



Buy Quiet Initiative in the USA

Bryan Beamer¹ · Trudi McCleery¹ · Charles Hayden¹

Received: 9 September 2015 / Accepted: 20 November 2015 / Published online: 10 December 2015
© Australian Acoustical Society 2015

Abstract Noise-induced hearing loss is still considered one of the most common work-related illnesses in the United States of America. The U.S. National Institute for Occupational Safety and Health launched a national Buy Quiet campaign to raise awareness of the importance of purchasing quieter equipment. Buy Quiet encourages companies to seek out and demand quieter equipment thus driving the market to design and create quieter products. In the long run, investment in noise controls should be more prevalent as the market demands quieter products. This paradigm occurs as the market for quieter products expands both from the supply side (manufacturers) and the demand side (tool and equipment purchasers). The key to experiencing the reduced costs and increased benefits of Buy Quiet will be to develop partnerships between manufacturers and consumers. To this end, the U.S. National Institute for Occupational Safety and Health continues to work with partners to educate stakeholders about the risks and true costs of noise-induced hearing loss, as well as the economic benefits of buying quieter equipment.

Keywords Noise · Hearing loss · Prevention · Engineering controls · Buy Quiet

1 Why Buy Quiet in the USA?

Tens of thousands of pieces of equipment and machinery that produce hazardous noise levels are used in manufacturing and construction industries in the United States of America. Managing noise hazards has frequently relied on providing hearing protection to workers, implementing hearing conservation programs, and training workers on the proper use and wear of hearing protection. To be effective, this strategy requires high levels of interaction and coordination from workers, supervisors, and safety professionals. Furthermore, the worker's primary workplace responsibilities and activities may distract them from consistent and proper hearing protection use. Although engineering controls are frequently a better solution, the reality is that cost-conscious employers

are unlikely to have a noise-control expert on staff to facilitate implementing such measures.

The lack of effective noise controls may be a reason that noise-induced hearing loss is still one of the most prevalent occupational health concerns in the United States of America, with the Agriculture, Construction, and Mining Industries most consistently leading in prevalence [1,2]. In fact, approximately 22 million workers are exposed to hazardous noise levels in the United States [3]. Noise exposures in the noisiest industries can be quite high due to equipment noise emissions. For instance, heavy equipment like piling equipment, road milling machines, and drill rigs can have sound power levels in excess of 110 dB(A), while other more common equipment like circular saws, loaders, and leaf blowers typically have sound power levels between 100 and 110 dB(A) [4]. Despite potentially dangerous noise levels in the workplace and the fact that, where feasible, engineering controls are the recommended method of noise mitigation, engineering controls for noise have not been universally adopted. Some of the reasons for this are as follows: information on the noise emission of equipment or machinery is not readily available; reducing noise at source is often seen as too expen-

✉ Bryan Beamer
zmy4@cdc.gov

¹ United States Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Robert A. Taft Laboratories, 1090 Tusculum Ave. MS C27, Cincinnati, OH 45226, USA

sive or not technologically feasible; and the perception that no market exists for quieter products. For these reasons, the Buy Quiet initiative is a long-term solution where increasing market demand for quieter equipment and machinery eventually drives decrease in noise-control costs and increase in technological feasibility. This period of time may be 5 years, 10 years, or even longer, but the end result is a sustainably market-driven demand for quieter equipment. For an individual company, implementation of an appropriately managed Buy Quiet program objectively examines availability and cost trade-offs associated with purchasing quieter equipment, suggesting the least costly and the most effective path to a quieter workplace and healthier workers.

2 What Does A Buy Quiet Program Look Like?

The U.S. National Institute for Occupational Safety and Health (NIOSH) recommends preventing hazardous noise exposures through noise controls [5]. To minimize occupational noise-induced hearing loss, NIOSH recommendations state that workers limit their noise exposure to no more than 85 dB(A) as an 8-hour time-weighted average [6]. Business owners are encouraged to create Buy Quiet programs as a first step in the effort to control noise emissions. Having information on the noise emission from tools, equipment, or machinery is an important step. NIOSH developed a Power Tools Database that contains sound power levels, sound pressure levels, and vibrations data for a variety of common power tools that have been tested by researchers. This database also contains downloadable sound level recordings to help with purchasing decisions (visit <http://www.cdc.gov/niosh-sound-vibration/>). As part of a national campaign, NIOSH launched a Buy Quiet web site to promote the initiative and educate employers and workers about Buy Quiet (visit <http://www.cdc.gov/niosh/topics/buyquiet/>). The website includes a video providing an overview of Buy Quiet and resources for construction company owners, employees, subcontractors, purchasers, and suppliers of power tools and equipment, as well as to the general community. Similar materials are being completed focusing on the manufacturing industry.

The key elements of a model Buy Quiet program are as follows:

A. *An inventory of existing machinery and equipment with corresponding noise levels* This inventory is updated as the quieter pieces of equipment are purchased to replace worn-out, noisier equipment. The inventory can also be used for facilitating, documenting, tracking, and promoting a company's Buy Quiet purchases.

