A. Reference Books and Articles

1. Comprehensive Review—Noise, Hearing Loss, Noise Control

American Industrial Hygiene Association. 2003. The Noise Manual. 5th edition. Edited by E.H. Berger et al. Fairfax, VA: American Industrial Hygiene Association.

A comprehensive manual on noise hazard and control for industrial hygienists and safety professionals. A revised edition is anticipated in 2013.

Dobie, Robert A. 1993. Medical-Legal Evaluation of Hearing Loss. Van Nostrand Reinhold.

Extensive information on occupational hearing loss.

Sataloff, R.T. and Sataloff, J. 1993. Occupational Hearing Loss, Second Edition. Marcel Decker, Inc.

Detailed information regarding occupational hearing loss.

Suter, A.H. 2002. Construction Noise: Exposure, Effects, and the Potential for Remediation; a Review and Analysis. AIHA Journal 63:768-789. November/December.

2. Noise Control and Engineering

Investigators develop new products and applications for noise control; however, the principles and basic materials of noise control remain unchanged. Some earlier titles remain useful. Books can be obtained through new or used book sellers and through interlibrary loan programs.

Barron, R.F. 2003. Industrial Noise Control and Acoustics. New York, NY: Marcel Dekker, Inc.

Bell, L.H. and D.H. Bell. 1994. Industrial Noise Control: Fundamentals and Application. 2nd edition. New York, NY: Marcel Dekker, Inc.

Bruce, R.D., A.S. Bommer, and C.T. Moritz. 2003. Noise, Vibration, and Ultrasound. In The Occupational Environment: Its Evaluation, Control, and Management. 2nd edition. Fairfax, VA: American Industrial Hygiene Association, pp. 435–475.

Cheremisinoff, N. 1996. Noise Control in Industry: A Practical Guide. Westwood, NJ: Noyes Publications.

Cox, T.J. and P. D'Antonio. 2004. Appendix A. In Acoustic Absorbers and Diffusers: Theory, Design and Application. New York, NY: Spon Press.

Diehl, George M. 1973. Machinery Acoustics. Wiley-Interscience. New York, NY.

NIOSH. 1980. Compendium of Materials for Noise Control. DHEW (NIOSH) Publication No. 80-116. http://www.nonoise.org/epa/Roll18/roll18doc9.pdf.

NIOSH. 1978. Industrial Noise Control Manual. DHHS (NIOSH) Publication No. 79-117. http://www.cdc.gov/niosh/docs/1970/79-117pd.html.

This manual includes 61 case histories on noise-control modifications for industrial processes and equipment. It displays decibel and octave band analysis of noise levels before and after control methods were applied. It also presents relative costs of many control methods (in 1978 dollars).

Peterson, A.P.G. 1980. Noise and Vibration Control. In Handbook of Noise Measurement. 9th edition. Concord, MA: GenRad, Inc., pp. 239–259.

World Health Organization. No date. Engineering Noise Control. http://www.who.int/occupational_health/publications/noise10.pdf.

B. Noise Physics

M^{C} Squared System Design Group, Inc. No date. Wavelength of sound – calculator. http://www.mcsquared.com/wavelength.htm.

> *This tool calculates the wavelength of any airborne noise frequency in inches, feet, and meters.*

C. Hearing Loss

1. Hearing Loss—Reporting

Council for Accreditation in Occupational Hearing Conservation. 2005. Determining When Hearing Loss Is Work Related. http://www.caohc.org/professional_supervisor/workrelatedloss.pdf.

2. Hearing Loss—Incident Rates

Bureau of Labor Statistics. 2011. TABLE SNR08: Incidence Rates of Nonfatal Occupational Illness, by Industry and Category of Illness, 2010. http://www.bls.gov/iif/oshwc/osh/os/ostb2808.pdf.

