NPL REPORT CMAM 40

REPORT

AN INVENTORY OF UK RESEARCH ON NOISE AND HEALTH FROM 1994 TO 1999

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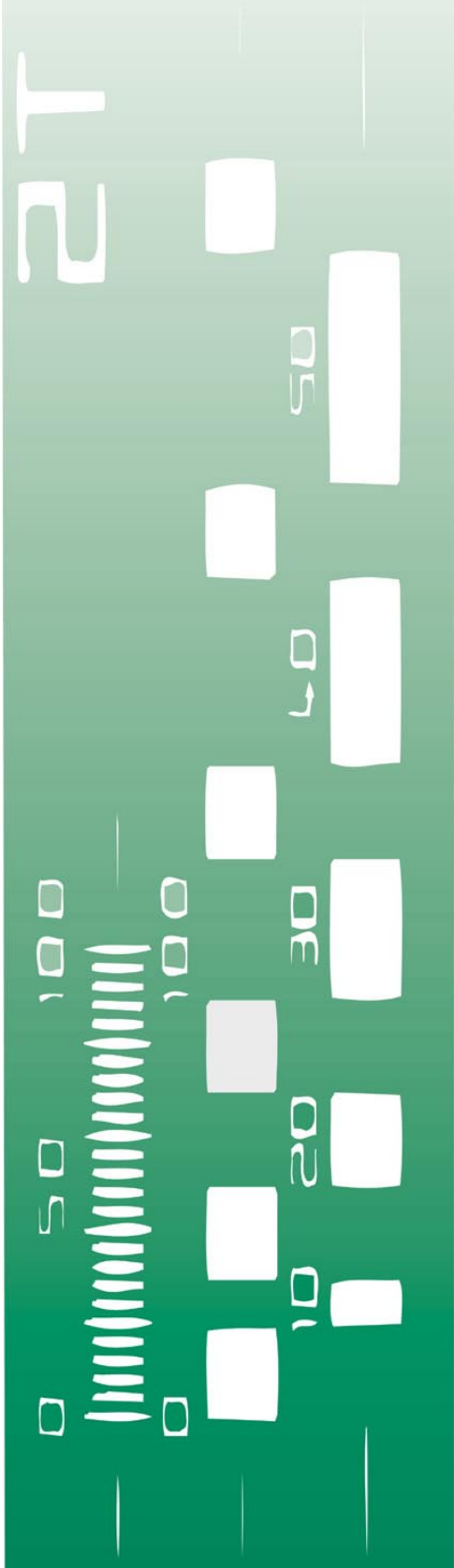

NPL
National Physical Laboratory

AN INVENTORY OF UK RESEARCH ON NOISE AND HEALTH FROM 1994 TO 1999

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ABSTRACT

At the European Commission's Copenhagen Conference in September 1998, the various Working Groups involved in the development of a new Directive on the Assessment and Reduction of Environmental Noise were formally established. This included WG2 Dose/Effect. Clearly, in fulfilling its Terms of Reference and meeting its various objectives, it was important for this Working Group to take full account of the considerable amount of research already reported on health effects and relevant research currently in progress in various Member States. In order to assist the Chairman of WG2 in this work, at the end of 1998, he requested all Member States represented on WG 2 to undertake research in order to provide the following information only in respect of their own countries;

1. An inventory of noise and health research projects currently in progress, and an inventory of work completed in the years 1994-98. This was to exclude direct effects on hearing.
2. An evaluation of this research in order to identify an inventory of research requirements.

This report presents the inventory of research in the UK and discusses research requirements arising from the inventory. Research requirements identified at the 1997 Institute of Environment and Health Seminar on Non-auditory health effects of noise, and requirements listed recently by a Task Group of the World Health Organisation are included in this report.

It is intended that the results of the activity by WG2 members, of which the present report is a part, will feed directly into the specification of research to be done during 1999 to 2002 and into the Position paper which the Chairman and Co-Chair of WG2 are required to produce for the Commission by August 2002.

The background research detailed in this report provides an opportunity to influence the outcome of the work of WG2 in the form of direct involvement in the development of arguments in the key Position Paper. Amongst other things this report will influence directly the various Commission "Targets" for national, regional and local authorities. It will also greatly assist the DETR and Department of Health in decisions on the funding of future studies within their own research programmes, and provide a valuable context against which to judge work in progress or completed in other countries.

The material included in the inventory is also available in electronic format, accessible from either the NPL or DETR Web sites at the following addresses:-

http://www.npl.co.uk/npl/acoustics/detrinventory/index.html
http://www.environment.detr.gov.uk/airq/nnp/index.htm

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1. INTRODUCTION

Since the Copenhagen Conference in September 1998 (1), the various European Commission Working Groups working towards a new Directive on the Assessment and Reduction of Environmental Noise can be considered as well established. The Terms of Reference of EC WG2 are given here as Annex 1. The position of WG2 Dose/Effect relative to the other EC WGs is shown in Annex 2.

Clearly, in fulfilling its Terms of Reference and meeting its various objectives, it was important for this Working Group to take full account of the considerable amount of research already reported on health effects and relevant research currently in progress in various Member States. In order to assist the Chairman in this work, at the end of 1998, he requested all Member States represented on WG 2 to undertake research in order to provide the following information only in respect of their own countries;

1. An inventory of noise and health research projects currently in progress, and an inventory of work completed in the years 1994-98. This was to exclude direct effects on hearing.

2. An evaluation of this research in order to identify an inventory of research requirements.

The initial report on item 1 was to be made at a meeting of WG2 in Paris on January 6 1999, although it was accepted that this left insufficient time for a proper assessment of research completed and in progress. Further discussion of the inventory was included on the agenda of the WG2 meeting in Leiden on February 28 1999.

It was intended that the results of this activity by WG members would feed directly into the specification of research to be done during 1999 to 2002 and into the Position Paper which the Chairman and Co-Chair are required to produce for the Commission by August 2002.

This report goes beyond the work completed by NPL (2) in Report CMAM16 - *Health effect-based noise assessment methods: a review and feasibility study* - in a variety of ways. Essentially that report was a review of other composite reviews, whereas the present task requires closer examination of the primary research solely from a UK viewpoint. Given the short time scale of the work leading to the publication of Report CMAM16, there was no opportunity to examine directly individual papers and reports. It is also true to say that the authors of the reviews which were studied may not have included all UK work since many reports for Government Departments and other reports may not have been picked up in the searches which preceded the review activity.

The second main aspect of this new work concerns evaluation of the research identified in the inventory in order to identify research needs. The assessment of future research needs in the NPL report CMAM 16 was rather specialised and as such not relevant to the WG2 task, in that it concerned the strategic value of health effects research to organisations such as the DETR, faced with making decisions on

environmental noise standards, and the implications of this for the design of future research studies.

The background research detailed in this report provides an opportunity to influence the outcome of the work of WG2 in the form of direct involvement in the development of arguments in the key Position Paper. Amongst other things this paper will influence directly the various Commission "Targets" for national, regional and local authorities.

The aim of this work was to summarise the current state of the art on research on noise and health in the UK, and make recommendations on the direction of future research. The purpose was to assist the DETR and Department of Health in decisions on the funding of future studies within their own research programmes and to provide a context against which to judge work in progress or completed in other countries.

2 WORK STRATEGY

2.1 Inventory of Current research

The first objective was an inventory of current work on noise and health in the UK. Occupational noise and the effects of noise on hearing were excluded. Naturally the projects currently approved by DETR/DoH which arose from the May 1997 IEH Seminar (3) were included (see Annex 3). In addition an extensive search was made using the NPL Main Library on-line databases such as the publication on CD-ROM "Current research in British Universities". Direct email enquiries were made to known contacts in universities, industry, and Government such as,

Dr Ian Flindell of ISVR, University of Southampton
Mr Ralph Weston of RAF Institute of Health
Mr Keith Broughton of HSE
Miss Nicole Porter of National Air Traffic Services (NATS) Ltd
Professor Stephen Stansfeld of UCL [now Queen Mary and Westfield College]
Professor Dylan Jones of Cardiff University
Professor Jim Horne of Loughborough University
Professor Andy Smith of University of Bristol [now Cardiff University]
Dr Ken Hume of Manchester Metropolitan University
Professor Judy Edworthy of Plymouth University
Mr Colin Grimwood of the Building Research Establishment
Dr Bridget Shield of South Bank University
Mr Geoff Kerry of Salford University
Professor Shirley Thompson of the University of South Carolina, USA

Information held by DETR arising from the activities of the Noise Research Advisory Committee (NRAC) was acquired. A request was also submitted to the Noise Research Network, an email based network for the exchange of information on research on noise, organised by Dr Manjula Patrick of the Institute of Laryngology and Otology at UCL in association with the international journal Noise and Health.