The U.S. manufacturers of equipment and machinery are required to provide noise-level information for the products they market and sell [7]. An equipment pur-

chaser uses the manufacturer's information to compare noise-emission levels of different models prior to purchase. How manufacturers make this information readily available to their customers is still being discussed, but one option includes an online database populated in a collaborative fashion by manufacturers. The motivation for manufacturers to include their products' noise-level information would be to increase product visibility and competitive advantages as more and more purchasers demand easily accessible noise-level information.

B. *A Buy Quiet company policy or procedure* Company policy can be an easy and effective way for employers to show commitment to using the best available technology to protect the hearing and well-being of their employees. Three levels of increasing commitment are suggested so that any company can initiate a Buy Quiet Program that realistically reflects their time and monetary resources. These levels of commitment include the following:

- *Low-Level* Commitment to purchasing replacement machinery that produces no greater noise levels than the original machinery.
- *Mid-Level* Commitment to purchasing the most cost-beneficial piece of machinery available that produces less noise than the original machinery.
- *High-Level* Commitment to purchasing the quietest piece of machinery available, regardless of price.

C. *Educational materials and promotional tools* Employees, management, customers, and the community can be informed about the importance and benefits of Buy Quiet. NIOSH developed a series of posters for construction companies to communicate their organization's efforts and commitment to reducing noise levels in and around construction worksites (see Fig. 1). These posters are available online for download and printing (visit <http://www.cdc.gov/niosh/topics/buyquiet/posters.html>).

D. *Analysis of the cost-benefit of Buying Quiet* Calculation methods can be used to conduct a cost-benefit analysis comparing one piece of equipment to another. Factors that can influence this analysis may include initial costs, long-term maintenance and depreciation, as well as the cost of noise-induced hearing loss to the worker, company, and the society. In many cases, the quieter piece of equipment is the most inexpensive alternative when a thorough cost-benefit analysis is completed that considers:

- all life-cycle costs of the machinery;
- possible worker's compensation claims;
- costs associated with a company's hearing-conservation program;
- costs of healthcare (such as hearing aids); and
- possible loss of productivity.



Fig. 1 Buy Quiet promotional and educational posters. Printable format available on NIOSH website (visit <http://www.cdc.gov/niosh/topics/buyquiet/posters.html>)

Conservative estimates suggest savings of \$100 (US) per decibel due to purchasing quieter products [8]. The savings are applicable across a wide variety of machinery and equipment.

3 Enhancing the Equipment Designer–Manufacturer–User Relationship

Most companies do not have the financial resources or technical expertise to design, implement, and retrofit engineering noise controls on the tools, equipment, and machinery they purchase. Therefore, noise-control consideration during the design and fabrication phases is more effective and economically efficient than implementing noise-control efforts after the event. As such, the Buy Quiet process moves the responsibility away from purchasers and end users, who do not necessarily have relevant experience in design and engineering noise control, to equipment designers and manufacturers who are best suited to implement engineering noise controls appropriate for their products.

Ultimately, equipment end users and their employers are responsible for following safe work practices and providing a safe workplace; Buy Quiet simply helps them accomplish that more efficiently and effectively by involving equipment design experts in the design and manufacturing phases of noise-control efforts.

4 Partnerships and Future Directions

Many challenges exist to the successful implementation of a long-term Buy Quiet initiative in the United States of America. Perhaps chief among these is the lack of consistent,

stringent standards for communicating existing noise levels of equipment and machinery in the USA. Ideally test methods would take into account noise levels both in the lab and in the field and could be applied equally by manufacturers, users, researchers, and others. Another obstacle to gaining buy-in from stakeholders is that the U.S. regulations pertaining to noise-control standards are inconsistently enforced, a situation partially stemming from the fact that regulating noise laws is left to the state and the local governments [9]. Perhaps, however, the greatest challenge to convincing companies to implement a Buy Quiet program is the perceived cost of buying quieter equipment, a point of view that is entrenched in poor understanding of the true costs of noise-induced hearing loss and the potential cost savings of buying quieter, safer tools, and equipment.

NIOSH and its partners are working to overcome the above challenges. For instance, NIOSH representatives from the Hearing Loss Prevention Research Program are participating in and leading efforts to improve national test methods and noise-rating standards. One example is the development and approval of the SAE International Standard AS6228, “Safety Requirements for Procurement, Maintenance and Use of Hand-held Powered Tools” (visit <http://standards.sae.org/as6228/>). This standard promotes the selection of quieter and lower vibration hand-held, powered tools for the prevention of Hand-Arm Vibration Syndrome (HAVS), hearing loss, and other repetitive motion injuries. Furthermore, the standard suggests the use of noise and vibration data provided by vendors to users of their products. Another way to promote the purchase of quieter tools is through collaboration with groups like the Institute of Noise Control Engineering (INCE) Product Noise Emissions Committee,

