



EPA Noise Library

Available at www.nonoise.org/epa

The EPA Noise Library is a rich resource for people wanting to learn about noise and its effects. The entire library of more than 1,000 documents was created during the 1970s and early 1980s when the EPA Office of Noise Abatement and Control was functioning. For many years, these documents were available only on microfilm from the EPA docket office in Washington, DC. The Noise Pollution Clearinghouse has taken the microfilm files of the EPA library and converted them to Acrobat PDF files. Now, more than 100 of the most pertinent documents are available on line at www.nonoise.org/epa. Some of the titles and abstracts are provided below.

The documents in the EPA library provide important research into the effects of noise on people, as well as important historical documents. While some of the materials are dated, the effects of noise on people and animals have not changed in the last 25 years. Included in the EPA Online Library is the 1972 Noise Control Act, which is still law, even though the EPA Office of Noise Abatement and Control

has been closed since 1982. In addition, you can find the most important EPA document, called the Levels Document (*Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*) which is still frequently used in planning and zoning commissions across the country today. The shorter version of the Levels Document (called *Protective Noise Levels*), and dozens of important reports (such as the *Noise Effects Handbook: A Desk Reference to Health and Welfare Effects of Noise*), and pamphlets (such as *About Sound*) also are available.

Whether you are an acoustical expert, police officer, city planner, researcher, or citizen concerned about noise, there is something in this library for you. Take some time and read over the following titles and abstracts, and visit www.nonoise.org/epa for more information or to find the complete documents. You may also use the enclosed envelope to request a free CD containing these documents.

EPA Noise Library Title Index

The Ability of Mildly Hearing-Impaired Individuals to Discriminate Speech in Noise, *January 1, 1978*

The purpose of the investigation was to explore the relationship between hearing level at various audiometric frequencies and speech discrimination in different noise backgrounds. The study was designed specifically to test the American Academy of Ophthalmology and Otolaryngology's (AAOO) selection of a 26-dB average of 500, 1000, and 2000 Hz, as the point above which hearing handicap occurs. The AAOO method for computing hearing handicap has lately been brought into question for two primary reasons: that the 26-dB fence is too high, and for the exclusion of frequencies above 2000 Hz. The present study, therefore, attempted to see if there were differences among individuals whose hearing was at or better than the low fence, and if so, what factors caused or affected the differences.

About Sound

May 1, 1976

This booklet is intended for anyone requiring knowledge of the fundamentals of acoustics and noise. It provides enough detail to allow the reader to become familiar with the physical phenomenon of sound and how it is propagated, described, and, to a certain degree, perceived. A bibliography is provided for those requiring more detailed technical information on specific aspects of this expansive subject.

Acoustic Terminology Guide

June 1, 1978,

The development and the acceptance of terminology standards has not kept pace with the increase in environmental-noise nomenclature. As a consequence, not only do the members of the noise control profession witness confusion in the use of terminology, but

Administrative Conference of the United States: The Dormant Noise Control and Options to Abate Noise Pollution — Noise and Its Effects *November 1, 1991*

In early 1981, the Director of the Office of Noise Abatement and Control (ONAC) at the Environmental Protection Agency (EPA) was informed that the White House Office of Management and Budget (OMB) had decided to end funding of ONAC and that the matter was non-negotiable. Congress' eventual acquiescence in OMB's action was, and remains, unique. Of the twenty-eight environmental and health and safety statutes passed between 1958 and 1980, the Noise Control Act of 1972 (NCA) stands alone in being stripped of budgetary support. Since Congress did not repeal the NCA when it eliminated ONAC's funding, EPA remains legally responsible for enforcing the regulations it issued under the Act, but without any budget support legislated for that purpose. Moreover, although some of the regulations are now out of date, and others may be inadequate, EPA's lack of budgetary support effectively precludes their amendment. Since the NCA preempts local and state governments from regulating noise sources in many situations, these levels of government may not be able to step into the void created by Congress' decision not to fund EPA. This report considers the future of noise abatement in the United States and what role EPA should play in that function. Part I describes the history of noise abatement in the United States before ONAC was created, during its tenure, and after its abolition. Part II evaluates the role of local and state governments in noise reduction and EPA's relationship to such efforts. Part III assesses the role of the federal government and EPA in noise reduction. The report concludes that it would be unfortunate for Congress to maintain the status quo where EPA has ongoing legal duties, but it has no funding to carry them out. Although Congress could eliminate the federal government's responsibilities for noise abatement, the NCA, with modifications, should remain in force. This does not mean, however, that EPA should merely pick up where it left off 10 years ago. Instead of relying primarily on emissions controls as it did previously, EPA should emphasize abatement approaches that rely on local and state activity, on market incentives, and on coordination with other agencies, private standard-setting groups, and regulatory agencies in other countries.

the public faces a sometimes overwhelming task of extracting substantive information out of noise directives and reports, while wading through ambiguous and confusing terminology. Faced with this problem, the Deputy Assistant Administrator for Noise Control Programs approved the formation of an ad-hoc task group to explore this problem. The group's intention was to generate a standard EPA list of acoustical descriptors, symbols, and units that would be consistent with current standards and usage. To assure that this condition was met, the group employed

standards developed by the American National Standards Institute (ANSI) and the Committee on Hearing, Bioacoustics and Biomechanics (CHABA) as a basis for its work.

Analysis and Control of Mechanical Noise in Internal Combustion Engines

July 1, 1982

This report reviews the state-of-the-art for internal combustion engine noise reduction and presents new techniques for reducing engine block vibration and radiated noise. A vibration analysis technique was devel-

oped as a diagnostic tool for identifying noise sources and vibration transmission paths. This technique makes it possible to identify and rank order the sources of noise within the engine. New design techniques using resilient bearings and modified cylinder liners are also described.

Analysis of Noise-Related Auditory and Associated Health Problems in the U.S. Population

*(1971-1975) - Volume 2,
March 1, 1982*

The First National Health and Nutrition Examination Survey (NHANES I) was designed to characterize the overall health and nutritional status of the U.S. civilian noninstitutionalized population aged 1-74 years and to permit examination of the prevalence of specific health conditions on a subsample of adults aged 25-74 years. Analyses presented in this report are based on the national probability subsample of 6913 adults aged 25-74 years who were administered an audiometric test as well as detailed questionnaires and physics: examinations dealing with hypertension and a variety of other health conditions. Detailed occupational descriptions were used in the present study to estimate approximate eight-hour noise levels for the sample of 3942 adults aged 25-74 years in the workforce. Among the major findings: 1. Hearing impairment is a widespread health problem in the United States; 2. Occupational noise exposure was identified as a major risk factor associated with the prevalence of hearing impairment among men; 3. Occupational noise exposure was not significantly related to hearing sensitivity among working women; 4. Occupational noise exposure was found to have a weak, but nevertheless significant association with hypertension for both men and women; 5. Among men, occupational noise exposure was associated with overall physical health, whereas among women,

it was associated with only overall psychological health; and 6. No conclusive relationships were found between occupational noise exposure and the remaining indicators of specific health conditions.

A Basis for Limiting Noise Exposure for Hearing Conservation

July 1, 1973

A compilation of data is provided, with references to published work, which represents the present state of knowledge concerning the effects of continuous and impulsive noise on hearing. The danger to the ear of both occupational and non-occupational human exposure to noise is considered. Data are included or cited which enable quantitative predictions to be made of the risk to hearing in the American population due to noise exposure in any working or living context. Recommendations are made concerning the need to obtain more definitive data. Relevant aspects of noise measurement, the physiology of hearing, and theories explaining the effects of noise on the ear are discussed in appendices to the main report. This report deals solely with the effects of noise on hearing; other physiological or psychological effects of noise are not considered in the present document.