The email request related to this, which is identical to that sent to individual contacts is reproduced as Annex 4.

2.2 Inventory of Research 1994-1998.

The second objective was the inventory of work completed in the period 1994-1998. The same on-line databases and the DETR records re. NRAC were searched historically. The Proceedings of key conferences such as Noise and Man '93 and Noise Effects '98 plus the annual Internoise conferences for the years 1993 to 1998, and the main scientific journals were searched for UK research. Direct enquiries were made to the same contacts as above to establish details of work completed by their own organisations and work which the contacts knew of which had been completed by other UK organisations.

2.3 Inventory of research requirements.

The research material catalogued above was evaluated critically and systematically in order to establish the requirements for further research from a UK viewpoint. This was combined with material in previous reports such as the report of the IEH May 1997 Seminar (3) to lead to an inventory of research needs.

3. INVENTORY OF UK RESEARCH

3.1 WG2 Inventory of Research

During the meeting of the EC WG2 in Paris in January 1999, it was decided that a common format should be adopted for the inventory submissions by the various Member States. Thus both current and past research was to be categorised under the following headings.

Project leader/Affiliation (country)
Subject Area
Project title
Objectives
Date
Published literature

The various items for the inventory, acquired by the various methods outlined in the Work Strategy above, were developed into a database using Microsoft Access™. The material contained in the Inventory of UK Research was submitted to the Chairman of WG2, Mr Jacques Lambert, in time for collation into the EC-wide database and for consideration at the meeting of WG2 held in Leiden, Netherlands on February 26 1999. The combined database contains more than 140 studies carried out in Europe, Australia, Japan and the USA. Within the next two years, in depth analysis of this existing material will be carried out within WG2 in order to provide dose/effect relationships and threshold levels for annoyance, sleep disturbance and speech interference.

3.2 Inventory of Research 1994-1998 and Current Research.

The inventory identifies 38 entries as completed shown in Table 1 listed in order of subject area and in Table 2 listed by project leader. 13 entries are identified as

on-going work shown as Table 3 listed in order of subject area, whilst Table 4 shows the same material listed by Project Leader.

3.4 Electronic form of the Inventory of UK Research

The material included in Tables 1 to 4 has also been prepared in electronic format, this will enable searching of the inventory for key words etc. The inventory can be accessed from either the NPL Website or on the DETR Web site at the following addresses:-

http://www.npl.co.uk/npl/acoustics/detrinventory/index.html

http://www.environment.detr.gov.uk/airq/nnp/index.htm

4. RESEARCH REQUIREMENTS.

4.1 Requirements Arising from the Inventory

A "master" copy of most of the publications listed in the inventory has been filed at NPL and studied with particular reference to comments or specific recommendations on requirements for further research (some work had not resulted in published material or material was not available at the time of gathering the information) Requirements identified by this process are listed as follows, in the form, in most cases, of verbatim extracts from the originals.

No attempt has been made at this stage to group suggestions by subject or other classification, or to identify duplications etc.

- Research should be carefully designed not only in its planning and execution but also in terms of setting precisely defined and achievable objectives (2).
- Consideration should be given to developing methods to identify vulnerable groups and then using such groups for future research studies to facilitate identification of health effects which otherwise might be difficult to observe in the general population (2).
- It is more important to make small but scientifically defensible steps along the way towards a complete understanding than to try to understand the overall problem in one hit and probably fail (4).
- More research into the link between chronic physiological effects and stress[1] (4).
- Further research is needed to develop an Acoustic Feature model to describe annoyance reactions to complex noise environments (5).
- greater attention should be paid to estimating the physical noise exposure more comprehensively and accurately (6).

[1] For a discussion of the various aspects of the "stress" reaction to noise, the reader is referred to the report of the 1997 IEH Seminar (3).

- use of psychoacoustic techniques (loudness, roughness, sharpness etc.) and personal dosemeters are necessary to appropriately describe sound and to distinguish sufficiently among sound environments (e.g. low frequencies) (7).
- the observed exposure range in many studies is not sufficient or is truncated, and group sizes at the various noise levels are too small to allow dose response analysis (7).
- because traffic noise occurs jointly with other ambient exposures (vibration, air pollution) it is necessary to characterise these as well (7).
- because noise - more than other pollutants - interacts with other daily stressors (work schedules, family stress, social support) it is necessary to measure the total amount of stress at a specific setting (7).
- Concentration on vulnerable groups may be a promising approach (7).
- coping activities/styles and coping resources available to escape from the noise should be studied more often in relation to behavioural and health outcomes (7).
- behaviours such as alcohol, tobacco or drug use, and potential biochemical mediating factors of cardiovascular outcomes such as magnesium deficiency, fibrinogen and serum lipids should be at the centre of noise epidemiology that touches on cardiovascular outcomes (7).
- the most obvious potential mediator bundle - annoyance/affectedness or interference - has not yet been sufficiently studied (7).
- refinement in standardisation of health outcome measures should be pursued further (7).
- It is vital for the establishment of effects to study the appropriate time window, e.g. for the time of onset of cardiovascular outcomes (7).
- the whole range of potential non-auditory effects needs to be studied concurrently (7).
- possible “after effects”, e.g. accidents, effects on the immune system and hypotension should be studied in further detail (7).
- Future research (on auditory distraction) should concentrate on further refinement of the acoustic factors associated with streaming at a level of granularity far finer than has been employed hereto (8).
- Pin pointing foci of noise effects on childrens’ cognition, maybe with laboratory experiments, is a possible future research line (8).
- There is a need for further field studies in the area of irrelevant sound and speech (8).
- Further investigation of the long term effects of aircraft noise on cognitive performance and stress in larger samples of children are urgently needed (9).
- combining noise with pharmacological challenges, and the use of brain scanning, we may gain a better understanding of what noise is doing to the brain (10).
- Noradrenaline changes can account for the effects of noise in low alertness situations and it is now important to determine other mechanisms underlying effects of noise (11).

4.2 Requirements from IEH Seminar Report R10

In addition to the above recommendations arising from the current inventory of published research, it is useful to recall the research requirements itemised at the conclusion of the report (3) of the important Seminar on Non-auditory health effects of noise, held at the MRC Institute of Health and the Environment in May 1997**.** Key points from that are as follows:

MEASUREMENTS OF EXPOSURE AND EFFECT
Greater attention should be paid to the need for standardisation of measures of effects and measures of noise exposure. More work on noise characterisation could possibly be incorporated into ongoing studies such as the Speedwell and Caerphilly studies. A secondary analysis of noise exposure might also be possible in some ongoing studies of other factors disturbing sleep. Future research on noise exposure should be directed to:

- better sound characterisation (noise level, noise source, nature of noise, e.g. barking, music, traffic noise etc.), ideally carried out (preferably at the individual level) at the same time that health outcomes are investigated;

- investigation of the best measure (s) that should be used to quantify different kinds of noise associated with different health outcomes, taking into account the consideration that it is not possible to identify one single parameter for quantifying noise levels;

- studies on links between acute and chronic effects of noise exposure.

