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THE RATING OF ENVIRONMENTAL NOISE FROM MINERAL EXTRACTION OPERATIONS

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1. INTRODUCTION

There is no generally agreed method of rating noise from mineral workings to assess the effect on the environment. In view of their open site location and relatively limited duration in any one area, they are sometimes considered more sympathetically than are permanent industrial activities. However the working life of a mineral extraction site is typically ten to fifteen years and sometimes the developer will make a second application to win further minerals from extensions to the original site area. In such cases the operations can become in effect permanent for some people living nearby and the aim of environmental noise planning policy relating to mineral extraction is summarised in the well known words from Circular 10/73 "Planning and Noise" [1]

"The need then is to take every precaution to ensure that noise emitted by the development in question does not on the whole make the area a less pleasant place in which to live".

This immediately raises the question of the method of rating to be adopted in order to achieve this objective and in summary there are three possible approaches:

- (a) comparing the site attributable noise arising from the operation in question with the pre-existing background noise externally at the noise sensitive locations.
- (b) defining an "absolute" noise level limit for external noise which is therefore independent of the pre-existing background noise level.
- (c) defining an "absolute" limit for noise within houses based on criteria of acceptability applied to living rooms, bedrooms etc.

Methods (b) and (c) are closely related since, assuming that (b) is defined as the noise level close to a facade of a building, the noise within it will depend upon the attenuation by its structure, especially the window configuration. However (b) could relate to noise in the garden of a property, as also could (a) of course. In this case one is

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applying a different criterion, that of the enjoyment of the property in terms of leisure or other activity outside the building. The acceptable noise level, as in other cases where the criterion is related to recreation, is then more difficult to establish. Whether the method is based on noise within the building or noise in garden areas the results should be the same, ie that the property does not become a less pleasant place in which to live.

2. METHODS OF RATING

2.1 Existing Documents used in the UK.

There are many documents including British Standards, Mineral Planning Guidance Notes, Government Circulars and Local Authority Guidelines which are used in the determination of planning applications. It is necessary to consider these in addition to decisions made by Inspectors at planning appeals before coming to a conclusion on the most appropriate method of rating. A report, "The Control of Noise at Surface Mineral Workings" [2], prepared on behalf of the Department of the Environment, was published in 1990 and this will be considered in more detail following a consideration of other documents.

2.1.1 Noise Final Report [3]. Generally known as "The Wilson Report", this contains a wealth of information and despite its age, (it was published in 1963), it is still held in high regard and forms the basis of much of the work which followed in the UK in the field of the effect of noise on people. For example Appendix XV describes a method of rating industrial noise which formed the basis on which BS4142 was prepared. Mineral workings are dealt with in Chapter XII where it is recommended that the advice relating to noise from construction and demolition sites and to noise from industrial premises should apply where appropriate. In relation to the three approaches described above in the introduction to this paper it is significant that the introduction to Chapter XII contains the following:

"It must be remembered, however, that the same noise may give rise to greater annoyance in the country on account of the lower background noise, and for the same reason a lesser noise may still cause significant annoyance".

Hence the Wilson Report established the basic principle that the background noise should be considered which is approach (a) given above. In dealing with noise within building Chapter V of the report suggests noise levels inside living rooms and bedrooms which should not be exceeded for more than ten percent of the time. This information is well known but it is significant that the values given for country areas are 40 dB(A) and 30 dB(A) for day and night respectively. The higher

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level corresponds to the L_{10} level of 40 dB(A) quoted in 'Planning and Noise' as a 'good' standard. Hence the Wilson Report also assists in the determination of an acceptable noise level within dwellings which is approach (c) given above.

2.1.2 BS4142 [4]. Although this standard is meant to apply to fixed installations it is sometimes used in connection with mineral workings. Perhaps this is because some inspectors at planning appeals find its relatively simple approach, at least in its pre-1990 form, easy to understand. However most practitioners working in the noise field limit application of this standard to any fixed processing plant which may be part of the mineral workings. The standard does of course give a strong backing to the general principle of comparing site noise with background noise given as approach (a) above. Also the 10 dB(A) excess, given as a point at which complaints are likely, is often used probably because it appears to be simple to understand and to apply. Some Local Authorities also "borrow" the 5 dB(A) correction for noise character from BS4142 and automatically apply it to mobile machines used in mineral extraction operations. British Coal Opencast Executive positively discourages the application of BS4142 to opencast coal mines.

2.1.3 The Mineral Planning Guidance Notes MPG2 [5] deals with noise in Part VI where it makes reference to DoE Circular 10/73, the Control of Pollution Act and to BS5228. MPG2 advises that the control of noise should, "be exercised from the outset through the use of appropriate conditions attached to the planning permission". It recommends that the noise levels in dB(A) terms which should not be exceeded at site boundaries or outside key nearby buildings should be stipulated. Exceptionally noisy short term operations may need to be excluded from noise limitations. Other conditions which may be necessary involve the use of silenced plant, the provision of acoustic screens or earth banks and a restriction in working hours. A restriction on hours may also meet objections to site generated traffic noise.