Behavioral and Physiological Correlates of Varying Noise Environments

June 1, 1977

Eighty male college juniors and seniors were dichotomized into either High or Low Anxiety groups. Each subject experienced a household noise profile under a quiet (50 dBA), intermittent (84 dBA) and continuous (84 dBA) noise condition, while performing either an easy or difficult pursuit tracking task. Heart rate, electromyographic potentials, and tracking error responses were evaluated. Results indicated significant ($P < .01$) main effects for task difficulty and noise condition and significant ($P < .01$) interaction effects for task difficulty, noise condition and anxiety level (as measured by the IPAT Self

Annoyance, Loudness, and Measurement of Repetitive Type Impulsive Noise Sources

November 1, 1979

This study was undertaken to evaluate subjective and objective aspects of moderate levels of noise from impulsive sources. While the study included original investigations into some of the objective aspects of impulsive noise, a detailed review of the literature on the subjective aspects was emphasized. Based on this available literature, the annoyance and loudness from a wide variety of repetitive impulse noises were evaluated. These results were applied to the evaluation of impulsive noise from a number of specific noise sources. Based on the most pertinent literature, it is tentatively concluded that a subjective impulse correction factor of +7 dB applied to the A-weighted equivalent sound levels of these types of repetitive impulsive noise sources would better define their effective level in terms of annoyance reactions. Research on subjective correction factors for helicopter blade slap is also reviewed and potential reasons for the smaller subjective correction factors (i.e. 0 to 6 dB) for annoyance response to this type of sound are discussed. It is recommended that refinements to this subjective correction factor be based on the use of standard loudness calculation methods (Stevens Mark VII or Zwicker) modified to include provision for a shorter time constant to reflect subjective response to short duration impulsive sounds.

Aviation Noise Effects

March 1, 1985

This report summarizes the effects of aviation noise in many areas, ranging from human annoyance to impact on real estate values. It also synthesizes the findings of literature on several topics. Included in the literature were many original studies carried out under FAA and other Federal funding over the past two decades. Efforts have been made to present the critical findings and conclusions of pertinent research, providing, when possible, a "bottom line" conclusion, criterion or perspective for the reader. Issues related to aviation noise are highlighted, and current policy is presented. Specific areas addressed in the report include the following: Annoyance, Hearing and Hearing Loss, Noise Metrics, Human Response to Noise, Speech Interference, Sleep Interference, Non-Auditory Health Effects of Noise, Effects of Noise on Wild and Domesticated Animals, Low Frequency Acoustical Energy, Impulsive Noise, Time of Day Weightings, Noise Contours, Land Use Compatibility, Real Estate Values. This document is designed for a variety of users, from the individual completely unfamiliar with aviation noise to experts in the field. Summaries are provided at the beginning of each section; references are also included.

Analysis Form) of subjects. The significant noise effect occurred for the difficult task condition during the second tracking period (which includes transfer of training effects) indicating that factors such as task difficulty, direction of task transfer effects, duration of noise exposure as well as anxiety level of subjects appear to be important variables affecting human psychomotor performance in noise environments below 85 dBA. These findings appear

to be consistent with previous research which suggests that task difficulty is the variable determining the direction of stress (noise) effects on psychomotor performances and the nature of the interaction between stress and anxiety level. The present findings are therefore seen as supporting the concepts of the response interference hypothesis and the inverted-U function between stress and performance.

Combating Noise in the 90s: A National Strategy for the United States

December 17, 1991

This document is a summary of the Symposium "Combating Noise In the '90s" initiated by Congressman Richard J. Durbin of Illinois.

Community Noise

December 31, 1971

This report addresses the part of the overall noise pollution problem which is associated with outdoor noise in the community. It attempts to provide a quantitative framework for understanding the nature of the outdoor noise environment and the reaction of people and community to its various aspects. The detailed information in this report provides backup to the summary material in the EPA report, as well as additional material relevant to meaningful measures of the noise environment for both future community noise monitoring and research purposes.

Community Noise Assessment Manual — Social Survey Workbook

The U.S. Environmental Protection Agency has developed a "Community Noise Assessment Manual" to provide local governments detailed guidelines in developing a comprehensive noise control program. This manual includes the following documents: Acoustical Survey, Social Survey Workbook, and Community Noise Strategy Guidelines. This specific document - the second referenced above - is a workbook which provides specific instruction for the design and administration of a social survey of community attitudes towards noise. The reader is referred to the U.S. Environmental Protection Agency's Office of Noise Abatement and Control for assistance in analysis and interpretation of this survey data and for information concerning the other referenced publications.

Community Noise Assessment Manual — Strategy Guidelines for Developing a Community Noise Control Program

August 1, 1979

In response to Congressional mandates, the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, has funded the development of a series of manuals, prepared by Wyle Laboratories, to support a Quiet Cities Program. The first of these manuals, entitled "Community Noise Assessment Manual - Social Survey Workbook," provided detailed instructions for conducting an attitudinal survey on noise in a community. The second manual, entitled "Community Noise Assessment Manual - Acoustical Survey," provided detailed practical procedures for conducting a noise measurement survey in a community. This manual, the third in this series, is designed to assist local governments in making logical and cost-effective decisions on the allocation of funds to reduce the adverse effects of noise in their communities. To make maximum use of the material in this document, a community will have utilized the preceding manuals, or their equivalents, to obtain detailed data on the noise environment, and attitudes toward this environment, in their community. However, this manual also stands alone in that it contains many useful guidelines and procedures which a community can utilize to decide on the most efficient allocation of effort and funds directed toward preserving the natural resource - quiet - in their community.

Community Noise Assessment Manual - User's Manual for the Social Survey Computer System

July 1, 1981

The Attitudinal Survey Data Analysis System (ASDAS) is a system of computer programs. It is designed to analyze the raw numbers generated by a sociological survey (the Community Noise Assessment Social Survey) and produce from them a series of concise, meaningful reports. The system is administered by the State and Local Programs Division of the EPA's Office of

Noise Abatement and Control (ONAC). In conjunction with the Acoustical Data Reduction and Noise Optimization (NOIZOP) computer programs, ASDAS makes up the data processing and of a larger system of data collection and data processing protocols. This larger system is called LISTEN, an acronym for Local Information System to Evaluate Noise. (Strictly speaking, LISTEN refers only to the data processing end of this system, but the term is often used to refer the system as a whole). LISTEN enables a community to determine the most effective combination of noise control measures to employ, given: the nature and distribution of noise sources within the community; the extent and manner in which noise affects the community's residents; and the budgetary limits imposed on the community's planners. Figure 1-1 shows ASDAS' relationship to the rest of LISTEN.

Community Noise Assessment Manual: Acoustical Survey of a Community

July 1, 1981

This report was prepared by EPA, Office of Noise Abatement and Control, in support of its function to provide technical assistance to communities. It is one of nine which comprises the Community Noise Assessment Manual. The Manual provides a comprehensive and computerized system for assessing the noise problems of a community and then planning a noise control strategy for its abatement. This Manual presents the technical instructions and guidelines needed by municipal authorities to carry out an initial noise survey. This survey will determine average noise levels and major noise sources for the community as a whole. It can be used in planning noise reduction measures to benefit the entire community or a substantial portion thereof.