SLEEP
As noted above, longitudinal studies are far more informative than cross-sectional studies, and should, therefore, be encouraged. However, it is recognised that longitudinal studies are likely to be costly (e.g. £7-8 million for a comprehensive study). It would also be beneficial to combine studies of the effects of noise with those of other factors that disturb sleep in order to establish the relative importance of noise, although such studies would require large numbers of subjects. The following studies are particularly recommended:

- longitudinal studies of the impact of changes in noise exposure, paying particular attention to the possibility of investigating natural experiments such as the re-siting of airports or the Channel Tunnel, or populations such as shift workers;

- studies on time taken to fall asleep, effects of noise during sleep, premature awakening and after-effects of noise-disturbed sleep such as performance next day, sleepiness the next day and psychosocial well-being;

- intervention studies on measures taken to counter the effects of noise;

- studies on susceptible groups and sensitive individuals (if they can be identified by some objective physiological measure, the establishment of which would require preliminary laboratory studies) - studies should

concentrate on groups where there are a high percentage of complaints or high levels of exposure or both;

- studies on noise sources other than aircraft and on noise from combinations of sources.

PERFORMANCE

In assessing performance effects there is a need not only to describe the effects caused by noise, but also to develop a theoretical framework to enable the interpretation of different types of study. This will require precise descriptions of the performance tasks being assessed. The widest possible population range should be studied. Suggested studies are:

- investigation of the effects of irrelevant speech, in particular what type of work task is impaired;

- comparisons of laboratory and field studies;

- the effect of background music on performance;

- longer-term studies in occupational settings.

HYPERTENSION

As any effect would be expected to be very small, a very large study would be needed to investigate the influence of environmental noise on hypertension. It is therefore recommended that the effect of noise on hypertension should first be investigated by longitudinal occupational studies. Should studies of environmental noise then be justified, it would be easier to study, for example, road traffic noise than aircraft noise, as a larger population would be likely to be affected.

ISCHAEMIC HEART DISEASE

Again, though the high cost is likely to be a limiting factor, longitudinal studies are preferable, with careful measurement of duration and intensity of individual exposure, and a more comprehensive adjustment for potential confounding factors than has been the case in many studies reported to date. Although case-control studies of patients with ischaemic heart disease can be informative, there will often be difficulties in characterising noise exposure. Cross-sectional studies are unlikely to be informative. Specific studies should investigate:

- people with a family history of hypertension;

- the role of annoyance and coping strategies, which could affect the risk for ischaemic heart disease.

FOETAL EFFECTS

Characterisation of noise exposure, including level of noise and duration of exposure is particularly important and should be an essential feature of all future studies. All studies should give adequate consideration to confounding risk factors. The following studies are recommended:

- studies of intrauterine growth retardation specifically and separately from low birth weight and prematurity, with personal dosimetry throughout pregnancy if possible and control for other stressors and other strong risk factors;

- multi-centre studies of pregnancy outcome, with pregnant mothers stratified according to noise dosimetry;

- studies of pregnancy outcome in mothers exposed to L_{Aeq} >70dB and L_{Aeq} >90dB - these would necessarily have to be occupational studies;

- evaluation of the Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC) study to see if noise exposure during pregnancy can be estimated.

ENDOCRINE AND IMMUNE RESPONSES

Longitudinal studies with adequate control of potential confounding factors should be encouraged. The effects of noise on the hormonal and immune systems may best be studied by considering noise as one of the possible causative factors in ongoing studies investigating such health impacts. Other recommended studies include investigation of:

- changes (increases and decreases) in hormone levels in association with noise exposure and the associations between noise exposure, performance and hormone levels;

- the effects of noise on immune system function;

- hormone levels as markers of effect in studies of noise and the cardiovascular system.

PSYCHIATRIC DISORDERS

Longitudinal studies looking at changes in noise exposure (which should be well characterised) will be the most informative. There is also a need for the development of more detailed and comprehensive measures of psychiatric disorders, including a wider range of outcome measures than has been the case to date. Particularly informative would be studies to investigate the relative role of noise in comparison with other environmental stressors and coping strategies. Recommended studies are:

- an investigation of the effects on health of living in close proximity to a busy road, including an investigation of the relative influences of road traffic noise, safety, air pollution, road surface, coping strategies (such as closing windows, living to the rear of the house) etc.;

- longitudinal studies of populations recently exposed to a new noise source;

- a case-control study of prescriptions issued for treatment of anxiety disorders, with a retrospective assessment of noise exposure;

- studies on the relative effects of noise and other factors, such as housing, in causing anxiety disorders.

ANNOYANCE

As already mentioned, sound characterisation is particularly important to enable the determination of what kinds of noise are particularly annoying. As studies of systematic changes in noise character are difficult to conduct in the field, there will be a role here for laboratory studies. The following studies are recommended:

- studies on annoyance in combination with studies on coping strategies;

- studies on the link between annoyance and stress, including investigation of the extent to which behavioural impacts lead to physical health effects such as stress;

- additional laboratory studies on the effects of systematic changes in noises of different types;

- further investigations into how readily individuals can discriminate between different noise sources.

CHILDREN

As an adjunct to longitudinal studies on performance and physiological effects such as hypertension, laboratory studies could be used to investigate more specific effects such as the type of memory that is most affected by noise. Epidemiological studies should be used to investigate effects in large numbers of children, over a range of schools, and should include studies on particularly vulnerable groups within the child population. Experimental studies would be less expensive than epidemiological studies and would involve a far more homogeneous group than is normally the case in general population studies. In both epidemiological and laboratory studies effects should be investigated at different age levels. Recommended studies include:

- investigation of the effects of noise on blood pressure in children;

- studies of the effects of noise on speech perception;

- experimental studies of effects on memory, including intervention studies on counter measures such as insulating classrooms;

- an investigation to determine whether some cognitive measures are more affected by noise than others;

- studies to determine whether noise effects on cognition are paralleled by effects in other response systems, such as stress hormones and blood pressure, and if so whether there is a causal connection.

4.3 Requirements from the World Health Organisation Task Group

A meeting was recently held (April 26-30, 1999) in London of experts preparing a revision of WHO Guidelines for Community Noise (12). Professor Shirley Thompson, author of a number of reviews on this topic (13,7), acted as Rapporteur for this meeting and produced a list of "Statements on research needs" listed as follows:

Research related to direct and/or long -term health effects (sensitive risk groups , sensitive areas and combined exposures

1. Identification of potential risk groups, including identification of sensitive individuals (such as people with particular health problems or people dealing with complex cognitive tasks, the blind, hearing impaired, young children and the elderly), differences between sexes, discrimination of risk among age groups, and influence of transportation noise on pregnancy course and on foetal development.
2. Studies of dose-response relationships for various effects and continuous transportation noise at relatively low levels of exposure and low number of noise events per unit time (including traffic flow composition)
3. Researching combined health effects of traffic noise, especially considering the distribution of sound levels over time and sub-environments (time-activity pattern) of populations.
4. Comprehensive studies of combined noise sources on combinations of health effects in the 3 main areas of transport (road, rail and aircraft).
5. Studies on perception of control of noise exposure, genetic traits, coping strategies and noise annoyance as modifiers of the effects of noise on the cardiovascular system and as causes of individual variability of response to noise.
6. Prospective longitudinal studies of transportation noise that examine physiological measures of health including standardised health status inventory, blood pressure, neuroendocrine and immune function.
7. Procedures for evaluating the various health effects from complex combined noise exposures over the 24 hours on vulnerable groups and on the general population.
8. Methods for assessing the total health effect from noise immission (and also other pollution) in sensitive areas (e.g., airports, city centres, and heavily trafficked highways).
9. Knowledge on the health effects relevant to low-frequency components in noise and vibration.
10. Protocols for reliable measurements of high-frequency hearing (8000 Hz and above) and evaluation of such measures as early biomarkers for hearing loss/deficits.

Research related to indirect or after effects of noise exposure

11. Field studies on effects of exposure to specific sounds such as aircraft noise and loud music, including effects such as noise-induced temporary and permanent threshold shifts, speech perception and misperception, tinnitus and information retrieval.
12. Studies on the influence of noise-induced sleep disturbance on health, work performance, accident risk and social life.
13. Assessment of dose-response relationships between sound levels and politically relevant variables such as noise-induced social handicap, reduced productivity,

decreased performance in learning, workplace and school absenteeism, increased drug use and accidents.