> *This extensive table lists, by industry, the incidence of reported illnesses per 10,000 full-time workers. The table includes a column for hearing loss. BLS publishes this information annually each fall, covering the previous year's data. Check for the latest edition and previous years at http://www.bls.gov/search/?cx=011405714443654768953:btgxl8qv780&cof=FORID:10;NB:1&ie=ISO-8859-1&prefix=&query=table+SNR08&submit.x=28&submit.y=5&filter=0&sa=Search.*

3. Hearing Loss Prevention

American National Standards Institute/American Society of Safety Engineers. 2007. Hearing Loss Prevention for Construction and Demolition Workers. ANSI/ASSE A10.46-2007.

> *This ANSI document recommends standards for hearing conservation programs for construction and demolition workers. Recommendations cover hazard identification, hazard control, hearing protection devices, audiometry, training, recordkeeping, and program evaluations. An appendix lists noise levels (in decibels) that are likely to be exceeded by several dozen different construction activities and cites a source for each listed level.*

D. Sound Levels of Equipment, Occupations, and Activities

> *See also ANSI/ASSE A10.46-2007 under the "Hearing Loss Prevention" heading.*

Noise Navigator® Sound Level Database. 2008. http://www.e-a-r.com/pdf/hearingcons/Noise_Nav_1_35.xls.

An extensive database of over 1,700 sound level measurements reported by various references for a wide range of equipment and activities (occupational, recreational, and military noise sources). A reference for each source is provided. The "Intro" tab of this Excel spreadsheet introduces the spreadsheets in which the sound level measurements are organized. This database is compiled by E-A-R/Aero Company and the University of Washington; as of spring 2012, the current version (1.4) is dated 2008.

Noise Database for Prediction of Noise on Construction and Open Sites. 2005. http://archive.defra.gov.uk/environment/quality/noise/research/construct-noise/constructnoise-database.pdf.

Eight tables reporting average measurements for noise from equipment used on construction and open sites in the United Kingdom (UK). Organized by construction phase and type; noise level information includes both unweighted octave band L_{eq} levels and overall A-weighted L_{eq} values (in decibels). This document was commissioned by the UK government and published in 2005.

Noise Emissions for Outdoor Equipment. http://ec.europa.eu/enterprise/mechan_equipment/noise/citizen/app.

This European Commission database lists operating noise levels for several dozen categories of outdoor equipment. The European Commission requires equipment manufacturers to accompany their equipment with a declaration of conformity, stating that the equipment conforms to the provisions of noise-limiting directives issued by the European Community governing organizations (e.g., Directive 2000/14/EC of the European Parliament and Council, May 8, 2000). Equipment manufacturers continue to add new information to this database in a standard format.

E. Noise Control

1. Engineering Controls and Noise-Control Programs

Colgate-Palmolive. 2012. Excellence Award Corporate-Wide: Colgate-Palmolive Company. http://www.safeinsound.us/swf/colgate/index.html.

Colgate-Palmolive won the 2012 Safe-in-Sound award through an extensive international effort to reduce noise exposure in its facilities around the world. This online presentation outlines the company's efforts and successes and presents a summary of numerous adopted engineering modifications (with photos, notes on the changes made, and examples of noise reductions achieved).

National Aeronautics and Space Administration. Approximate Sound Power-Pressure Conversion Worksheet. http://buyquietroadmap.com/buy-quiet-purchasing/buy-quiet-process-roadmap/forms-worksheets/convert-sound-power-tofrom-sound-pressure/approximate-sound-pressurepower-conversion-worksheet.

A simplified conversion method for sound pressure/power conversion; part of the NASA Buy-Quiet Roadmap.

2. Noise-Control Products

Sound and Vibration Magazine. 2011. Buyer's Guide to Products for Sound and Vibration Control. http://www.sandv.com/downloads/1107bgnv.pdf.

This guide is published annually. Check http://www.sandv.com/home.htm for the latest edition.

3. Buy-Quiet and Quiet by Design Programs

National Aeronautics and Space Administration. 2012. Buy-Quiet Process Roadmap. http://buyquietroadmap.com/buy-quiet-purchasing/buy-quiet-process-roadmap.