Community Noise Ordinances: Their Evolution, Purpose and Impact

March 13, 1973

In the United States most municipal noise ordinances

initially regulated street related activities, however, these early provisions were generally non-quantitative and consequently unenforceable. The first ordinances containing specific permissible noise levels regulated either activities fixed to the land (industrial activity being the primary source) or automobile and trucks operating on roadways. Today more comprehensive ordinances are evolving and these regulations are the basis for expanded municipal noise control programs. Their impact has varied due to the quality, content and administration of these ordinances. Recently approved Federal noise legislation (Noise Control Act of 1972) will have a profound influence on the quality and quantity of municipal ordinances.

Comparison of Various Methods for Predicting the Loudness and Acceptability of Noise

August 1, 1977

The objective of this investigation was to compare commonly employed frequency weightings and calculation rating schemes with respect to their ability to predict the subjective effect of sound. This report presents the results of a detailed examination of 23 studies in which listeners judged either the loudness or acceptability of sound. These studies included data available from both the laboratory and the field, and encompassed a wide variety of natural and simulated noise stimuli. The following parameters were examined: (1) subjective attribute judged, (2) type of noise, (3) presence or absence of tonal components, (4) mode of sound presentation, and (5) effect of sound pressure level on observed discrepancies between measurements and predictions. Included in this analysis are computations of absolute mean differences between subjectively equal sounds, mean differences between calculated and measured levels, and standard deviations for each frequency-weighting and calculation system. Among the overall findings were that (a) the standard deviations produced by the A, D1, D2, and E frequency

weighting schemes are significantly smaller than the standard deviations produced by the B and C weightings; (b) the standard deviations produced by the D1 and E weightings are not significantly different from each other but are significantly smaller than that produced by the A weighting; (c) the D2 weighting does not appear to be significantly better than either the D1 or E weightings, nor is it statistically different from the A weighting; (d) only the Mark VI and Mark VII calculation systems show significantly smaller standard deviations than the D1 and E weightings, although the Mark VI, Mark VII, PNL, and Zwicker systems all exhibit significantly smaller standard deviations than the A, B, and C weightings.

Compendium of Materials for Noise Control

June 1, 1975

The compendium of available commercial, noise-reduction materials was developed for use by plant engineers, industrial hygienists, acoustical consultants, and others engaged in noise control. It can be used to determine the availability of noise control materials, the characteristics and specifications of the materials, and their supply sources. Also included are data on both sound absorption and transmission loss of materials and a general and technical description of the uses and limitations of the materials listed.

Construction Noise Control Technology Initiatives

September 1, 1980

The objective of this report is to develop construction noise technology initiatives which could be implemented by the Technology and Federal Programs Division, Office of Noise Abatement and Control, U.S. EPA during the period FY1981-FY1985. The report includes background information on the impact of construction noise, actions that have been carried out by Federal, State and local governments to control construction equipment and construction site noise, and a forecast of construction activity for the period

1980-1985. Construction noise technology needs are developed by: (1) analyzing the noise problems and needs of State and local governments reported in several EPA sponsored surveys; (2) interviews with knowledgeable persons in the Federal government, and (3) a telephone survey of equipment manufacturers, construction contractors and trade organizations. Technology initiatives are identified based on the analysis of needs. Project descriptions for each initiative are included in the Appendix. The relative priority for implementing each project is determined using a priority ranking scheme. Finding and conclusions based on the expressed needs, the technology initiatives, and the priority for implementing the technology projects are presented.

**Control of Motorcycle Noise
Volume 1 Technology and
Cost Information**
June 1, 1974

This document contains information useful for the development of noise emission standards for motorcycles. Topics covered include information on motorcycle construction, noise characteristics of models currently on the market, and noise reduction techniques and costs necessary to achieve specified noise levels.

**Control of Snowmobile Noise
Volume 1: Technology and Cost
Information**
June 1, 1974

This document contains information useful for the development of noise emission standards for snowmobiles. Topics covered include information on snowmobile construction, noise characteristics of models currently on the market, and noise reduction techniques and costs necessary to achieve specified noise levels.

**Desk Reference to Health &
Welfare Effects of Noise**
October 1, 1979

This document is an overview of the health and welfare effects of noise.

**Economic and Social Impact of
Occupational Noise Exposure
Regulations**
September 1, 1976

This report elaborates on the costs and benefits associated with alternative occupational noise exposure regulations. The limitations of cost/benefit analysis for social decision-making are enunciated. The impact of various regulatory alternatives for 85 dBA and 90 dBA criteria are analyzed.

The Economic Impact of Noise
December 31, 1971

A study has been undertaken to survey the economic impact of noise. Data available on the entire subject of noise and its abatement are so rudimentary that they do not lend themselves to even the most primitive economic analysis. It is demonstrated that the number of sources of noise in homes, in industry, on the highways, and in the air. It is growing at a dramatic rate. These noise sources are heterogeneous and transient, and, therefore, a universal solution for abatement of noise at the source is not available. From the economic viewpoint, it has been demonstrated that substantial costs are associated with noise and its abatement. Costs such as those associated with equipment redesign, right-of-way, and receiver insulation are discussed in detail. The most glaring data gaps highlight the need for research into the relationship between noise, its abatement, and its impact on: wages, prices, productivity, production costs, employment, balance of payment, real property values, and health. Research using the principles of economics must identify and analyze the most cost-effective alternative solutions to noise. A discussion of spending for noise research is included in the study.

Effects of Noise on People
December 31, 1971

Noise can permanently damage the inner ear with resulting permanent hearing loss that can range from slight impairment to nearly total deafness. Noise can result in temporary hearing losses and repeated exposures to

noise can lead to chronic hearing losses. Noise can interfere with speech communication and the perception of other auditory signals. Noise can disturb sleep. Noise can be a source of annoyance. Noise can interfere with the performance of complicated tasks and, of course, can especially disturb performance when speech communication or response to auditory signal is demanded. Noise and other acoustical considerations can reduce the opportunity for privacy. Noise can adversely influence mood and disturb relaxation. In all of these ways noise can affect the essential nature of human life - its quality. It is for these reasons that the recitation of facts and hypotheses that follow may be of some importance.

**Effects of Noise on Wildlife
and Other Animals**
December 31, 1971

In recent years the possible effects of noise on wildlife have become a matter of serious concern, for several excellent reasons. Our rapidly growing population and advancing technology result in ever increasing noise levels. Noise is an unwanted and at times a potentially dangerous by-product of virtually every aspect of modern-day life - construction, transportation, power generation, manufacturing, recreation, etc. Today we find that areas previously considered remote, and therefore relatively non-polluted by noise, are now being exposed or are in danger of exposure to various kinds of noise pollution. The effects that increased noise levels will have on wildlife in these areas are virtually unknown. Obviously animals that rely on their auditory systems for courtship and mating behavior, prey location, predator detection, homing, etc., will be more threatened by increased noise than will species that utilize other sensory modalities. However, due to the complex interrelationships that exist among all the organisms in an ecosystem, interference with one species might well affect all the other species.

**Effects of Noise on Wildlife
and Other Animals - Review of
Research Since 1971**
July 1, 1980

This report represents a survey of the most significant studies since EPA issued its first report concerning noise effects on wildlife in 1971. The report has been divided into three main sections: laboratory animals, domestic animals, and wildlife. Studies within each of the three sections are further arranged by taxonomic groups and/or individual species, depending on the amount of material available. Reports on each species or taxonomic group are presented in four major categories of noise effects: auditory physiological, masking, nonauditory physiological, and behavioral.

