Proceedings of the Institute of Acoustics

REPORT ON THE FIRST TWO YEARS OF THE INSTITUTE OF ACOUSTICS, CERTIFICATE OF COMPETENCE IN ENVIRONMENTAL NOISE MEASUREMENT

J C Goodchild & B M Gibbs

Acoustics Research Unit, University of Liverpool, PO Box 147, Liverpool L69 3BX

1. INTRODUCTION

Environmental assessment is increasingly becoming part of the UK planning process, with environmental consultancies required to address noise issues in environmental impact assessments. Local authority planning departments are then required to assess the noise issues, frequently taking the advice of environmental health officers (EHOs) with noise monitoring experience. In large local authorities, EHOs are supported by technical and scientific officers who undertake a broad range of measurement work, including environmental noise measurement. In environmental consultancies, noise measurement is frequently undertaken by consultants supported by technical officers with broad areas of responsibility.

Traditionally, the necessary expertise to undertake environmental noise measurement and assessment has a base in an appropriate technical or scientific background and experiential learning, and in attendance at courses such as the Institute of Acoustics, Diploma in Acoustics and Noise Control. Between 1978 and 1993 in the North West, for example, some 200 Diplomas were awarded, a high proportion to local authority EHOs, who had followed this route at Liverpool John Moores University. Many of these have subsequently become corporate members of the Institute of Acoustics.

However, the time scale for acquisition of expertise via this route is not always appropriate. Local authority EHOs moving into pollution control sections for 2 to 3 years, as part of their career progression, may take a substantial part of that time obtaining the Diploma, leaving only a limited period where the authority benefits from their training, before they move on into other areas with different training needs. Chief Officers have identified the need, in some cases, for shorter more sharply focussed training courses, to provide a 'kick-start' for officers taking responsibility for noise pollution and assessment problems.

In response to this identified training need, a programme for a one week 'Certificate of Competence' course was prepared by the Institute of Acoustics. Initially a group of senior EHOs in the North West advised on the syllabus content. Detailed course organisation and syllabus revision became the responsibility of an Advisory Committee,

set up for that purpose, by the Institute of Acoustics as a sub-committee of the Education Committee. The membership of the Advisory Committee has representation from the Chartered Institute for Environmental Health (CIEH) and the Royal Environmental Health Institute of Scotland (REHIS).

Accredited centres with tutors approved by the Institute of Acoustics were established, primarily at approved centres for the Diploma in Acoustics course, but with additional centres not necessarily in educational establishments. Tutors need to have a broad experience of the use of acoustic instrumentation, and have recent experience of environmental noise measurement work, having presented relevant proof of evidence at public enquiry, or submitted noise assessment reports in support of planning applications etc.

The Institute of Acoustics is experienced in offering 'Certificate of Competence' courses. The Certificate of Competence in Work-place Noise Assessment course started in 1989, in response to the Noise at Work Regulations 1989 [1] requirement for occupational noise surveys be undertaken by a 'competent person'. Typical topics for inclusion in general training courses for 'competent persons' are given in Noise Guide No 6 [2]. In excess of 1000 students have been awarded the Work-place Certificate so far, and the course continues to recruit well.

The aims and objectives of the work-place noise course are strictly confined to the Noise at Work Regulations requirements to undertake occupational noise surveys, and where necessary, to make outline recommendations for reducing the occupational noise exposure of workers.

The training requirements for environmental noise measurement are broader based. Environmental noise data is assessed in terms of acceptability to the community, using a wide range of guidance documents, standards and legislation, some of which are listed in Table 1.

It would be difficult to provide detailed training on noise measurement methodology specific to each of these guidance documents. However, there are welcome moves towards standardisation in environmental noise measurement, as illustrated in Figure 1.

