) greater than that with the shaped spectrum, so the difference between the two can be quite significant.

Once the maximum attenuation has been achieved it is now possible to determine the maximum level at the mixer that will mean that the environmental criteria are met. This value must be compared with the equivalent limit that is required to meet the hearing damage risk criterion and the lower one used. A formal letter stating the value of this limit should now be given to the licensee.

5. The licence should stipulate that an official of the licensing authority shall be in attendance at the mixer throughout the concert.

This condition is essential if active noise controls are to be effective. The security that exists at the mixer is usually very tight and can be quite aggressive. Unless officials have the correct passes it can prove to be extremely difficult to gain access despite their authority and as indicated earlier, negotiating in ambient noise levels of 100 dB(A) is not easy!

The method that has been found to be most effective makes use of the sound attenuation test which usually occurs the day before the concert. At this time, the official can become known to the mixer engineer, explain the procedure and set out what would be required during the concert. Also, the relevant passes can be obtained so that on the day of the concert the official has easy access to the arena.

It has been found that arriving about one hour before the crowd are allowed in gives sufficient time to meet again with the mixer engineer, speak with the security officers and become established as part of the general activity at the mixer. There is then ample time to set up the monitoring equipment and to try to establish a good working relationship with the various other sound engineers who will be operating the mixer desk from time to time during the concert.

6. The licence should state clearly that any subsequent application will be assessed against the degree of compliance with this licence.

Despite the powers available under either the Control of Pollution Act or the relevant licensing act, it has been found that if a problem arises during the concert then this condition is the most effective sanction. The licensee is usually the owner of the venue and the concert is being held for financial reasons. To be threatened then with a possibility of being refused a subsequent application (and hence lose a source of income) tends to result in the licensee joining the official in applying pressure on the mixer engineer/promoter to reduce the noise level.

In order to strenghten this clause still further a severe financial penalty (of the order of £25,000-£50,000) could be included. This sum would be forfeit if the licence conditions were flagrantly broken. Clearly, though, there are difficulties in determining at what point a flagrant breach has occurred. Also, such a severe penalty would put a much greater responsibility on the licensing authority, firstly in ensuring that the limits set are accurate and realistic and secondly in ensuring that the licensee understands the meaning of the limits.

7. Noise levels should be measured throughout the concert at the mixer position as part of an overall active noise control operation

The details of the noise control techniques that should be carried out during the concert have been described in detail elsewhere.[2] These include measurements both inside and outside the venue, a co-ordinating location where any noise complaints can be directed and radio links between everyone involved.

It has been found that the one minute Leq (60sLeq) is the most useful parameter to measure. Although the overall noise limit is likely to be set in terms of the Leq for the concert duration, measuring that alone will only give information at the end of the concert about whether the limit has been met. It is then too late to try to exercise any control. (Of course by use of extrapolation the final Leq can be predicted - but this is tedious and difficult to explain to the mixer engineer.)

The 60sLeq gives much more immediate information and for control purposes the required overall limit can be translated into a limit in terms of this parameter. For a concert duration of six hours with about four hours live music it has been found that:

60sLeq limit = Overall limit + 3dB(A).

There are various options for measuring the one minute Leq: integrating sound level meters with the 60sLeq option driving a level recorder, or micro-computer based techniques, which are now being extended so that the one minute Leq can be measured at the monitoring locations in and around the ground and provide a complete picture of the noise climate.

For the mixer position the level recorder technique has a number of advantages. Firstly it is easy both for the official and the mixer engineer to read (it has been found that marking in red ink the limit level line on the recorder is helpful). Secondly, the mixer engineer can see how the level changes with the various bands and type of songs and, as it usually does, see how it gradually becomes noisier. Thirdly, the official can determine when to start insisting that the level be reduced by carefully interpreting the immediate past history of the noise level. It is, probably, at this point when the greatest expertise is required.

In many branches of environmental acoustics, scientific knowledge is closely linked with negotiating skill and tact when dealing with problems. This situation is no exception. If the official is not firm then there will be a loss of respect and any control will be minimal. Conversely an official that is too strict can also cause difficulties. It must be remembered that, for the mixer engineer, this is just another concert and the Control of Pollution Act is just another piece of red tape which seems immaterial with a world tour about to commence. It is a matter of judgement which really only experience can help to develop.

Conclusion

The various stages of the control procedure have been described. The procedure has been found to be effective in allowing many thousands of people to be entertained without unduly disturbing those living nearby. At concerts which have not been so successful it can usually be attributed to a failure to adopt properly one or more of the stages

described. A summary of the procedure is given below:

1. Establish the criteria that will determine the noise limits to be used.

2. Determine the background noise levels against which to assess the criteria.

3. Make sure that the propagation charateristics of the venue are understood.

4. Within the licence stipulate that the sound system should be available for testing at a reasonable time before the event.

5. Within the licence stipulate that an official should be in attendance at the mixer position throughout the concert.

6. The licence should state that any subsequent applications will be assessed against the degree of compliance with this licence.