**El Ruido: Un Problema Para La
Salud Spanish language version
of Noise, a Health Problem.
The EPA Noise Abatement and
Control Program**

This document is an outline-like overview of the EPA's noise program.

**EPA Noise Abatement Program
Strategy, 1976**

This strategy paper describes EPA's plan for noise abatement over the next five years, as well as in the longer term. The background of this strategy is described and the selection of goals and priorities is explained. The step-by-step plans for implementing the goals are then detailed and the assessment of progress is discussed.

**An Evaluation of Strategies
to Control Noise From Refuse
Collection Vehicles**
October 1, 1981

This report investigated four potential noise control approaches to the control of noise from refuse collection vehicles. These included: (1) the potential impact of a legislative alternative requiring stationary compactors for all new high-rise developments; (2) the effect of a collection curfew; (3) the incorporation of noise into an annual inspection program and (4) the impact of taking no local action and allowing federal regulations to serve as

the only control. It provides a mechanism for routine monitoring and isolation of particularly noise vehicles. As this study was performed in Prince George's County, Maryland, where high-rise development is minimal, further consideration for the first alternative was not given.

Federal Noise Research in Health Effects, 1978-80

December 1, 1980

This review of federally sponsored research on the effects of noise on health updates a previous survey, and compares present trends in research in each research category and by federal agency. The following categories of research are covered: Nonauditory Physiologic Responses; Noise Effects on Sleep; Individual and Community Response; Behavioral, Social, and Performance Effects; Communication Interference; Noise Environment Determination and Exposure Characterization; and Human Response to Noise Concomitant with Vibration. Over 250 research projects were sponsored by twenty Departments, Institutes, and Agencies during the 1978-80 period. The following information is provided for each project: title; objective; description; summary of findings; where findings are published; period of performance; name and address of investigator; name, address and telephone number of agency contact person; fiscal year funding data. In comparing present research with previous recommendations made by an Inter-agency Panel, it was determined that overall expenditures had increased by about 15 percent (compared with the previous period) instead of the recommended 40 percent; and that in general, the Panel's recommendations have not been implemented in the priority areas.

Federal Noise Research in Noise Effects

February 14, 1978

The Federal Noise Effects Research Program was documented and reviewed. The program expanded slightly over the last few years, with more agencies participating. The program is

reasonably comprehensive and in general coordinated with no unjustified overlap of efforts. Research needs to support and justify regulatory and standards requirements were identified by the Panel as being of the highest priority. Satisfaction of these relatively short term goals with present budget restrictions could jeopardize long-range basic research needs to understand basic effects mechanisms. To satisfy both requirements, the Panel on the average recommends an increase of the overall Federal noise effects research budget of 40%. The Panel recommends several specific research topics for high priority funding. Some of these recommendations are the same ones listed among the 1974 recommendations, and the Panel was concerned about the only partial responsiveness to previous findings. Among the areas requiring additional support are effects of noise on sleep, and community or collective response. The area primarily requiring additional support priority and clarification is the area of non-auditory health effects, since no major well planned program for this area was apparent.

Foreign Noise Research in Health Effects

May 1, 1981

Research from 19 countries, including 168 research projects, is described on the following topics: nonauditory physiologic response to noise; noise effects on sleep; industrial and community response to noise; noise-induced hearing loss and hearing conservation; behavioral, social and performance effects on noise; communication interference, noise environment determination and impact characterization, and effects of noise concomitant with vibration. For each project, an abstract, the name and address of the principle investigation, funding and sponsor data if available, and citations for available publications are given. It is concluded that foreign research efforts in this area have remained fairly constant over the last six years.

Fundamentals of Noise: Measurement, Rating Schemes, and Standards

December 31, 1971

This report is intended to serve as an introduction to noise, including the inter-relationship between physical measures and psychological responses. The basic principles of sound generation and propagation are discussed as well as the measurement of both the physical attributes of noise and effects of noise on people. The suitability and effectiveness of various noise exposure rating schemes, used to estimate or predict the effects of noise on man, are discussed and critiqued. Included are sample calculations of sound level, loudness level, and perceived noise level for five selected spectra. The need is stressed for inclusion of well-defined environmental and operational requirements into measurement procedures for those devices where the noise produced is dependent on the surroundings and the operation of the device. Also presented are a glossary of pertinent acoustic terminology and a compilation of existing standards related to noise, including a brief description of the intent and scope of each.

Guidance Manual for Police in State and Local Noise Enforcement Procedures, 1982

The purpose of this manual is to provide law enforcement personnel with the necessary technical skills and procedures to enforce State and Local motor vehicle noise laws. The manual has been written for use by the police officer charged with the enforcement responsibilities, as well as his supervisor.

Guide to the Soundproofing of Existing Homes Against Exterior Noise

October 1, 1977

This manual was prepared for the city of Los Angeles Department of Airports and is reprinted and distributed with their permission. This manual should be of help to the designer in selecting and conceptualizing various methods of soundproofing existing homes. The manual

would be useful with the previously distributed TechShare Report No. TS-77-202, "Insulation of Buildings Against Highway Noise," and the current distribution of TechShare Report No. FHWA TS-77-220 titled "Background Report on Outdoor Indoor Noise Reduction Calculation Procedures Employing the Exterior Wall Noise Rating (EWN) Method." This guide presents the various successful methods used in a 1970 pilot project to increase the noise reduction capabilities of existing houses for the Los Angeles Department of Airports. Three categories of modification from minor to extensive are covered. The guide also provides a basic understanding of the elements of noise control and the systematic method of soundproofing houses. This guide expands the repertory of methods and techniques of reducing the impact of highway traffic noise on its neighbors.

Guidelines and Sample Training Workbook for Police Enforcement of Noise Regulations

February 1, 1980

This report is one of the products of EPA's Noise Enforcement Division to develop materials suitable for use in training State and local police officers to enforce their noise control laws.

Guidelines for Considering Noise in Land Use Planning and Control

June 1, 1980

The purpose of this document is to put the various Federal agency noise policy and guidance packages into perspective for local communities. Although several of these Federal programs include noise standards or guidelines as part of their eligibility and performance criteria, the primary responsibility for integrating noise considerations into the planning process rests with local government which generally has exclusive control over actual land development. Noise, like soil conditions, physiographic features, seismic stability, floodplains and other considerations, is a valid land use determinant. Scien-

tific evidence clearly points to noise as not simply a nuisance but an important health and welfare concern. The purpose of considering noise in the land use planning process is not to prevent development but rather to encourage development that is compatible with various noise levels. The objective is to guide noise sensitive land uses away from the noise and encourage non-sensitive land uses where there is noise. Where this is not possible, measures should be included in development projects to reduce the effects of noise. Section 1 presents consolidated Federal agency land use compatibility guidelines. Section 2 overviews techniques by which the guidelines can be implemented. Section 3 briefly overviews the major Federal agency noise control policies and programs. The Appendices contain brief descriptions of environmental noise descriptors and annotated bibliographies of selected Federal documents.

Guidelines for Noise Impact Analysis
April 1, 1982

The purpose of the guidelines proposed in this report is to provide decision-makers, in both public and private sectors, with analytic procedures which can be uniformly used to express and quantify impacts from noise, so that such impacts can be readily understood and fully considered within the comparative evaluations which constitute noise environment decisions. The procedures contained within the guidelines are applicable to the preparation of environmental noise assessments and environmental impact description of noise environment changes would be useful. The procedures allow a user to arrive at an objective, and for most situations, quantitative definition of noise impact. In many situations, the procedures will allow the calculation of a single number descriptor which expresses the total noise impact of a proposed project on the population exposed. The quantification methods recommended for impact assessment in these guidelines are further developments of the Fractional

Impact Methodology used for assessing the health and welfare effects of a noise environment. Three principal types of noise and vibration environments are considered: general audible noise; special noises; and vibrations. There is a separate chapter for each of these principal types of environment.