14. Determination of, e.g., by longitudinal studies, the form of the causal connection between mental health effects, annoyance and (spontaneous) complaints in areas e.g., around large airports, heavy- trafficked highways, high-speed rail tracks, and heavy vehicles transit routes.

Research on the efficiency of noise abatement policies which are health based

15. Determination of accuracy and effectiveness of modern sound insulation (active noise absorption), especially in residential buildings, for reducing long term annoyance/sleep disturbance/speech intelligibility by studying sites which provide data on remedial activities and change in behavioural pattern among occupants.
16. Evaluation of environmental (area layout, architecture) and traffic planning (e.g., re-routing) interventions on annoyance, speech interference, and sleep disturbance.
17. Comparative studies related to equity in access to healthier lives of children and the hearing impaired vs. regular grown-ups in noise-exposed areas.
18. Development of a methodology for environmental health impact assessment of noise applicable in developing as well as developed countries.

Research related to monitoring systems for health effects

19. Development of continuous monitoring systems for direct health effects in critical locations.
20. Development of a global noise impact monitoring study designed to obtain longitudinal data across countries on the health effects experienced by communities because of the various types of environmental noise. A baseline survey could be undertaken in both developed and developing countries and monitoring surveys conducted every 3-5 years. Since a national map of noise exposure from all sources would be prohibitively expensive, periodic surveys of a representative sample of about 1000 people using standard probability techniques could be reliably generalised to the whole population of a country with an accuracy of plus-or-minus 3%. A small number of standard questions could be used across countries to obtain comparative data on the impact of all the main types of noise pollution.

Research into positive acoustical needs of the general population and vulnerable groups

21. Development of techniques/protocols for the design of supportive acoustic environments for the general population and for vulnerable groups in regard to time periods which are sensitive from a physiological, psychological and socio-cultural point of view.

5. CONCLUSIONS

An inventory of UK research on noise and health has been compiled both in conventional form - this report - and in electronic form allowing searching on key words etc. The inventory has been submitted to the European Commission Working Group 2 Dose /effect, where it will form part of a Europe-wide inventory used to guide consideration of future research. Information on this broader inventory is available from the authors at NPL. A compilation of research requirements arising from the inventory has been made and listed together with requirements identified during the course of the IEH Seminar in 1997 (3) and those arising from a recent meeting of a WHO Task Group. Although limitation on resources has not permitted a complete classification or prioritisation of these various requirements, some general observations can be made. Much has been written about the need for better design of research studies, including the need for longitudinal designs, with better quantification and standardisation both of noise exposure parameters, and of health outcome indicators. Allied to this is the perceived need to consider complex physical situations with multiple sources of noise and also other pollutants. Finally we would observe that there appears to be a "polarisation" between those who argue for a set of linked small scale studies, moving in stages towards a better overall understanding, and those who promote the development of complex theoretical models of the health impact of noise to be tested in complex multi-factor situations.

6. REFERENCES

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7. ACKNOWLEDGEMENTS

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8. INVENTORY TABLES

Table 1 - Inventory of completed work sorted by subject area

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
	I Ertoren & A P Smith - University of Bristol (UK)	A cross-cultural study of the effects and after-effects of noise	Examination of whether students in Turkey and the UK respond differently during and after exposure to noise	1998	Proc. Noise Effects 98, Vol 1, p407-410
Annoyance	Dr B M Shield - South Bank University (UK)	Subjective Response to Low Frequency Sound	A laboratory sudy of the effects of spectral shape on annoyance caused by sound	Completed Nov 1998	None given
Annoyance	G Kerry - University of Salford (UK)	The management of light aircraft and microlight noise at military airfields	Literary reveiw and summary of complaints at airfields in the UK	1997	Proc Internoise 97 Vol III, p1223-1226
Annoyance	J Seller - BRE (UK)	Clay target shooting noise	Investigate dose/response relationship	1996 - 1997	Clay Target Shooting Noise, Proc. IOA Autumn Conf, Nov 1997
Annoyance	H G Leventhall - Digisonix Inc (UK)	The role of low frequency noise and infrasound in sound quality	Explores the link between sound quality and complaints of noise	1995	Proc. Internoise 95, p 933-936
Annoyance	C G Rice - ISVR (UK)	Quantifying annoyance potential of environmental noise		1995	Proc. ICA 95, p263-266
Annoyance	B F Berry - NPL (UK)	The evaluation of acoustic features in industrial noise	Subjective listening tests on judged annoyance of specific types of industrial noise	1994	Proc Internoise 94, Vol 2, p803-808

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Combined effects (multiple noise sources and/or effects)	DoT (UK)	Quality of noise and noise nuisance	To establish what extent noise levels measured in dB (A) correlate with percieved noisiness from road traffic sources and whether alternative established metrics provide improved correlation	Not given	None given
Combined effects (multiple noise sources and/or effects)	RAF IoH/CSSB/ISVR (UK)	Startle effects	To understand the mechanics of startle. To determine any possible health outcomes. To relate startle effects with those from low flying aircraft.	Not Given	None given
Combined effects (multiple noise sources and/or effects)	C Cobbing - London Borough of Hillingdon (UK)	Perception and significance of transportation noise changes		1998	Proc. IOA Vol 20 Part 1 (1998)
Combined effects (multiple noise sources and/or effects)	Bernard Berry - NPL (UK)	Health effect-based noise assessment methods: a review and feasibility study	Explore the idea of effects based standards for exposure to environmental noise	1998	NPL Report CMAM 16, September 1998 Proc. Noise Effects 98, Vol 2, p729-732
Combined effects (multiple noise sources and/or effects)	G Kerry - University of Salford (UK)	The assessment of noise from low flying military jet aircraft in the community		1998	Internoise 98

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Combined effects (multiple noise sources and/or effects)	B P Ludlow - RAF (UK)	Are the benefits of modern transport outweighed by the health effects caused by its noise		1998	Proc. IOA Vol 20 Part 1 (1998)
Combined effects (multiple noise sources and/or effects)	C Whitehead - Manchester Metropolitan University (UK)	Cardiovascular responses to aircraft noise in sleeping subjects	Investigate cardiovascular arousals, during sleep, due to aircraft noise, using data collected in a previous field study (Ollerhead et al 1992)	1998	Proc. Noise Effects 98, Vol 2, p471-474
Combined effects (multiple noise sources and/or effects)	M M Haines & S A Stansfeld - University College London (UK) R F S Job (Australia), B Berglund (Sweden)	Chronic aircraft noise exposure and child cognitive performance and stress	Compare the cognitive performance and stress of children attending four schools exposed to high levels of aircraft noise with childrenattending four matched schools exposed to lower levels of aircraft noise around Heathrow Airport	1998	Proc. Noise Effects 98, Vol 1, p329-335
Combined effects (multiple noise sources and/or effects)	A Smith - University of Bristol (UK)	Noise, neurotransmitters and performance		1998	Proc. Noise Effects 98, Vol 1, p346-351

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Combined effects (multiple noise sources and/or effects)	Medical Research Council - Institute for Environment and Health (UK)	IEH Report on The Non-auditory Effects of Noise	To asses the strength of the evidence for any causal association between adverse health effects (other than auditory effects) and exposure to noise from environmental source; and to identify gaps in knowledge and make recommendations for future research, taking into account the balance between the likely benefit and the research effort that will be required.	1997	IEH Report R10, ISBN 1 899110 14 3
Combined effects (multiple noise sources and/or effects)	B P Ludlow - RAF (UK) I H Flindell - ISVR (UK)	An overview of noise and health effects - one way forward?		1997	Proc Internoise 97 Vol III, p 1199-1202
Combined effects (multiple noise sources and/or effects)	Nicole Porter - NPL (UK)	Night noise contours: a feasibility study	Examine the causes of annoyance, investigate prediction models for night time annoyance, review existing dose-response relasionships used to assess effects, applicability of existing night time proceedures	1997	NPL Report CMAM 4 December 1997