2.1.4 Part III of the Control of Pollution Act (1974) [6] empowered Local Authorities to limit the noise which can be allowed from construction and demolition sites. Parts of this Act have now been repealed and replaced by the Environmental Protection Act 1990 [7] but the specific reference to construction sites has been retained within the Control of Pollution Act. In order to provide an effective control over noise from mineral extraction a proper system of noise monitoring needs to be set up. This would enable the Local Authority to have test results which they could use if necessary under the "Nuisance" provisions of the Environmental Protection Act (sections 79 to 82).

It is essential that specific guidance is given by the Department of the Environment as to whether mineral extraction operations fall within the

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Environmental Protection Act and hence whether Local Authorities could use their powers under these provisions. If they were allowed to do this they would normally apply BS4142 as a means of rating the noise and may well use the 10 dB(A) excess rule as a means of "proving" a nuisance. This could be in conflict with planning conditions relating to noise for the site in question, particularly where an "absolute" noise limit had been specified as described under approach (b) above.

2.1.5 BS5228 [8]. Part 1 of this standard contains a great deal of basic information and procedures for the prediction of noise from "construction and open sites" and Part 3 is a much shorter part dealing with surface coal extraction by opencast methods. The methods given are almost always those applied when predicting noise from mineral workings although practitioners sometimes also use their own empirical data which can be especially valuable when it is site specific as it can take account of local topography which is not dealt with in BS5228. The Standard contains little guidance as to what constitutes an acceptable level of noise and hence in terms of establishing a rating method is of limited assistance beyond the recommendation that the noise level should be described in terms of L_{Aeq} .

2.1.6 Local Authorities become involved in the setting of limits in respect of noise from mineral extraction sites since Public Inquiries and Planning Appeals are often held in respect of the extraction of sand, gravel, coal, Fullers Earth and other minerals commonly found near the ground surface. For example Surrey County Council deal with noise level limits for mineral workings and waste disposal schemes in their document "Guidelines for Noise Control" [9]. The Guidelines stipulate that the day-time operation of plant and machinery should not cause the L_{Aeq} noise level to exceed the existing L_{90} level by more than 10 dB(A) at the facade of any residential building. Maximum noise levels should not exceed the L_{90} by more than 15 dB(A). For short term operations, ie, those not exceeding 2% of the total working period, all these allowable excesses are increased by 5 dB(A). Experience in dealing with other planning applications has shown that other County Councils, eg, Bedfordshire and Berkshire, use noise level limits similar to those stipulated by Surrey County Council. Cheshire and Hampshire County Councils adopt a more stringent approach by requiring an L_{Aeq} which exceeds the L_{90} by only 5 dB(A). In addition, Cheshire and Hertfordshire require that where appropriate the 5 dB(A) correction for noise character should also be applied.

2.1.7 A guide to the appropriate noise level considered as a general environmental health goal is given in the World Health Organisation publication "Noise" [10] which states in section 4.4:

"The results of social surveys on the extent of annoyance can be

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used as guidance concerning the relation between different types of outdoor noise and the extent of dissatisfaction or annoyance in the community. Available data indicate that day-time noise levels of less than 50 dB(A) L_{eq} cause little or no serious annoyance in the community. With noise at this level, other factors such as transport needs, road safety, and the availability of schools are likely to cause more concern than occasional noise disturbances. Based on this likelihood, daytime noise limits in the region of 55 dB(A) L_{eq} might be considered as a general environmental health goal for outdoor noise levels in residential areas. However, technological and economic limitations may make this goal impracticable, at present, for many existing urban areas."

2.1.8 The report "The Control of Noise at Surface Mineral Workings" [2] makes firm recommendations for "absolute" noise limits, described as approach (b) above. The recommended noise limits given in section 5.1.2 of the report include the following and relate to L_{Aeq} (1 hour) noise levels 1m in front of the most exposed facade of noise sensitive property:

"During the working week the daytime limit (typically 07.00 - 19.00 hours) should be in the range of 55 to 60 dB L_{Aeq} (1 hour). More stringent limits within the range 50 to 55 dB L_{Aeq} daytime may be imposed for fixed plant and facilities in continuous use, including haul roads, as described in Section 4.5.5.

During the working week the night time limit (typically 22.00 - 06.00 hours) should be in the range of 40 to 45 dB L_{Aeq} (1 hour).

Where a different limit is considered appropriate for an evening or early morning period this should be in the range 45 to 50 dB L_{Aeq} (1 hour)."

I consider that these recommendations can be criticised as follows:

1. These suggested limits are considered to be high if applied in quiet rural areas where daytime background noise levels can be about 35 dB(A). The proposed limits for mineral extraction operations could therefore allow increases of the order of 20 to 25 dB(A) which is not considered to be acceptable.
2. For fixed plant, the limit of 50 to 55 dB L_{Aeq} would indicate that, by the BS4142 method of assessment, complaints would be likely in the quieter rural areas. This would present the Inspector at a Public Inquiry with a problem if he were to allow such limits which are independent of background noise and hence are in conflict with BS4142.