This is an online tool for navigating the procurement of low-noise equipment. Part of the NASA EARLAB Auditory Demonstration Laboratory website, the Roadmap can be accessed from the "Buy-Quiet Purchasing" tab in the top navigation menu. Other NASA hearing conservation resources, such as the "Auditory Demonstrations" series and "TWA Calculator," are also part of this website. All are available as free, publicly accessible digital downloadable files. This site is hosted and maintained by Nelson Acoustics as a service to the noise-control and hearing conservation technical community and was updated in 2012.

The website describes itself as follows: "The Roadmap guides users through a stepwise process that includes project planning, researching the marketplace, selecting an achievable noise emission criterion, and developing a specification document. The Roadmap also includes guidelines for identifying the appropriate government procurement strategy for each purchase, based on an assessment of the purchase-specific long-term financial and noise exposure risk. The Roadmap is applicable to both public and private sector organizations, and the downloadable forms and worksheets can be customized to each organization. There is a very brief tutorial PowerPoint presentation here: http://buyquietroadmap.com/buy-quiet-purchasing/buy-quiet-process-roadmap/about-the-nasa-buy-quiet-process-roadmap/roadmap-tutorials."

F. Cost of Hearing Loss/Cost of Hearing Conservation Programs

Nelson, D.A. 2012. White Paper: The Long-Term Cost of Noise Exposure. http://buyquietroadmap.com/wp-content/uploads/2010/02/Long-Term-Cost-of-Noise-Exposure.pdf.

NASA's Roadmap (see entry in the previous section) includes this paper, which provides one alternative methodology for calculating the cost of long-term exposure to the noise emission of various products being considered for a particular purchase. This allows the comparison of the true cost of candidate products that may differ in noise emission and price. Users may input their own experience; for example, as discussed in Appendix G of this chapter, hearing conservation costs vary widely due to factors such as economies of scale, geography, and what elements are included in the calculation). NASA seeks feedback on this methodology in order to continue to improve and update the Roadmap.

Driscoll, D.P. and L.H. Royster. 2003. Chapter 9: Noise Control Engineering. In American Industrial Hygiene Association. The Noise Manual. 5th edition. Edited by E.H. Berger et al. Fairfax, VA: American Industrial Hygiene Association.

See "Benefits and Costs of Noise Control" on pages 281–289.

G. Acoustical Consultants

National Council of Acoustical Consultants. 2012. What Sets an Expert Apart? http://www.ncac.com/howto.php.

This site also includes an online directory of consultants.

National Aeronautics and Space Administration. No date. When to Hire an Acoustical Consultant: Get Help Before You Get in Over Your Head. http://buyquietroadmap.com/buy-quiet-purchasing/buy-quiet-process-roadmap/procurement-planning/when-to-hire-an-acoustical-consultant.

> *This Web page (part of NASA's Roadmap) lists examples of situations where an acoustical engineer can provide valuable expertise and when a product representative can be useful. The site also describes credentials that acoustical professionals might have.*

American Industrial Hygiene Association. Search for a Consultant. https://webportal.aiha.org/Custom/ConsultantsSearch.aspx.

> *Industrial hygiene professionals develop hearing conservation programs, conduct noise evaluations, measure sound levels, and perform noise dosimetry. In the box for "Specialty," select "Hearing Conservation/Noise Reduction."*

H. Associations, Education, and Conferences

Institute of Noise Control Engineering. http://www.inceusa.org.

> *Sponsor of the annual conference "Inter-Noise, International Congress and Exposition on Noise Control Engineering." Offers continuing education.*

National Council of Acoustical Consultants. http://www.ncac.com.

"The acoustician seeks to understand and quantify the production, control, transmission and effects of sound." Offers continuing education.

Acoustical Society of America. http://acousticalsociety.org.

> *International scientific society in acoustics dedicated to increasing and diffusing the knowledge of acoustics and its practical applications. Offers continuing education.*

Council for Accreditation in Occupational Hearing Conservation. http://www.caohc.org/index.php.

> *Offers continuing education.*

Acoustical Solutions, Inc. ASI University. http://www.acousticalsolutions.com/asi-university.

> *This noise-control materials manufacturer's website offers general background information on understanding noise-control principles and terminology. Offers continuing education related to noise through the American Institute of Architects.*