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Combined effects (multiple noise sources and/or effects)	DETR (UK)	Investigation into domestic noise complaints	To provide information on the main sources giving rise to domestic complaints. To determine the reason for complaints. To view the noise complaint from the perspective of the complainant, the noise maker and the local authority.	1997	None given
Combined effects (multiple noise sources and/or effects)	J Sargent - BRE (UK)	A study of environmental low frequency noise	Increase understanding of low frequency noise complaints	1993 - 1995	A study of environmental low frequency noise complaints, Proc IOA Vol. 17: Part 4, 1995
Combined effects (multiple noise sources and/or effects)	DoE (UK)	Response to transportation noise	To produce a general model relating to people's response to noise exposure which will provide a common measure for the assessment of noise from all forms of transportation, cover a wide range of noise levels and enable the efficiency of noise control measures to be considered.	1994	None given

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Combined effects (multiple noise sources and/or effects)	C Grimwood - BRE (UK)	1991 National noise attitude study	National survey of attitudes, model of noise reaction process	1990 - 1993	Effects of environmental noise on people at home, BRE Information Paper IP22/93, June 1993 A national survey of the effects of environmental noise on people at home, Sept 1993, Proc. IOA Vol. 15, Pt 8, p69-76, 1993
Effects on performance and productivity	D M Jones (UK)	Auditory distraction and memory: the role of streaming		1998	Proc. Noise Effects 98, Vol 1, p361-364
Effects on performance and productivity	A P Smith - University of Bristol (UK)	Noise, central noradrenaline and lapses of attention in a categoric search task		1998	Proc. Noise Effects 98, Vol 1, p403-406
Effects on performance and productivity	D M Jones - Cardiff University (UK)	The nature of auditory distraction: an overview		1998	Internoise 98
Effects on performance and productivity	D M Jones - Cardiff University (UK)	Impact of irrelevant sounds on memory: the interplay of mismatch and streaming		1998	Internoise 98

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Effects on performance and productivity	S Hygge - RIT (Sweden) D M Jones - University of Cardiff (UK) A P Smith - University of Bristol (UK)	Recent developments in noise and performance		1998	Proc. Noise Effects 98, Vol 1, p321-328
Effects on performance and productivity	A P Smith (UK)	Noise, caffeine and performance		1998	Proc. Noise Effects 98, Vol 1, p377-380
Effects on performance and productivity	S P Banbury - DERA (UK)	Extending the irrelevant sound effect: the effects of extraneous sound on performance in the office and on the flight deck		1998	Proc. Noise Effects 98, Vol 1, p381-384
Effects on performance and productivity	S L Airey - Heriot-Watt University (UK)	"Can you hear me at the back?" Effective communication in classrooms	Assessment of the classroom acoustics on the communication with children (background noise levels)	1998	Proc. Noise Effects 98, Vol 1, p195-198
Effects on performance and productivity	D M Jones Cardiff University (UK)	Acoustic determinants of auditory distraction by irrelevant sound	A review	1998	Proc. Noise Effects 98, Vol 1, p213-220

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Other	B F Berry - NPL (UK) I H Flindell - ISVR (UK)	Noise effects research: the importance of estimating noise exposure properly		1998	Proc. Noise Effects 98, Vol 2, p627-630
Other	G Kerry - Univesity of Salford (UK)	The aural response to noise from low flying military fast jet aircraft		1998	Proc. Noise Effects 98, Vol 2, p619-622
Physiological effects	W Babisch - Federal Environment Agency - (Berlin) P M Sweetnam - Llandough Hospital (UK) P M Sweetnam	The Caerphilly and Speedwell studies, 10 year follow-up	To test the hypothesis that prolonged exposure to traffic noise increases the risk for ischemic heart desease	1998	Proc. Noise Effects 98, Vol 1, p230-235
Physiological effects	P Lercher - University College London (UK)	Non-auditory effects of noise: reveiw of the 1993-1998 period		1998	Proc. Noise Effects 98, Vol 1, p213-220
Physiological effects	Ian H Flindell - ISVR (UK) RAF DoH (UK)	Tri-national study - epidemiological health effects study	An Investigation of the Feasibility of carrying out a prospective epidemiologic study of potential health effects from exposure to noise from low flying military aircraft in the United Kingdom	1996	Final Report Proc. Internoise 97 Vol III, p1219-1222

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Sleep disturbance	J A Horne - Loughborough University (UK)	A Field Study of Sleep Disturbance: Effects of Aircraft Noise and Other Factors on 5,742 Nights of Actimetrically Monitored Sleep in a Large Subject Sample	Assessed the effects of night-time aircraft noise on actimetrically measured sleep in 400 people habitually living at eight sites adjacent to four UK airports, with different levels of night flying	Unknown - 1994?	Sleep, 1994, 17, 146-159

Table 2 - Inventory of completed work sorted by project leader

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
S L Airey - Heriot-Watt University (UK)	Effects on performance and productivity	"Can you hear me at the back?" Effective communication in classrooms	Assessment of the classroom acoustics on the communication with children (background noise levels)	1998	Proc. Noise Effects 98, Vol 1, p195-198
W Babisch - Federal Environment Agency - (Berlin) P M Sweetnam - Llandough Hospital (UK) P M Sweetnam	Physiological effects	The Caerphilly and Speedwell studies, 10 year follow-up	To test the hypothesis that prolonged exposure to traffic noise increases the risk for ischemic heart desease	1998	Proc. Noise Effects 98, Vol 1, p230-235
S P Banbury - DERA (UK)	Effects on performance and productivity	Extending the irrelevant sound effect: the effects of extraneous sound on performance in the office and on the flight deck		1998	Proc. Noise Effects 98, Vol 1, p381-384
B F Berry - NPL (UK) I H Flindell - ISVR (UK)	Other	Noise effects research: the importance of estimating noise exposure properly		1998	Proc. Noise Effects 98, Vol 2, p627-630
Bernard Berry - NPL (UK)	Combined effects (multiple noise sources and/or effects)	Health effect-based noise assessment methods: a review and feasibility study	Explor the idea of effects based standards for exposure to environmental noise	1998	NPL Report CMAM 16, September 1998 Proc. Noise Effects 98, Vol 2, p729-732

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
B F Berry - NPL (UK)	Annoyance	The evaluation of acoustic features in industrial noise	Subjective listening tests on judged annoyance of specific types of industrial noise	1994	Proc Internoise 94, Vol 2, p803-808
C Cobbing - London Borough of Hillingdon (UK)	Combined effects (multiple noise sources and/or effects)	Perception and significance of transportation noise changes		1998	Proc. IOA Vol 20 Part 1 (1998)
DETR (UK)	Combined effects (multiple noise sources and/or effects)	Investigation into domestic noise complaints	To provide information on the main sources giving rise to domestic complaints. To determine the reason for complaints. To veiw the noise complaint from the perspective of the complaiant, the noise maker and the local authority.	1997	None given
DoE (UK)	Combined effects (multiple noise sources and/or effects)	Response to transportation noise	To produce a general model relating to people's response to noise exposure which will provide a common measure for the assessment of noise from all forms of transportation, cover a wide range of noise levels and enable the efficiency of noise control measures to be considered.	1994	None given

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
DoT (UK)	Combined effects (multiple noise sources and/or effects)	Quality of noise and noise nuisance	To establish what extent noise levels measured in dB (A) correlate with percieved noisiness from road traffic sources and whether alternative established metrics provide improved correlation	Not given	None given
I Ertoren & A P Smith - University of Bristol (UK)		A cross-cultural study of the effects and after-effects of noise	Examination of whether students in Turkey and the UK respond differently during and after exposure to noise	1998	Proc. Noise Effects 98, Vol 1, p407-410
Ian H Flindell - ISVR (UK) RAF DoH (UK)	Physiological effects	Tri-national study - epidemiological health effects study	An Investigation of the Feasibility of carrying out a prospective epidemiologic study of potential health effects from exposure to noise from low flying military aircraft in the United Kingdom	1996	Final Report Proc. Internoise 97 Vol III, p1219-1222