PPG24. Planning and Noise. Department of the Environment 1994

PPG22. Renewable Energy. Annex on Wind Energy. Department of the Environment 1993

MPG11. The control of noise at surface mineral workings. DOE 1993

BS5228:1984 'Noise Control on Construction and Open Sites'

BS4142:1990, 'Rating industrial noise affecting mixed residential and industrial areas'

'Calculation of Road Traffic Noise', Department of Transport 1988

'Draft Calculation of Railway Noise', Transport Research Laboratory 1993

BS7445:1991.Acoustics - Description and measurement of environmental noise.
Part 1: Basic quantities and procedures (ISO1996/1:1982)
Part 2: Acquisition of data pertinent to land use (ISO1996/2:1987)
Part 3: Application to noise limits (ISO1996/3:1987)

Design Manual for Roads and Bridges. Volume 11 Section 3 Part 7
'Traffic Noise and Vibration' . Department of Transport 1993

Guide to Health, Safety & Welfare at Pop Concerts & other Similar Events. Draft proposals for guidance by the Health and Safety Commission and the Home Office.

BS8233:1987 'Sound insulation and noise reduction in buildings'.

Code for Practice on Noise from Model Aircraft. Department of the Environment 1982

Code for Practice on Noise from Ice Cream Van Chimes Etc. DOE 1982

Code of Practice on Noise from Organised Off-road Motorcycle Sport. Noise Council 1994

Noise from Clay Target Shooting . CIEH Proposed Professional Practice Note. 1993

Draft Code of Practice for Wind Turbines. DTI/ETSU

Code of Practice on Noise from Pop Concerts. CIEH Working party document. 1993

Table 1. Guidance documents, reports and legislation for environmental noise assessment

When offering advice on factors to consider in relation to industrial noise, PPG24 'Planning and Noise' in Annex 2 'calls up' the rating method of BS4142: 'Rating industrial noise affecting mixed residential and industrial areas'. The measurement methodology and terminology referred to in BS4142 is in turn consistent with that of BS7445:1991 Acoustics - Description and measurement of environmental noise (ISO1996).

THE CERTIFICATE OF COMPETENCE IN ENVIRONMENTAL NOISE MEASUREMENT

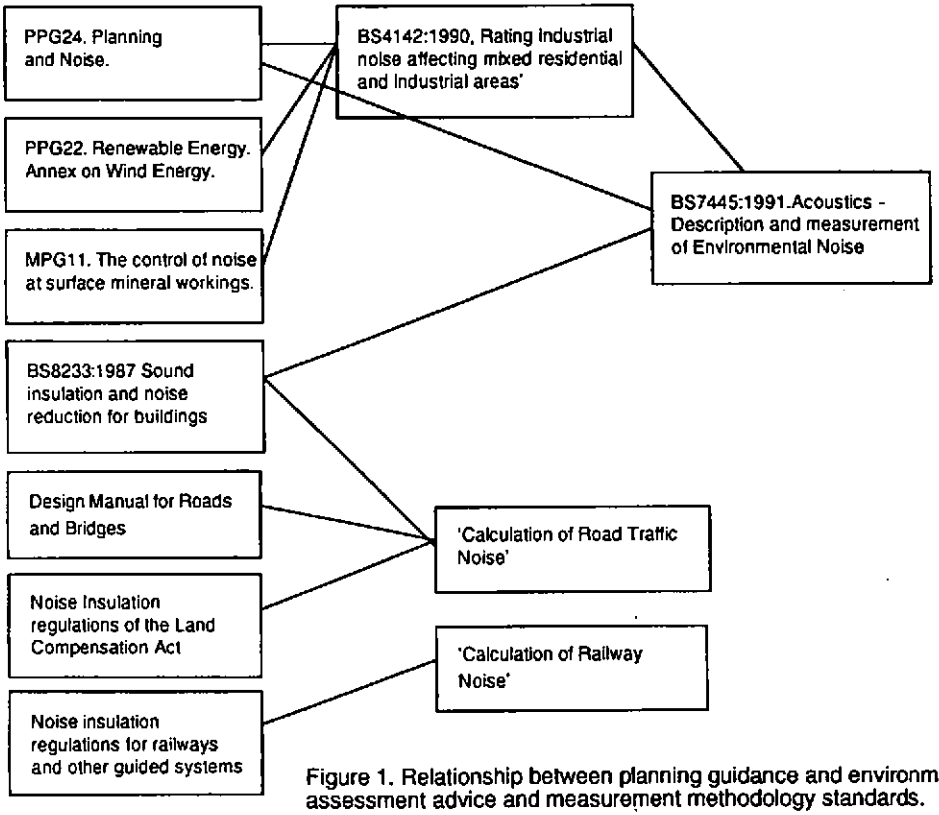

Figure 1. Relationship between planning guidance and environmental assessment advice and measurement methodology standards.