Handbook of Noise Ratings
April 1, 1974

The Handbook of Noise Ratings has been compiled to provide information in a concise form describing the multitude of noise rating schemes which are in use today. Although most of the information contained herein can be found in other references, it is hoped that by describing the noise rating methods in a single volume the user will have better access to the definitions, application and calculation procedures of the current noise rating methods. The format used in this handbook divides the measures into four chapters: I. Direct Ratings of Sound Level, II. Computed Loudness and Annoyance Ratings, III. Communication Interference Ratings, IV. Community Response Ratings. The first page for each noise rating contains the title of the measure, the units used, the definition of the measure, associated standards, geographical usage, and purpose. On the following pages, the additional information on a given noise rating is divided into such headings as: Background, Calculation Method, Example, Equipment And References.

Health Effects of Noise — Literature Survey Update
June 1, 1982

In September 1980, the authors submitted a report to the Motor Vehicle Manufacturers Association which reviewed the literature existing at that time concerning the health effects of noise. This report is an update and extension of that literature review, covering material published on that topic since January 1, 1980, and extending the coverage to include infrasound. The time period covered with reference to the effects of infrasound is from 1972 to the

present. This report is a brief summary of the findings, based on the same procedures and the same criteria described in full in the 1980 report.

Highway Noise - A Reprint of "The Audible Landscape: A Manual for Highway Noise and Land Use"
August 1, 1976

This manual, from the US Department of Transportation, concerns highway noise and land use planning.

Impact of Noise on People
May 1, 1977

Aviation noise significantly impacts approximately six million people in urban areas. In an effort to explain the impact of noise on these citizens, the Federal Aviation Administration (FAA) presents this brochure. Included are aircraft noise indices, information on human response to noise, and criteria for land use controls. Additionally, hearing damage and occupational health standards for noise are described. FAA presents this information in an effort to enhance public understanding of the impact of noise on people and to answer many questions that typically arise.

Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety
March 1, 1974

This document identifies noise levels consistent with the protection of public health and welfare against hearing loss, annoyance, and activity interference.

Is Quiet Possible at the Dudley Home?
December 1, 1978

This brochure outlines some steps to quiet homes.

Lawn Mowers: Noise and Cost of Abatement
June 1, 1974

This document contains information useful for the development of noise emission standards for lawn mowers. Topics covered include information on

lawn mower construction, noise characteristics of models currently on the market, and noise reduction techniques and costs necessary to achieve specified noise levels.

Measures of Noise Level: Their Relative Accuracy in Predicting Objective and Subjective Responses to Noise During Sleep
February 1, 1977

A review of domestic and foreign scientific literature on the effects of noise on human sleep indicates that no sleep disruption can be predicted with good accuracy (correlation coefficients of about 0.80) if the noise descriptor accounts for the frequency-weighted spectrum and the duration of the noise. Units such as EdBA, EPNdB, and SENEL are better predictors than a unit such as maximum dBA. Furthermore, no sleep disruption can be predicted more accurately than arousal or behavioral awakening responses. Some evidence suggests that questionnaires about subjective sleep quality should contain items dealing with the subject's (a) sense of well being on arising, (b) sense of the general quality of his sleep, and (c) estimates on how long it took to fall asleep. Scores on these items can be summed to develop a Composite Sleep Quality measure. Although the amount of evidence is limited, such Composite Sleep Quality is correlated highly (about 0.90) with Composite Noise Rating (CNR) when units of EPNdB or EdBA are used to calculate CNR. Other techniques for calculating the total nighttime noise environment, such as Leq and NNI, have some shortcomings with respect to their ability to predict Composite Sleep Quality.

A Method for Assessing Automobile Noise
June 1, 1980

This study presents a method that can be used to examine and quantify each factor contributing to motor vehicle noise produced by automobile accelerating on city/suburban streets. It is based on data collected in

six different jurisdictions subject to a range of noise control programs and was developed to assist State/local jurisdictions to formulate or refine motor vehicle noise control programs.

Method for Assessing Benefits of Airborne Noise Isolation Requirements in Residential and Educational Buildings
July 1, 1982

This report presents a method for estimating benefits accruing from implementation of acoustical performance requirements for new buildings. The method can be applied to a wide range of environmental noise conditions and noise isolation requirements for building envelopes. Benefits are estimated based upon the distribution of population with outdoor noise level and the noise isolation provided by the building envelope. A method is described for estimating noise isolation provided performance of existing construction based upon local conditions.

A Method for Assessing the Effectiveness of Property Line Noise Control Programs
June 1, 1980

This study describes the basic components found in four active property line noise control programs and suggests a method for assessing program effectiveness. It is for use by local jurisdictions interested in developing property line noise control or assessing current program completeness.

Model Community Noise Control Ordinance
September 1, 1975

The Model Noise Control Ordinance (model ordinance) is intended to be a basic tool which communities, both large and small, can use to construct noise control ordinances suited to local needs and conditions. The complete model ordinance, including optional provisions, is perhaps more suitable for larger communities, with populations of about 100,000 or more. Smaller communities and large communities with limited resources may wish to adopt only those provisions which

address their most pressing noise problems. It is important that the community ensure that all provisions adopted are realistic in relation to local needs and conditions; that all provisions are consistent with one another, with other local law, and with State and Federal law; and, finally, that all provisions are clear and otherwise well drafted so that enforcement problems will be mineralized.

National Ambient Noise Survey
January 1, 1982

The objectives, methodology, and results of a national survey of outdoor noise environments in urban residential areas are discussed. The objectives were to determine overall noise levels, source contributions, and patterns of spatial and temporal variation in these areas, along with the effect of three locational factors on these parameters. The survey employed a randomized site selection procedure, a stratified sampling strategy, and a multifaceted measurement protocol to meet these objectives. Results of the survey include a simple model which predicts Ldn in these areas, projections of nationwide noise impact, average source contributions and temporal noise level histories and average variations in noise level at different locations around residential units.

Noise - It Hurts!

This document is an EPA fact sheet on noise.

Noise: A Challenge to Cities
September, 1978

This document is an EPA report on urban noise issues.

Noise: A Health Problem
August 1, 1978

This document is a succinct description of the health effects of noise.

Noise and its Measurement
January 1, 1981

This EPA brochure provides an overview of noise and noise measurement.

Noise and Urban Pedestrian Areas

November 1, 1980

This study consists of three reports which treat the subject of noise within the context of urban pedestrian areas. The main concern of the study is noise mitigation, although its contents cover a wide range of topics related to noise in the urban environment. The first report provides a description of existing noise mitigation techniques which have application to pedestrian improvement areas. The second report summarizes the actual application of noise mitigation techniques to pedestrian areas based on the results of a questionnaire sent to pedestrian projects throughout the country. The second report also includes the formulation of noise abatement criteria for the design of Broadway Plaza, a proposed pedestrian project in New York City. The third report analyzes actual noise levels and attitudes by pedestrians toward noise in several public plazas in New York City based on actual noise monitoring and attitudinal surveys in the plazas.

Noise Around Our Homes
March 1, 1980

This EPA brochure is a guide to noise at home.