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
C Grimwood - BRE (UK)	Combined effects (multiple noise sources and/or effects)	1991 National noise attitude study	National survey of attitudes, model of noise reaction process	1990 - 1993	Effects of environmental noise on people at home, BRE Information Paper IP22/93, June 1993 A national survey of the effects of environmental noise on people at home, Sept 1993, Proc. IOA Vol. 15, Pt 8, p69-76, 1993
M M Haines & S A Stansfeld - University College London (UK) R F S Job (Australia), B Berglund (Sweden)	Combined effects (multiple noise sources and/or effects)	Chronic aircraft noise exposure and child cognitive performance and stress	Compare the cognitive performance and stress of children attending four schools exposed to high levels of aircraft noise with children attending four matched schools exposed to lower levels of aircraft noise around Heathrow Airport	1998	Proc. Noise Effects 98, Vol 1, p329-335
J A Horne - Loughborough University (UK)	Sleep disturbance	A Field Study of Sleep Disturbance: Effects of Aircraft Noise and Other Factors on 5,742 Nights of Actimetrically Monitored Sleep in a Large Subject Sample	Assessed the effects of night-time aircraft noise on actimetrically measured sleep in 400 people habitually living at eight sites adjacent to four UK airports, with different levels of night flying	Unknown - 1994?	Sleep, 1994, 17, 146-159

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
S Hygge - RIT (Sweden) D M Jones - University of Cardiff (UK) A P Smith - University of Bristol (UK)	Effects on performance and productivity	Recent developments in noise and performance		1998	Proc. Noise Effects 98, Vol 1, p321-328
D M Jones Cardiff University (UK)	Effects on performance and productivity	Acoustic determinants of auditory distraction by irrelevant sound	A review	1998	Proc. Noise Effects 98, Vol 1, p213-220
D M Jones - Cardiff University (UK)	Effects on performance and productivity	The nature of auditory distraction: an overview		1998	Internoise 98
D M Jones (UK)	Effects on performance and productivity	Auditory distraction and memory: the role of streaming		1998	Proc. Noise Effects 98, Vol 1, p361-364
D M Jones - Cardiff University (UK)	Effects on performance and productivity	Impact of irrelevant sounds on memory: the interplay of mismatch and streaming		1998	Internoise 98
G Kerry - Univesity of Salford (UK)	Other	The aural response to noise from low flying military fast jet aircraft		1998	Proc. Noise Effects 98, Vol 2, p619-622

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
G Kerry - University of Salford (UK)	Combined effects (multiple noise sources and/or effects)	The assessment of noise from low flying military jet aircraft in the community		1998	Internoise 98
G Kerry - University of Salford (UK)	Annoyance	The management of light aircraft and microlight noise at military airfields	Literary reveiw and summary of complaints at airfields in the UK	1997	Proc Internoise 97 Vol III, p1223-1226
P Lercher - University College London (UK)	Physiological effects	Non-auditory effects of noise: reveiw of the 1993-1998 period		1998	Proc. Noise Effects 98, Vol 1, p213-220
H G Leventhall - Digisonix Inc (UK)	Annoyance	The role of low frequency noise and infrasound in sound quality	Explores the link between sound quality and complaints of noise	1995	Proc. Internoise 95, p 933-936
B P Ludlow - RAF (UK)	Combined effects (multiple noise sources and/or effects)	Are the benefits of modern transport outweighed by the health effects caused by its noise		1998	Proc. IOA Vol 20 Part 1 (1998)
B P Ludlow - RAF (UK) I H Flindell - ISVR (UK)	Combined effects (multiple noise sources and/or effects)	An overview of noise and health effects - one way forward?		1997	Proc Internoise 97 Vol III, p 1199-1202

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
Medical Research Council - Institute for Environment and Health (UK)	Combined effects (multiple noise sources and/or effects)	IEH Report on The Non-auditory Effects of Noise	To asses the strength of the evidence for any causal association between adverse health effects (other than auditory effects) and exposure to noise from environmental source; and to identify gaps in knowledge and make recommendations for future research, taking into account the balance between the likely benefit and the research effort that will be required.	1997	IEH Report R10, ISBN 1 899110 14 3
Nicole Porter - NPL (UK)	Combined effects (multiple noise sources and/or effects)	Night noise contours: a feasibility study	Examine the causes of annoyance, investigate prediction models for night time annoyance, review existing dose-response relasionships used to assess effects, applicability of existing night time proceedures	1997	NPL Report CMAM 4 December 1997
RAF IoH/CSSB/ISVR (UK)	Combined effects (multiple noise sources and/or effects)	Startle effects	To understand the mechanics of startle. To determine any possible health outcomes. To relate startle effects with those from low flying aircraft.	Not Given	None given

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
C G Rice - ISVR (UK)	Annoyance	Quantifying annoyance potential of environmental noise		1995	Proc. ICA 95, p263-266
J Sargent - BRE (UK)	Combined effects (multiple noise sources and/or effects)	A study of environmental low frequency noise	Increase understanding of low frequency noise complaints	1993 - 1995	A study of environmental low frequency noise complaints, Proc IOA Vol. 17: Part 4, 1995
J Seller - BRE (UK)	Annoyance	Clay target shooting noise	Investigate dose/response relationship	1996 - 1997	Clay Target Shooting Noise, Proc. IOA Autumn Conf, Nov 1997
Dr B M Shield - South Bank University (UK)	Annoyance	Subjective Response to Low Frequency Sound	A laboratory sudy of the effects of spectral shape on annoyance caused by sound	Completed Nov 1998	None given
A Smith - University of Bristol (UK)	Combined effects (multiple noise sources and/or effects)	Noise, neurotransmitters and performance		1998	Proc. Noise Effects 98, Vol 1, p346-351
A P Smith (UK)	Effects on performance and productivity	Noise, caffeine and performance		1998	Proc. Noise Effects 98, Vol 1, p377-380
A P Smith - University of Bristol (UK)	Effects on performance and productivity	Noise, central noradrenaline and lapses of attention in a categoric search task		1998	Proc. Noise Effects 98, Vol 1, p403-406

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
C Whitehead - Manchester Metropolitan University (UK)	Combined effects (multiple noise sources and/or effects)	Cardiovascular responses to aircraft noise in sleeping subjects	Investigate cardiovascular arousals, during sleep, due to aircraft noise, using data collected in a previous field study (Ollerhead et al 1992)	1998	Proc. Noise Effects 98, Vol 2, p471-474

Table 3 - Inventory of on-going work sorted by subject area

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Annoyance	Dr B M Shield - South Bank University (UK)	Investigation of low frequency noise complaints	In a recent MSc project the distress caused to complainants of disturbance caused by very low levels of noise has been studied. It has been found that the complainant's distress can be mitigated or exacerbated by the attitude of the person appointed to investigate the noise. Funding is currently being sought to enable further work to be done in this area, with a view to developing a protocol to be followed when carrying out investigations of this type of noise complaint.	1999 -	None yet
Annoyance	DoT (UK)	Factors affecting the perception of noise	To assess the importance of qualitative descriptors of traffic noise as an additional indicator of nuisance. To assess the benefit of alternative measures of noise to take account of noise quality.	(1 year)	

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Annoyance	DoT (UK)	Resurfacing with porous asphalt: effects on noise and nuisance	To assess the ability of volunteers to discriminate between recordings of noise from traffic travelling on different types of road surface. To assess the subjective responses of residents to the replacement of a concrete surface with porous asphalt on M40 in Buckinghamshire.	(4 years)	
Annoyance	C Grimwood - BRE (UK)	1999 National noise incidence study	National survey of noise exposure of UK population (will include dose/response aspect)	1999 -	Incidence of and attitude to environmental noise in England and Wales, Proc Internoise '98, July 1998
Annoyance	C Grimwood - BRE (UK)	1999 National noise attitude study	National survey of attitudes	1999 -	Incidence of and attitude to environmental noise in England and Wales, Proc Internoise '98, July 1998
Annoyance	DoT (UK)	Nuisance from changes: effects of starting level.	To assess the relative importance of noise to those living in quiet rural areas compared to those living in noisier suburban or urban locations in terms of change in level from a starting level.	1996 - 1997	

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Combined effects (multiple noise sources and/or effects)	Prof Andy Smith - University of Bristol (UK)	Noise and insomnia: A study of community noise exposure, sleep disturbance, noise sensitivity and psychiatric disorders	Investigation of the associations between community noise, sleep disturbance, noise sensitivity and psychiatric disorders using a survey of subjective reports and objective indicators	1998 - 2001	None as yet
Effects on performance and productivity	Dr B M Shield and Professor J Dockrell - South Bank University (UK)	The Effects of Noise on the Attainments and Cognitive Performance of Primary School Children	Assess the effect of environmental noise on the acedemic performance of 7 year olds in schools in inner and outer London as measured by SAT results and specially designed tests	1999 - 2001	None given
Other	Dr Judy Edworthy - University of Plymouth (UK)	The perceived urgency of speech warnings	To determine the extent to which the perceived urgency of speech warnings is determined by acoustic structure and by semantic content, both in noise and in quiet surroundings	1998 - 2000	Listener's understanding of warning signal words. Contemporary Ergonomics 1998 Ed. M Hanson, 316-320. London: Taylor & Francis. Warning people through noise. Noise Effects '98, 147-156. Sydney, Australia.