The training provided in the Certificate of Competence in Environmental Noise Measurement course, is concentrated on achieving competence in environmental noise measurement according to BS7445:1991 Acoustics - Description and measurement of Environmental Noise. This should also encourage the student to look critically at other advisory documents, standards and legislation, before commencing a measurement programme, to identify whether the standard measurement methodology is specified or appropriate, or whether a different methodology is necessary.

2. THE AIMS AND OBJECTIVES OF THE CERTIFICATE COURSE

These are a compromise between the consensus view of the knowledge required and what can be achieved in a one week course. The course should be open to students who may have little or no previous contact with the subject. The basics of acoustics terminology, and some manipulative skills with decibels are necessary, but the emphasis is on the correct use of sound level meters for noise measurement.

The aims are to provide students with a basic knowledge of the methodology of environmental noise measurement, including in particular the use, and accuracy requirements, of sound level meters and analysers, and to enable students to be aware of the significance of measurement data against the framework of standards and legislation for environmental noise.

The detailed objectives, expressed in terms of what delegates should be able to do after completing the course, are:

- *Make reliable measurements of background noise and noise from a variety of noise sources, according to the requirements of the relevant British Standard or guidance document.*
- *Present and interpret measurement data in a form suitable for inclusion in reports.*
- *Demonstrate an ability to measure noise levels in a manner appropriate to established rating procedures, guidance documents and standards set by local authorities.*
- *Identify in outline the principal methods of noise control to mitigate the impact of noise on the community.*
- *Explain the noise measurement methodology, data and interpretation in reports and environmental appraisals, and in proposals for mitigation of noise impacts.*

3. THE COURSE PROGRAMME

There has been continuous development of the course since its inception in 1993, with some components increasing in relative importance in response to comments from students, college tutors and Advisory Committee members. At present, typically four

hours are devoted to the basic concepts of noise units, and a similar period to acoustic instrumentation, including field and laboratory calibration of sound level meters.

Five hours are devoted to discussion of noise indices and measurement methodology for environmental noise, including: the methodology of BS7445, PPG24, Calculation of Road Traffic Noise, the BS4142 rating procedure for predicting complaints from industrial noise affecting residential property, BS5228 for construction site noise, and MPG11 for noise from surface mineral workings.

Emphasis is given to acquiring hands-on experience and over ten hours is spent on practical exercises on the use of sound level meters, including field survey exercises and data interpretation and report preparation.

An outline treatment of noise propagation and control is given (3.5 hours), where the effects of distance, reflection, and propagation from point and line sources are considered. Standard noise control techniques, including enclosures, barriers, and the use of absorption and insulation, referring to the source-path-receiver model, are dealt with briefly. Planning measures to control external noise in dwellings are discussed, referring to BRE report BR238 'Sound Control for Homes'[3].

4. THE WRITTEN AND PRACTICAL TESTS

There is a 2 1/2 hour written examination, set and moderated by the Institute of Acoustics, and taken simultaneously at all centres. The paper has two components: the first is of ten compulsory short questions, and the second of two answers from three questions. This is supported by a practical test taking about 1 hour, which includes a written report, which is also assessed. The practical test typically involves a BS4142 rating of an industrial noise source, including measurement of background noise.

The written examination is intended to test basic decibel manipulative skills, and knowledge about acoustic instrumentation and measurement methodology. The pass rate for the compulsory section is set at 70%, and for the elective section, 60%. The pass mark for the practical test performance and the report is 70%.