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3. The suggested lower limits for night time evening and early morning imply that the background noise is a relevant consideration and yet the basic daytime limits take no account of it.

Surprisingly, the Summary of Findings in section 2.0 of the report contains the following paragraph:

"Although there are no standard guidelines, current practice seems to be moving towards the setting of 65 dB L_{Aeq} (12 hour) noise limits at the site boundary as a planning condition. This practice seems to be generally successful in ensuring acceptable noise levels for local people."

No justification is given for this statement although it is the standard normally adopted by British Coal Opencast Executive which was represented by three members of the steering committee who gave advice to the authors of the report.

3. PREVIOUS PLANNING DECISIONS

3.1 Mockbeggar Lane, Ibsley, Hampshire [11]

This appeal involved sand and gravel extraction operations and the Inspector decided that an L_{Aeq} noise level at the facade of nearby properties should not exceed $L_{90} + 10$ dB(A) and that there should be an intervening noise barrier together with a minimum "stand-off" distance of 100m.

3.2 Hawkhurst Moor, Coventry [12]

This was an appeal concerning a deep mine application and the Inspector's decision included the following:

- 18.51 (i) The fundamental aims should be to ensure that absolute noise levels inside dwellings do not go too high,
- (ii) Circular 10/73 and BS 4142 together provide sound guidance,
- (iii) Noise levels at maximum capacity should be compared with noise levels prior to the start of construction,
- (iv) L_{Aeq} has been adopted as an appropriate measurement descriptor for noise.

18.53 The environmental impact due to noise can be assessed in two ways:

- (i) Take existing background noise levels in terms of L_{90} and adding 10 dB(A) as advocated in BS 4142.

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- ii) Establish a good standard of noise inside affected dwellings and adding any attenuation stemming from a "windows open" situation.

18.54 In the case of Hawkhurst the Inspector considered that the appropriate standards for operational noise outside vulnerable properties existing at the start of construction were:

Daytime	07.00 - 18.00 hr	55 L_{Aeq}	} free-field noise levels
Evening	18.00 - 22.00 hr	50 L_{Aeq}	
Night-time	22.00 - 07.00 hr	45 L_{Aeq}	

18.56 The Inspector concluded that "construction noise" would differ from operational noise both in terms of duration and character particularly during the initial stages when screen mounds were being constructed. He concluded that a daytime limit of 65 L_{Aeq} for such work would be appropriate but that evening and night-time limits should be the same as for operational noise.

3.3 Twynning, Tewkesbury, Gloucestershire

Gloucester County Council refused permission for sand and gravel extraction at Twynning near Tewksbury. Reporting on the subsequent Appeal Inquiry (October 1987) the Inspector said that despite the fact that the plant was mobile and the working would be limited to 10 years he considered that noise assessment should be made according to BS 4142. He decided that BS 5228 was not applicable because it does not rate noise for complaint potential. In his view the predicted increase of 14 to 20 dB(A) above background might give rise to complaints and would make the area a less pleasant place in which to live. He recommended upholding the Council's refusal.

3.4 Woburn Sands, Bedfordshire

This appeal was in connection with the extraction of Fullers Earth and the Inspector's decision is awaited (October 1991). The writer gave evidence on behalf of the applicant and the aim was to limit the noise to $L_{90} + 10$ dB(A) at the facades of the nearest properties. This evidence was not challenged by Bedfordshire County Council but a considerable revision of the site and the method of working was necessary to show that the limit could be met.

4. CONCLUSION ON METHOD TO BE ADOPTED

4.1 From a consideration of these various documents and decisions, it is concluded that the most appropriate noise level limits are those used by many other local authorities and which is typified by the "Guidelines for Noise Control" published by Surrey County Council. This assessment of the noise from coal extraction and the associated movement of

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overburden is therefore based on an excess of the L_{Aeq} over the L_{90} background noise of not more than 10 dB(A).

This would not apply to site preparation work such as the stripping of topsoil and subsoil or to the construction or removal of the earth screening mounds which would be short-term operations as defined in para 91 of MPG2. It is considered that the appropriate limit for such operations would be that recommended in the Surrey County Council Guidelines, ie, a 1 hr L_{Aeq} of 75 dB(A) at the facades of houses which is equivalent to a free-field level of 72 dB(A).

4.2 It is vital that a comprehensive discussion takes place on the recommendations given in the report "The Control of Noise at Surface Mineral Workings [2] otherwise the daytime limit written into the new MPG dealing with noise will become 55 to 60 dB L_{Aeq} (1 hour) or even the 65 dB L_{Aeq} (12 hour) boundary limit favoured by British Coal. In many areas where minerals are extracted the daytime background noise level is as low as 35 dB(A) and if such limits become the accepted norm the affected areas will certainly become much less pleasant places in which to live.

REFERENCES

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