Area	Project leader/ Affiliation	Project Title	Objectives	Date	Published Literature
Physiological effects	Miss Kathleen Sixsmith, OM Div, RAF Institute of Health	Long-term effects of childhood exposure to military fast jet noise on hearing thresholds	a. To review the literature surrounding noise-induced hearing loss and environmental aircraft noise. b. To explore the feasibility of examining adults with childhood environmental military fast jet noise exposure, to investigate the relationship with noise-induced hearing loss. c. To investigate proposition that environmental military fast jet noise is associated with noise-induced hearing loss via a cross-sectional pilot study.	1997 -	a. Oral presentation to Pan '98, Stockholm, March 1998 "Effects on hearing of military jet noise exposure during childhood - a pilot study. b. Poster presentation to Noise Effects 98, Sydney, Nov 1998. K.C. Sixsmith & B.P.Ludlow. Long-term effects of military jet noise exposure during childhood on hearing threshold levels. 91 - 94.
Physiological effects	Dr Ken Hume (UK)	Tinnitus and exposure to social noise	Assess and evaluate the extent of the problem in young adults	1998 -	Meecham E.A. & Hume K.I. Tinnitus and attendance at night-clubs. Noise Effects 1998, Vol 1, 106 - 109
Physiological effects	DETR/DoH (UK)	Noise and health	To review the non-auditory effects of noise on health	1998 - 2001	
Sleep disturbance	Dr Ken Hume (UK)	Transportation noise and sleep disturbance	Assess and evaluate the extent of the problem, particularly for aircraft noise	1995 -	Various and on-going

Table 4 - Inventory of on-going work sorted by project leader

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
DETR/DoH (UK)	Physiological effects	Noise and health	To review the non-auditory effects of noise on health	1998 - 2001	
DoT (UK)	Annoyance	Factors affecting the perception of noise	To assess the importance of qualitative descriptors of traffic noise as an additional indicator of nuisance. To assess the benefit of alternative measures of noise to take account of noise quality.	(1 year)	
DoT (UK)	Annoyance	Resurfacing with porous asphalt: effects on noise and nuisance	To assess the ability of volunteers to discriminate between recordings of noise from traffic travelling on different types of road surface. To assess the subjective responses of residents to the replacement of a concrete surface with porous asphalt on M40 in Buckinghamshire.	(4 years)	

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
DoT (UK)	Annoyance	Nuisance from changes: effects of starting level.	To assess the relative importance of noise to those living in quiet rural areas compared to those living in noisier suburban or urban locations in terms of change in level from a starting level.	1996 - 1997	
Dr Judy Edworthy - University of Plymouth (UK)	Other	The perceived urgency of speech warnings	To determine the extent to which the perceived urgency of speech warnings is determined by acoustic structure and by semantic content, both in noise and in quiet surroundings	1998 - 2000	Listener's understanding of warning signal words. Contemporary Ergonomics 1998 Ed. M Hanson, 316-320. London: Taylor & Francis. Warning people through noise. Noise Effects '98, 147-156. Sydney, Australia.
C Grimwood - BRE (UK)	Annoyance	1999 National noise incidence study	National survey of noise exposure of UK population (will include dose/response aspect)	1999 -	Incidence of and attitude to environmental noise in England and Wales, Proc Internoise ’98, July 1998
C Grimwood - BRE (UK)	Annoyance	1999 National noise attitude study	National survey of attitudes	1999 -	Incidence of and attitude to environmental noise in England and Wales, Proc Internoise ’98, July 1998

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
Dr Ken Hume (UK)	Physiological effects	Tinnitus and exposure to social noise	Assess and evaluate the extent of the problem in young adults	1998 -	Meecham E.A. & Hume K.I. Tinnitus and attendance at night-clubs. Noise Effects 1998, Vol 1, 106 - 109
Dr Ken Hume (UK)	Sleep disturbance	Transportation noise and sleep disturbance	Assess and evaluate the extent of the problem, particularly for aircraft noise	1995 -	Various and on-going
Dr B M Shield - South Bank University (UK)	Annoyance	Investigation of low frequency noise complaints	In a recent MSc project the distress caused to complainants of disturbance caused by very low levels of noise has been studied. It has been found that the complainant's distress can be mitigated or exacerbated by the attitude of the person appointed to investigate the noise. Funding is currently being sought to enable further work to be done in this area, with a view to developing a protocol to be followed when carrying out investigations of this type of noise complaint.	1999 -	None yet

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
Dr B M Shield and Professor J Dockrell - South Bank University (UK)	Effects on performance and productivity	The Effects of Noise on the Attainments and Cognitive Performance of Primary School Children	Assess the effect of environmental noise on the acedemic performance of 7 year olds in schools in inner and outer London as measured by SAT results and specially designed tests	1999 - 2001	None given
Miss Kathleen Sixsmith, OM Div, RAF Institute of Health	Physiological effects	Long-term effects of childhood exposure to military fast jet noise on hearing thresholds	a. To review the literature surrounding noise-induced hearing loss and environmental aircraft noise. b. To explore the feasibility of examining adults with childhood environmental military fast jet noise exposure, to investigate the relationship with noise-induced hearing loss. c. To investigate proposition that environmental military fast jet noise is associated with noise-induced hearing loss via a cross-sectional pilot study.	1997 -	a. Oral presentation to Pan '98, Stockholm, March 1998 "Effects on hearing of military jet noise exposure during childhood - a pilot study. b. Poster presentation to Noise Effects 98, Sydney, Nov 1998. K.C. Sixsmith & B.P.Ludlow. Long-term effects of military jet noise exposure during childhood on hearing threshold levels. 91 - 94.

Project leader/ Affiliation	Area	Project Title	Objectives	Date	Published Literature
Prof Andy Smith - University of Bristol (UK)	Combined effects (multiple noise sources and/or effects)	Noise and insomnia: A study of community noise exposure, sleep disturbance, noise sensitivity and psychiatric disorders	Investigation of the associations between community noise, sleep disturbance, noise sensitivity and psychiatric disorders using a survey of subjective reports and objective indicators	1998 - 2001	None as yet

9. REPORT ANNEXES

Annex 1 Terms of Reference of European Commission WG2 Dose/effect

4.1. Scope

The WG shall elaborate a set of relationships between noise exposure (dose, in terms of an agreed indicator) and the effects of the noise.