Noise Control Act of 1972
1972

This is the text of the Noise Control Act, creating and defining the role of the EPA in noise control.

The Noise Control Act of 1972 as Amended by The Quiet Communities Act of 1978
1978

This is the text of the Noise Control Act as amended by the Quiet Communities Act, defining the role of the EPA in noise control.

Noise Control Ordinance Development: A Guidebook for Local Officials

May 1, 1982

This publication is a step-by-step guide that local officials

can use as they undertake the ordinance development process. The future of America's cities depends on how effectively they can compete as desirable places in which to live and work. Much of their attractiveness is determined by the quality of their environment. Noise is adversely affecting the quality of urban life and is a threat to the public health, safety, and welfare of our cities' residents. NLC is committed to assisting communities throughout the United States in resolving their various noise problems through the Community and Airport ECHO Program, by promoting the "Buy Quiet" program, and by preparing this publication to emphasize the important steps that a community should take in developing a noise control ordinance.

Noise Effects Handbook: A Desk Reference to Health and Welfare Effects of Noise
July 1, 1981

This desk reference contains the most up-to-date scientific information on the health effects of noise in a "Question and Answer" format designed for technical or semi-technical audiences such as State and local Noise Control Officials or the general public.

Noise Emission Measurements for Regulatory Purposes
March 1, 1977

A review is given of the measurement needs attendant to regulation of the noise generated and emitted by commercial products. The emphasis is primarily on measurement procedures for use in conjunction with point-of-sale regulations as opposed to regulations on the noise which a source actually emits when in operation. The report is divided into three major parts. Part I is a discussion of overall measurement requirements and the type of data and information which are needed in order to promulgate regulations based on appropriate measurement techniques. Part II is designed as a checklist for the

evaluation of the suitability of a noise measurement standard for a particular class of products or, in the absence of a suitable standard, as a framework for development of one. The intent is to identify and discuss in some detail those factors which can impact on the accuracy, precision, and applicability of a noise measurement process. Part III consists of a series of flow charts depicting the development appropriate procedures for the measurement of product noise emission.

Noise Facts Digest
June 1, 1972

This pilot issue of Noise Facts Digest has been prepared in response to a widely expressed need for more and better information on the prevention, abatement, and control of noise.

Noise. From the Tenth Annual Report of the Council on Environmental Quality
December 1, 1979

Health and welfare effects; noise sources and trends; noise control at the local level; state noise programs; the role of the federal government; continuing problems.

Noise, General Stress Responses and Cardiovascular Disease Processes: Review and Reassessment of Hypothesized Relationships
June 1, 1980

This report contains a limited survey on the existing literature indicating cardiovascular effects of high noise exposure and places that literature in perspective based on the available knowledge of general cardiovascular effects of stressful stimuli. The authors also discuss conceptual obstacles to progress in cardiovascular disease research, key technical or measurement system obstacle, for research, and findings related to noise and suggestions for further research.

The Noise Guidebook
March, 1985

The Noise Guidebook has been prepared to serve as the basic reference document for all HUD

field aff who are responsible for implementing the Department's noise policy. It brings together in one place all the various reports, informational papers and other items that have been put out by the Department over the past several years. It also contains several new items designed to make your job easier. This Guidebook is designed to serve not only the experienced HUD staff member but also the new employee of the old employee who is new to the noise field. Because of this, the Guidebook contains some fairly basic background material as well as quizzes and other material specifically geared for the "learner".

Noise Hazard Evaluation — Sound Level Data of Noise Sources
January 1, 1975

This technical guide was developed as an aid simplification of the noise hazard assessment element of the installation hearing conservation program. Part I of the technical guide provides the reader with basic information necessary for the conduct of a routine occupational noise hazard evaluation, while part II provides additional information and guidance concerning typical personnel exposures to military noise sources.

Noise in America: Extent of the Noise Problem
September 1, 1981

The number of Americans exposed to various levels of occupational and environmental noise is estimated. Estimates are made for 11 categories of noise producers (e.g., traffic, aircraft, construction) using the Ldn or Leq(24) metrics. The assumptions in the models used, including demographic projections, are made explicit for all estimates. Estimates for combined exposures to traffic and other community noise sources are also made, as well as indoor noise exposures from home equipment like fans and clothes washers. According to the estimates, 1.5 million people are exposed to outdoor noise levels (from a11 sources) of over 75 Ldn, and over 90 mil-

lion, to levels over 58 Ldn. Over 9 million people are exposed to occupational noise in excess of 80 dB (Leq(24)).

Noise Pollution — Now Hear This!

An overview of noise and its effects written for a general audience.

Noise Pollution — What's That?

This pamphlet uses a questions and answers format to provide facts about urban noise and to describe the steps you can take to protect your family, your community, and yourself.

Noise Source Regulation in State and Local Ordinances
February 1, 1975

This document has been prepared as a planning and reference guide for public administrators of environmental noise control programs. It presents a summary of noise source regulations encompassed in current state laws and local ordinances. Data have been extracted from only those laws and ordinances stipulating specific decibel levels. For the states, the laws summarized are grouped under the headings: motor vehicles, recreational vehicles, land use, and general. For localities, the headings are: motor vehicles, recreational vehicles, intrusive noise sources, stationary noise sources, construction noise, and miscellaneous noise regulations. Because of the many variations among local jurisdictional regulations, no attempt was made to list the specific noise level requirements for recreational vehicles, construction equipment, or land use.

Noise Violations: Guidance Manual for State and Local Prosecutors
September, 1980

The purpose of this manual is to provide guidance to prosecutors who choose to take legal action against violators of State or local noise control regulations; its intent is to assist prosecutors preparing for and conducting a trial - from drafting the complaint to submitting jury instructions.

Pow! - Noise and Hearing Loss — NIH Consensus Development Conference
January 22, 1990

The National Institutes of Health Consensus Development Conference on Noise and Hearing Loss brought together biomedical and behavioral scientists, health care providers, and the public to address the characteristics of noise-induced hearing loss, acoustic parameters of hazardous noise exposure, individual and age-specific susceptibility, and prevention strategies. Following a day and a half of presentations by experts and discussion by the audience, a consensus panel weighed the evidence and prepared a consensus statement. Among their findings, the panel concluded that sounds of sufficient intensity and duration will damage the ear and result in temporary or permanent hearing loss at any age. Sound levels of less than 75 dB(A) are unlikely to cause permanent hearing loss, while sound levels above 85 dB(A) with exposure of 8 hours per day will produce permanent hearing loss after many years. Current scientific knowledge is inadequate to predict that any particular individual will be safe when exposed to a hazardous noise. Strategies to prevent damage from sound exposure should include the use of individual hearing protection devices, education programs beginning with school-age children, consumer guidance, increased product noise labeling, and hearing conservation programs for occupational settings.

Non-Auditory Effects of Noise
June 1, 1971

This report is a summary and evaluation of research findings that relate to any effects of noise other than to the ear and related structures. For example, included herein are research

efforts concerned with physiological effects of noise, effects on task performance, effects on the cardio-vascular system, and on general health. This report also presents areas and types of research studies that may help to provide full answers to questions on the degree of noise control desirable with respect to the non-auditory effects of noise normally present in living and working environments.