On successful completion of the course, students are presented with a certificate worded as follows: *This is to certify that ..... has completed a course of instruction approved by the Institute of Acoustics and designed to enable the candidate to undertake environmental noise measurement in a competent manner, and has achieved*

a satisfactory performance in the written and practical tests thereof and that this fact has been recorded in a register kept by the Institute.

5. CONTINUING PROFESSIONAL DEVELOPMENT

The Royal Environmental Health Institute of Scotland and the IOA have entered into a joint agreement, with the IOA and its approved centres as course providers. The Certificate of Competence is awarded jointly by the IOA and REHIS. Bell College of Technology, Hamilton, has applied to become an approved centre for the course, and applications from other colleges and universities in Scotland would be welcomed.

The Chartered Institute for Environmental Health does not have the resources to accredit individual courses for CPD purposes [3]. It is up to individual members to judge whether courses attended contribute to CPD, and if so, how many hours of relevant activity were involved .

6. EXPERIENCE IN RUNNING THE COURSE

The course has run on six further occasions since its launch in June 1993. The annual cycle includes examinations in March, June and November. The total number of students examined is 200 to date. The commitment of the students has been excellent, with a pass rate of 93%. The failures are often the result of exam nerves, or the lack of recent examination experience and technique, rather than incompetence.

Students often have good communication skills (with the public), sometimes have a good knowledge of the legal framework, and hands-on ability in using instrumentation is rarely a problem. It is basic mathematics and dB manipulation using calculators that generally causes concern, and this can distort the balance of work during the week. Students are asked to complete a set of numerical calculations sent out a week before attending the course, as pre-course preparation, but for weaker students the difficulties can continue throughout the course.

The written examination has certainly provided the stimulus for students to work hard. However, with the examination looming at the end of the week, students have naturally concentrated on getting a few basic calculations right, and knowing those basic facts that are frequently asked for on examination papers. There may consequently, be a tendency for them to lose sight of the broader subject areas discussed on the course.

The weather dependence of the course can cause problems. While a flexible time-table can help, the careful interspersion of lectures and practical work during the week is important. Interpretation of measurement data for inclusion in draft reports is an effective way of developing confidence in decibel manipulation. Some practical exercises can be undertaken in an anechoic chamber, but this is a poor substitute for field measurements, where prevailing weather conditions are carefully monitored.

Whilst the examination must be taken simultaneously at all centres, the mode of attendance varies. Some centres, including the University of Liverpool, run the course on a one week, full-time basis, with the examination at the end of the week. This mode of attendance suits many employers and students, particularly those from outside mainland UK. The University of the West of England prefers the students to attend three days in the first week, with two days, including the examination in the following week. North East Surrey College of Technology offers the course on a one week, full-time basis, with the students returning a week later to take the written and practical tests. It is a demanding undertaking for students to complete the taught course, the practical test and the written examination in one week, but they rise to the challenge, and leave with a sense of achievement.

The final question, of course is "Are the students who complete the course competent?". While there is little doubt about the 'value added' benefits of attending the course, the level of competency attained varies, even amongst students who pass the written and practical tests, depending on students' ability, technical background and experience when they join the course. It might be appropriate to award a Certificate of Competence some time after students complete the course, when they have had the opportunity to gain experience of environmental noise measurement, and can show evidence by submission of reports that they have produced or contributed to. The course is continually under review, and the Advisory Committee would welcome constructive suggestions for changes in course material, method of delivery and assessment.

7. REFERENCES

[1] STATUTORY INSTRUMENTS. 1989 No.1790. The Noise at Work Regulations 1989

[2] HEALTH & SAFETY EXECUTIVE. Noise Guide No 6. HMSO London. 1990

[3] BUILDING RESEARCH ESTABLISHMENT/CONSTRUCTION INDUSTRIES RESEARCH AND INFORMATION ASSOCIATION 'Sound Control for Homes'. BRE238

[4] J BARLOW, Assistant Director (Education), CIEH. 1993 (*Private communication*)