4.2. Objectives and work programme

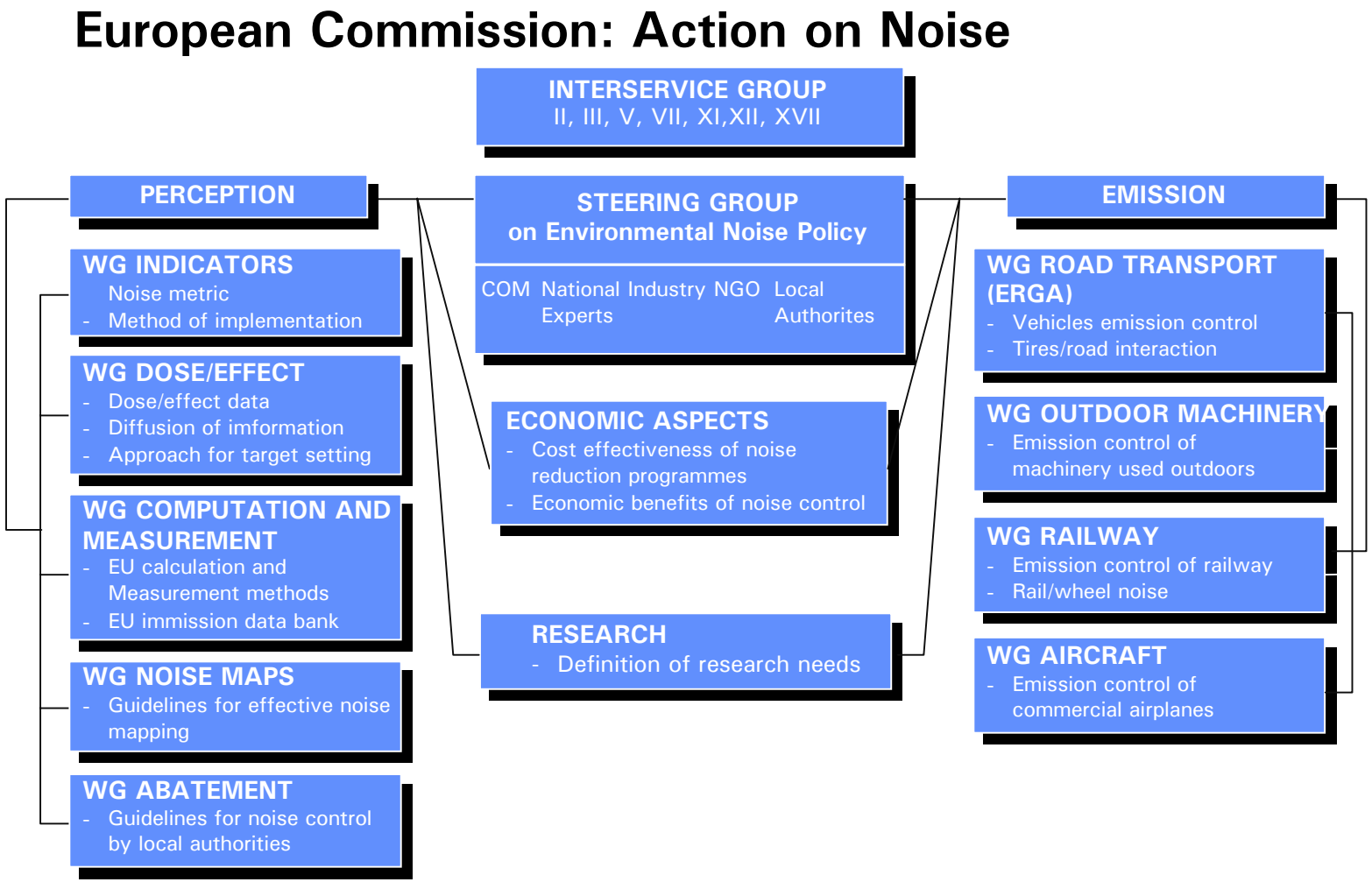
The WG shall:

- provide dose/effect relationships for annoyance, sleep disturbance, speech interference and other effects as appropriate; this shall be done for separate types of noise. The issue of combined effects of noise pollution and dose-effect relationships for vulnerable groups should also be addressed.
- provide proposals for indices covering cases not comprised by the proposals of WG I
- define the needs on dose/effect research and play an active role in the initiation and co-ordination of that research (in close co-operation, with WG Research)
- make proposals for the dissemination of gathered information to the public, and to national, local and regional authorities
- make a proposal for the setting of targets by national, regional and local authorities making use of harmonised dose/effect relationships
- co-operate closely with WGI, WG Research, ISO/TC43/SC I (i.e. WG40, WG45 and WG49) and ICBEN.

Time-scales

Start of work:	September 1998.
Inventory of existing material and research needs:	March 1999.
Initiation of research:	1998 -2000.
Yearly progress reports:	1999,2000,2001.
Text for position paper with recommendations for remaining indicators, dose/effect relations,	
Dissemination and target setting:	June 2002.
Publication of the position paper:	August 2002.

Annex 2. Structure of EC Working Groups



Annex 3. New research projects funded by DoH from late 1998

RESEARCH PROPOSAL FUNDING

THE NON-AUDITORY EFFECTS OF NOISE ON HEALTH

Project Leader/Affiliation	Project Title	Value £	Start Date	Duration
Stansfeld, S. Dr University College London Medical School	Aircraft noise exposure at school and children's cognitive performance and stress responses	120k	1.2.99	1 year 6 months
Shield, B. Dr South Bank University	The Effects of noise on the attainments and cognitive performance of primary school children	95k		2 years
McNamee, R. Dr University of Manchester	Occupational noise exposure in relation to cardiovascular morbidity and mortality	48k	1.9.98	1 year 3 month
Golding, J. Prof. University of Bristol	Relationship between noise in the home and the health, behaviour and development of children up to the age of 7 years	202k		3 years 6 months
Smith, A.P. Prof. University of Bristol	Noise and insomnia: A study of community noise exposure, sleep disturbance, noise sensitivity and psychiatric disorders	121k		2 years 8 months
	Total	**590k**		

Annex 4. Email request to Noise Research Network

To: 106016.1220@compuserve.com; a.whitfield@bham.ac.uk; acj@niwl.se; alberti@gpu.utcc.utoronto.ca; amb@oticon.dk; anzaida@cyber.net.pk; audiolog@cimedoc.uniba.it; barbara.canlon@fyfa.ki.se; DANCER@NEWEL.NET; esko.toppila@occuphealth.fi; g.smoorenburg@kmb.azu.nl; GELUID@NS.NL; gunn@worksafe.wa.gov.au; gyates@cyllene.uwa.edu.au; hoke@uni.muenster.de; hyyan00@pop.uky.edu; iipo@ent.ks.se; jcasali@vt.edu; jukka.starck@occuphealth.fi; jun.cheng@micforum.ki.se; kape@imp.sosnowiec.pl; Lillemor.Hallberg@psy.ju.se; mrforrest@dra.hmg.gb; pa.hellstrom@hellbergsafety.se; per.nylen@niwl.se; peter.rabinowitz@yale.edu; R.Dineen@latrobe.edu.au; richard_scott@technology.britishsteel.co.uk; rikha@mail.nsto.ns.unisource.nl; rpujol@infobiogen.fr; smithaw@who.ch; stig.arlinger@oto.liu.se; tcm2@cdc.gov; wolfgang.ellermeier@psychologie.uni-regensburg.de; ynakai@msic.med.osaka-cu.ac.jp
From: Dr Manjula Patrick
Date: 26/01/99 12:33:58
CC: bernard.berry@npl.co.uk; d.prasher@ucl.ac.uk
Subject: Subject: Inventory of UK research

Dear Noise Research Network Member,

We have been asked by Dr Bernard Berry to circulate the letter below to our members. If you can help with his inquiry please respond to him directly.

Sincerely,
Manjula Patrick

Subject:Inventory of UK research

Dear Colleagues
We have been appointed by the UK Department of Transport, Environment and the Regions to develop the following -
1. an inventory of current research in the UK on noise and health effects, (defined as broadly as possible - including annoyance, sleep effects, speech communication, performance, hormonal and immune system, stress etc) with title
/ scope/names of researchers/publications etc, and
2. an inventory of research on noise and health conducted in the UK since 1994.

The inventory will be evaluated systematically to help guide the planning of further research at the European level.

The project is being conducted in the context of the European Commission's Working Group 2 on Noise Dose/Effects, which is part of the process recently started by the Commission to develop a new Framework Directive on the Assessment and Reduction of Environmental Noise.

I am writing to a number of known UK experts in this field to ask if

they can suggest any items for these inventories. These could come from their own departments or from their knowledge of other work, The results, which will be of great value to many researchers, will be made available to all who
contribute in a report.
I look forward to hearing from you. We are working to a short time scale so a response before the end of January would be appreciated.

Bernard

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