Prediction of NIPTS Due to Continuous Noise Exposure
July 1, 1973

In support of the main document, "A Basis for Limiting Noise Exposure for Hearing Conservation," this report compares the relationship of noise exposure to Noise Induced Permanent Threshold Shift (NIPTS) as predicted by the currently available works of Passchier-Vermeer, Robinson, Baughn and Kryter, and the yet unpublished work of the National Institute of Occupational Safety and Health. The works of Passchier-Vermeer, Robinson, and Baughn are selected since these are the only works that completely predict the relationship between NIPTS and noise exposure for various audiometric frequencies, sound pressure levels and population percentiles. The predictions of these three methodologies are averaged in order to provide one single relationship between continuous noise exposure and NIPTS. This relationship is presented in various ways so that the effect of noise exposure on hearing can be viewed in more than one way. Discussion concerning the type of frequency weighting, the equal energy rule, and long duration exposures is also provided.

Preparing For A Quieter Tomorrow
May 1, 1980

Preparing for a Quieter Tomorrow is an environmental noise module developed as an instructional guide for teachers of students in grades 7-12. The module provides lecture summaries, projects, field trips, experiments, recommended films, additional readings and questions designed

to stimulate student interest and involvement. The goal of Preparing for a Quieter Tomorrow is to provide to the teachers the information necessary to create an awareness of noise as an environmental pollutant, explain the adverse effect of noise, identify major noise sources, describe noise control techniques and stimulate students' involvement in working for a quieter environment in the community.

A Primary Teaching Pack — Noise — Based on Darlington, England's Quiet Town Experiment

This Teaching Pack has been prepared for Primary Schools under the auspices of the Darlington Quiet Town Experiment, a joint venture between Darlington Borough Council and the Department of the Environment. The Management Committee established a School's Working Group which, with the help and advice of teachers, has produced this set of Work Cards, Teacher's Notes, Pamphlets and References which form the basis for Centres of Interest using the theme of 'Noise'. It is hoped that the materials will form a useful aid for Teachers wishing to spark off oral and written language, discovery of information through reading, investigation, observation, recording, surveying and collecting as well as creative, artistic, imaginative, dramatic, mathematic and scientific activities covering the breadth of the curriculum.

Proceedings of the International Congress on Noise as a Public Health Problem
1973

The conference, held in Yugoslavia, and sponsored by ONAC, has many important papers concerning noise and health, and more than 800 pages of academic studies and research.

Product Noise Labeling Standards - Draft - Background Document for Product Noise Labeling General Provisions
April 1, 1977

This Background Document has been prepared by the Environmental Protection Agency

in support of the Proposed Product Noise Labeling Standards - General Provisions. The proposed regulation will be promulgated under the authority of sections 8, 10, 11, and 13 of the Noise Control Act of 1972.

Product Noise Labeling Standards - Draft - Background Document for the Labeling of Hearing Protectors
April 1, 1977

This Background Document has been prepared by the Environmental Protection Agency in support of the Proposed Noise Labeling Standards for Hearing Protectors. The proposed regulation will be promulgated under the authority of sections 8, 10, 11, and 13 of the Noise Control Act of 1972.

Protective Noise Levels - Condensed Version of EPA Levels Document
November 1, 1978

This publication is intended to complement the EPA's "Levels Document," the 1974 report examining levels of environmental noise necessary to protect public health and welfare. It interprets the contents of the Levels Document in less technical terms for people who wish to better understand the concepts presented there, and how the protective levels were identified. In that sense, this publication may serve as an introduction, or a supplement, to the Levels Document.

Public Education and Information Manual for Noise
June 1, 1980

This manual is designed to assist with the implementation of a State and/or local noise control public education and information program. The purposes of the program are: a) To increase the awareness and knowledge levels of the general public with respect to the potentially harmful health effects of excessive noise and the effects of noise on their quality of life. b) To foster and promote locally and individually initiated noise control actions. c) To motivate

and generate the support of the general public, public/private agencies and organizations, groups and associations for the increased role of State and local governments in noise control and abatement. d) To encourage citizens to participate in the design and implementation of local noise control efforts.

Public Health and Welfare Criteria for Noise
July 27, 1973

The Noise Control Act of 1972 requires that the Administrator of The Environmental Protection Agency (EPA) develop and publish criteria with respect to noise. These criteria are to "reflect the scientific knowledge most useful in indicating the kind and extent of all identifiable effects of noise on the public health and welfare which may be expected from differing quantities and qualities of noise."

Quiet Communities: Minimizing the Effects of Noise through Land Use Controls
March 1, 1979

This handbook focuses on land use plans and regulation as a way of controlling noise.

Quieting in the Home
October 1, 1978

This extensive report is an invaluable resource for people seeking to quiet their home.

Regulation of Noise in Urban Areas
August 1, 1971

Noise legislation trends and observations; some fundamentals of sound and acoustic terminology; criteria for rating sounds; the character of urban noise.

Regulatory Analysis Appendices for the Noise Emission Regulations for Motorcycles and Motorcycle Exhaust Systems
December 1, 1980

This document includes detail information that supplements section 1 through 8 of the regulatory analysis. In addition it includes an analysis of State, local, and foreign motorcycle noise regulations and a sum-

mary of the motorcycle national emphasis plan.

Regulatory Analysis for the Noise Emission Regulations for Motorcycles and Motorcycle Exhaust Systems

December 1, 1980

This document presents the technical data and analyses used by EPA in developing the noise emission regulations for motorcycles and motorcycle exhaust systems. The information presented includes a detailed discussion of: the motorcycle and motorcycle exhaust systems industry; baseline noise levels for current motorcycles; the noise control technology available; the adverse health and welfare impacts of motorcycle noise and the potential benefits of regulation; the expected costs and potential economic effects of regulation; and the noise measurement methodology.

Relation Between Daily Noise Exposure and Hearing Loss Based on the Evaluation of 6,835 Industrial Noise Exposure Cases

June 1, 1973

The present study is designed to display the percent of a population exhibiting greater certain specified audiometric hearing levels as a function of specified exposure levels and duration of exposures to those levels. Audiometric data from 6,835 employees of an industrial plant were taken during the period from 1960 through 1965. The employees were selected only on the criterion that their noise exposures were reasonably well known. Hearing levels for each of three exposure conditions (78, 86 and 92 dBA) were obtained for the speech (0.5, 1, and 2 kHz) and the 4 kHz audiometric frequencies. The data are smoothed and hearing risk tables are presented.

The Relationship Between Annoyance and Detectability of Low Level Sounds

September 1, 1978

The relationship between the predicted detectability and judged annoyance of 25 low level sounds heard in three noise backgrounds was investigated by

an adaptive paired comparison procedure under free field listening conditions. The predicted detectability of the set of sounds accounted for almost 90% of the variance in the annoyance judgments in a conventional (falling spectrum) background noise environment. This strong relationship between predicted detectability and annoyance appears capable of supporting objective scales of the intrusiveness of low level sounds heard under everyday circumstances.

Simplified Noise Strategy Manual

July 1, 1981

This report was prepared by EPA, Office of Noise Abatement and Control, in support of its function to provide technical assistance to communities. It is one of nine which comprises the Community Noise Assessment Manual. The Manual provides a comprehensive and computerized system for assessing the noise problems of a community and then planning a noise control strategy for its abatement. This manual's objectives are the same as those described in the "Strategy Guidelines for Developing a Community Noise Control Program." It provides however a simplified and manual system for planning the noise control strategy for abating a community's noise problems. It assists communities in determining, in an objective manner, the efficient allocation of funds for reducing the adverse effects of noise in their community. By following a step-by-step written procedure, a noise planner can be assisted in selecting the most cost-effective noise abatement measures and the amount of money which should be spent on each. The primary criterion for optimization is based on economic and acoustical data gathered in the community.