7. Exercise active control throughout the concert.

References

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THE ROLE OF THE ENVIRONMENTAL HEALTH OFFICER

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In the control of noise from recreational and entertainment activities the Environmental Health Officers and colleagues have several roles to play.

At first sight the enforcement of Part III of the Control of Pollution Act appears quite mundane. In practice it is rarely so.

There are occasions when involvement in the planning stage is called for; unfortunately most of the recreational activities giving rise to noise problems slip through the planning legislation net. It is not easy to provide sufficient grounds to influence the planning process when noise is a result of secondary activity e.g. parking and moving vehicles, departing clientele.

The majority of cases involve retrospective action i.e. the events are occurring and giving rise to complaints. There is little need to adhere to the requirements of Section 57 to go out and seek the problem, the public response can often be within hours rather than days.

Whilst the papers today probably cover the majority of areas requiring control there are others as the enforcement officer well knows. Outdoor activities e.g. marching bands, majorettes, aviation, gardening, and indoor activities e.g. parties and musical tuition also form part of the drama. It can be seen that at times control involves all sections of the community by day and night. Those participating at the time are often in a state of excitement which does not assist in providing a stage for the quiet, sensible dialogue one finds in industrial circumstances. Indeed the noise aspect may well be the main source of enjoyment e.g. at discos, motor racing and wild west evenings.

Collecting evidence is always a painstaking task and is never more difficult than in recreational noise investigations. The officer may have to play the role of detective, diplomat and negotiator simultaneously. All to often in the excitement of the moment parties will resort to their imaginations for the facts. Those involved may well be hostile, excited and sometimes influenced by drink etc. The circumstances can be aggravated by having to investigate the matter in the late evening or early morning which does little to assist in forming a balanced judgement.

Where noise levels are taken they may prove an indicator requiring anecdotal evidence to form a complete case in any subsequent proceedings. The anecdotal data has to be carefully weighed before being included in evidence.

The Environmental Health Officer has to produce in most difficult circumstances accurate, legible, legally acceptable records that will stand third party scrutiny should the need arise.

In some instances the officer will advise that no further action can be contemplated. It usually is required of the officer to give an immediate account of the legal circumstances relevant to that case. In his role as advocate advice is given on statute law and case law relating to noise and often planning and entertainment law is included as well.

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There is no place for the indecisive or faint hearted. The main role, that of acoustician emerges. Each case will require its own approach, generally with the aim of securing compromise i.e. so that the activity can continue with an acceptable level of inconvenience. There are, of course, circumstances where there is no compromise and litigation soon follows. In recreational activities the organisers are often quick to recognise the need to compromise and welcome advice as any legal action would be beyond their financial means.

Entertainment noise is often the product of commercial enterprises. The officer has to be particularly careful when dealing with 'best practicable means' as a defence under Section 58(5). Bullying tactics, political pressure and economic catastrophe may well enter into negotiations. Even so, the legitimate needs of business must be recognised. An important point is the interpretation of best practicable means with respect to local conditions and circumstances. Again, an experienced officer should have sound knowledge of the particular locality so that a fair and reasonable decision can be made.

In this area of compromise the officer may well find himself a 'licenser of nuisances'. This occurs where noise cannot be satisfactorily controlled but agreement can be reached on a frequency of events that is acceptable, even though for all intents and purposes a nuisance exists e.g. stock car racing.

This approach, adopted by officers for some years, requires him to act as judge to balance the needs of the community against the inconvenience of the activity. It is a relief to note that there has been a tendency for the Courts to support this attitude in recent years.

Where detailed advice is necessary it is the usual practice to advise the services of an acoustic consultant. The authority is assured that the best possible advice is given and hopefully acted upon.

Should problems continue and the matter finishes in the courts the Environmental Health Officer will have to prepare the evidence for the prosecution. In the case of an appeal against a notice he will be acting for the defence. In this role his activities have to be legally watertight or the whole of his endeavours may come to nought.

With any drama there are the critics, these may be called in by any party during the course of the performance. I am quite sure that their presence encourages a consistently good standard.

The judiciary can be involved in vetting the matter when appeal against a notice takes place. The verdict on prosecution is often an indication of the social import of the infraction.

The judiciary can also be involved by the plaintiffs should there be no action taken by the enforcing authority. This can be done under Section 59 and would cause considerable embarassment to those professionals involved should the action be successful.

Last, but by no means least, is the Ombudsman. His presence has sharpened up the performance of many. Although dubbed toothless his activities have highlighted shortcomings in the workings of authorities. This has emphasised the need for the Environmental Health Officer to act as a careful and thorough administrator.

THE ROLE OF THE ENVIRONMENTAL HEALTH OFFICER

The involvement of the Environmental Health Officer in the control of entertainment and recreational noise is little known outside the profession. I therefore welcome this opportunity to shed a little light on the subject.

It may be of interest to note that some 73,000 noise complaints are received by local authorities each year. In 1985/86 the Ombudsman received only 103 complaints on all environmental health matters, and out of these as few as eleven reports were made. The record speaks for itself.