which concerns itself with methods for disseminating information on product noise emissions, such as product noise declarations and labels [10]. Also, through the Safe-in-Sound Excellence in Hearing Loss Prevention Award™, created in partnership with the National Hearing Conservation Association (NHCA), NIOSH has obtained information on real-world successful noise-control interventions, both in the construction and manufacturing sectors that include Buy Quiet strategies (see winners and archives at www.safeinsound.us). Links to other Buy Quiet partners can be accessed on the Buy Quiet website [11]. These partners include the National Aeronautics and Space Administration (NASA) who implemented a Buy Quiet program which developed the NASA Buy-Quiet Roadmap web tool; the U.S. National Academy of Engineering who espouse Buy Quiet principles as part of their Technology for a Quieter America report; CPWR—the Center for Construction Research and Training; the American Tinnitus Association; the Great Plains Center for Agricultural Health; the US Naval Safety Center; and the Laborers Health and Safety Fund of North America.

The most important way to overcome the challenges to implementing Buy Quiet may be through marketing and education efforts. To this end, NIOSH continues to work with partners to educate stakeholders about the prevalence and true costs of noise-induced hearing loss, as well as the economic benefits of buying quieter equipment. Ideally as consumers become more educated about noise levels, economics, and the benefits of quieter machinery and equipment, they will actively purchase quieter tools and machinery. In this way, market forces may ultimately be the key to future success of the Buy Quiet initiative.

5 Conclusions

In summary, the Buy Quiet initiative addresses the vision of eliminating noise hazards early in the design and manufacture of power tools and equipment, thus reducing the risk of occupational hearing loss. Buy Quiet encourages companies to seek out and demand quieter equipment effectively driving the market to design and create quieter products. Buy Quiet encourages the use of existing noise-control technology and the development of new noise-control technologies while demonstrating the cost benefits of doing so. In the long run, investment in noise controls should be more commonplace as the market demands quieter products. This paradigm occurs as the market for quieter products expands both from the supply side (manufacturers) and the demand side (tool and equipment purchasers). The key to experiencing the reduced costs and increased benefits of Buy Quiet will be to develop partnerships between manufacturers and consumers.

Acknowledgments The contributions of NIOSH contractors, David Nelson of Nelson Acoustics, Inc. and Rod Ford at Tier1 Performance Solutions, Inc. were instrumental in the development of Buy Quiet logistics, concepts, architecture, and promotional and educational materials.

Disclaimer The findings and conclusions in this report have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy. Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to Web sites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these Web sites. All the Web addresses referenced in this document were accessible as of the publication date.

References

- Occupational Safety and Health Administration, “Occupational Noise Exposure,” (Online). Available: <https://www.osha.gov/SLTC/noisehearingconservation/>. Accessed 1 July 2015
- Masterson, E.A., Deddens, J.A., Themann, C.L., Bertke, S., Calvert, G.M.: Trends in worker hearing loss by industry sector, 1981–2010. *Am. J. Ind. Med.* **58**, 392–401 (2015)
- Tak, S., Davis, R.R., Calvert, G.M.: Exposure to hazardous workplace noise and use of hearing protection devices among US Workers—NHANES, 1999–2004. *Am. J. Ind. Med.* **52**(5), 358–371 (2009)
- Roo, F.d., Gerretsen, E., Borst, J.: Environmental impact of noise from mobile outdoor equipment, In: *7th European Conference on Noise Control, EURONOISE 2008 and Acoustics '08*, Paris (2008)
- National Institute for Occupational Safety and Health: Criteria for a Recommended Standard. U.S. Department of Health and Human Services, Cincinnati (1998)
- National Institute for Occupational Safety and Health, “Noise and Hearing Loss Prevention”, 15 August 2013. (Online). Available: <http://www.cdc.gov/niosh/topics/noise/about.html>. Accessed 9 July 2015
- U.S. Environmental Protection Agency, “Summary of the Noise Control Act,” 1 June 2015. (Online). Available: <http://www2.epa.gov/laws-regulations/summary-noise-control-act>. Accessed 31 August 2015
- Nelson, D.: Adaptation of NASA buy-quiet process roadmap for construction firms., U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati (2011)
- US Environmental Protection Agency, (Online). Available: <http://www2.epa.gov/aboutepa/epa-history-noise-and-noise-control-act>. Accessed 30 July 2015
- The Institute of Noise Control Engineering of the USA, “Technical Activities,” (Online). Available <http://www.inceusa.org/about/technical>. Accessed 30 July 2015
- National Institute for Occupational Safety and Health, Buy Quiet Partners and Promoters, (Online). Available: <http://www.cdc.gov/niosh/topics/buyquiet/partners.html>. Accessed 4 August 2015
- National Institute for Occupational Safety and Health, (Online). Available: <http://www.cdc.gov/niosh/topics/buyquiet/posters.html>. Accessed 1 July 2015