The Social Impact of Noise

December 31, 1971

The World Health Organization defines health as a state of physical, mental, and social well being and not merely the absence of disease or infirmity. Using this definition it is evident that noise can be considered as

having an important influence on the health of man. Because of its pervasive influence in all settings, activities and walks of life it has been often cited as a major source of annoyance as well as a threat to physical and mental health. For most people the usual consequences of noise are associated with interference with listening to speech or other sounds, distraction at home and on the job, disturbance of rest and sleep, and disruption of recreational pursuits. All of the foregoing can be considered components of the quality of life. In dealing with the social impact of noise, this report is divided into several sections: 1. Overview 2. Extent of problem - Changing Scope of Problem 3. Effects of Noise 3.1 Medical 3.2 Psychological 3.3 Social.

Sound & Noise

A collection of resources concerning noise including some resources for children in the middle of the document.

Sound Advice — A Volunteer Noise Abatement Program — Organizer's/Counselor's Guide

In neighborhoods across the country, people are realizing that noise is a serious matter, and that practical steps are available to reduce noise. Many communities have been successful in reducing or eliminating noise problems. The success is usually the result of many individuals and groups working together. As an organizer of a noise abatement program, you can help to bring interested persons together to control or reduce noise. "Sound Advice" is a noise abatement program which can help to make your community a healthier and better place to live. "Sound Advice" will focus on the use of older persons as volunteers in the noise abatement program. Older Americans are an excellent resource for the program. Many older persons have the time and interest in the community that are required for volunteer noise counselors. Older persons also have various skills from past work or volunteer activities which can be put to use in

the campaign against noise. This guide will help concerned individuals who want to organize a noise abatement program in their community. Suggestions are given for establishing a volunteer noise counselor program and for recruiting and working with volunteers. Also included are samples of organizational materials and resource materials for use in establishing your program.

Sounds Alive — A Noise Workbook

December 1, 1979

Noise awareness aimed at children, with games, puzzles, and other activities.

Speech Levels in Various Noise Environments

May 1, 1977

Research on speech level measurements was conducted under laboratory and non-laboratory conditions. The goal of this study was to determine average speech levels used by people when conversing in different levels of background noise. The non-laboratory or real-life environments where speech was recorded were: high school classrooms, homes, hospitals, department stores, trains and commercial aircraft. Briefly, the results of speech measurements at schools confirmed that teachers in typical classroom situations speak at a consistently higher level (67-78 dB at one meter) than in face-to-face conversation. Further, their vocal effort increased at the rate of 1 dB/dB increase in background noise which ranged from 45 to 55 dB. The speech levels recorded in face-to-face conversation were lower, averaging 55 dB at 1 meter for ambient levels less than 48 dB. But, as the background level increased above 48 dB to 70 dB, people correspondingly raised their voice levels up to 67 dB at the rate of 0.6 dB/dB as the ambient increased. It was also noted that for background levels less than 45 dB, speech levels measured at the listener's ear - disregarding distance between talkers - was also 55 dB. The laboratory portion of the study was conducted

in an anechoic chamber. The analysis of approximately 100 observers for four varied speech instructions (“Speak in a normal, raised, loud, and shout voice”) showed an orderly progression in level, and shift in spectral emphasis as voice levels increased. A comparison of male and female voice levels for the speech categories normal and raised yielded minimal differences, thus negating conclusions by other researchers that background levels should be lowered to accommodate female speech. This report concludes with recommended background levels to achieve speech intelligibility for the various environments investigated in this study.

State and Municipal Non-Occupational Noise Programs
December 31, 1971

This document is a report on state and municipal government non-occupational noise abatement and control programs prepared from information obtained in response to a questionnaire disseminated by the Environmental Protection Agency (EPA). The questionnaire and a letter of inquiry were part of a study to establish the national need for legislation and research concerning noise abatement and control. They were forwarded by the EPA Administrator to the governors of each state (including Guam, Puerto Rico, the Virgin Islands) and the mayors of the 153 cities having populations, as of 1970, of 100,000 or more. The questionnaire requested information concerning the level and scope of existing and

Toward a National Strategy for Noise Control
April 1, 1977

This document has been developed to continue the dialogue on the overall goals of the noise program, the role of government, the role of consumers, and the role of industry in noise control, along with the selection of specific abatement and enforcement activities for EPA. It establishes a general framework for making decisions on the best strategy that EPA can employ to combat noise pollution. The primary goal of the Agency in the noise pollution area is to promote an environment for all Americans, free from noise that jeopardizes their health or welfare. In order to reach this legislatively mandated objective five specific operational goals have been formulated. These are: (A) To take all practical steps to eliminate hearing loss resulting from noise exposure; (B) To reduce environmental noise exposure to an Ldn value of no more than 75 dB immediately; (C) To reduce noise exposure levels to Ldn 65 dB by vigorous regulatory and planning actions; (D) To strive for an eventual reduction of noise levels to an Ldn of 55 dB; and (E) To encourage and assist other Federal, State and local agencies in the adoption and implementation of long range noise control policies.

planned noise abatement and control programs. It furthermore solicited opinions on what additional support programs could be developed by the Federal government. Described herein are the replies of 114 mayors and of 41 governors.

Summary, Conclusions and Recommendations from Report to the President and Congress on Noise
December 31, 1971

In accordance with Title IV, PL 91-604, The Noise Pollution and Abatement Act of 1970, the Environmental Protection Agency conducted extensive research and held a series of public hearings on noise. As required by that Act, the Agency submitted to the President and the Congress a comprehensive

“Report on Noise”. The Introduction, Summary and Conclusions of the Report, and a listing of the 15 Technical Information Documents prepared as part of the efforts to develop the Report are contained in this pamphlet.

United States Environmental Protection Agency - Bibliography of Noise Publications 1972-1982
1982

A list of EPA publications.

The Urban Noise Survey
August 1, 1977

A social survey was conducted to sample opinion over the entire range of noise exposure and population density characteristics of non-rural America. The objective of the

Urban Noise Survey was to develop a first order relationship between noise exposure and human response as a function of situational and attitudinal variables associated with the life styles of people in various urban environments. Some of the major conclusions are that: (a) exposure to noise typical of many urban (non-aircraft and non-highway) environments produces widespread annoyance, speech interference, and sleep disturbance; (b) a strong relationship was demonstrated between exposure level and the proportion of a community highly annoyed by noise; (c) the prevalence of speech interference is an especially good predictor of annoyance; (d) the number of complaints about noise is a poor predictor of the prevalence of annoyance; (e) demographic factors alone are relatively poor predictors of noise annoyance; (f) freedom from noise exposure is a component of a neighborhood satisfaction, and quiet is highly valued; (g) noises associated with automotive sources are the most pervasive sources of annoying noise in urban areas; (h) annoyance associated with intrusive noise sources may be related to measurable noise exposure from such sources, even when their magnitudes are not as great as the level of overall exposure in a community; (i) there is some evidence that human response to noise exposure at Ldn values in excess of 70 dB is more acute than at lower levels.

Who's Who in Federal Noise Programs - A Directory of Federal Professionals Involved in Noise Abatement and Noise Research
December 1, 1977

This document is a directory of Federal Noise Personnel engaged in noise abatement and noise research activities. Its purpose is to facilitate communication among members of the Federal Noise Community. The Environmental Protection Agency is publishing it in partial fulfillment of its responsibilities under Section 4 of the Noise Control Act of 1972.

For more information about the EPA Noise Library, contact the

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