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PROGRAMME CONFÉRENCE DES MINÉRALURGISTES DU CANADA

Courtesy of Andrew Dobson

Andrew Dobson, of HGC Engineering, helps companies minimize noise levels at their facilites to reduce workers' noise exposure.

The not-so-silent threat

Hearing loss is the most common mining affliction today. Why is it so hard to combat?

By Tim Edwards

Kentucky coal miner Kyle Lunsford had never looked into why his hearing had dulled. It didn't stand out at work like his back pain or the breathing difficulties that caused him to hang up his hard hat in 2001, after 37 years in the industry. In 2004, a doctor told him his hearing had diminished by 26 per cent, and it was likely due to his mining career.

Lunsford took his former employer, Manalapan Mining Company Ltd., to court for damages. The company was eventually exonerated on a statute of limitations – Lunsford filed his claim more than two years after his last exposure to workplace noise. But the case illustrated a growing precedent for employer liability for hearing loss on a mine site. It also demonstrated how easy it can be for workers to put off thinking of a gradual, subtle injury from which they might not suffer until they are older and the damage has been done.

A noisy occupation

Hearing loss was by far the most common occupational disease for which Ontario miners lost time in 2018, according to Workplace Safety North, an independent, not-for-profit safety association. And a 2018 study in Quebec found that exposure to noise cost mining companies more than any other occupational injury or disease, coming in at an average of $13.6 million each year between 2010 and 2012.

"Mining really is an inherently loud occupation," said Amanda Azman, a research audiologist in the National Institute of Occupational Safety and Health's (NIOSH) Mining Program. Extracting, transporting and processing ore requires heavy stationary and mobile equipment, which all produce a lot of noise. "Quieter equipment often just doesn't exist."

The U.S. Mine Safety and Health Administration sets the permissible limit for sound exposure at an eight-hour time-weighted average of 90 decibels (dB). (In Canada, the limit ranges from 85 dB in most jurisdictions to 90 dB in Quebec.) On both above-ground and underground mine sites – though more often in the latter – workers can experience repeated bouts of noise exposure above this level, which can cause permanent hearing loss. Pneumatic percussion drills are the loudest, emitting between 114 and 120 dB. Fans run between 90 to 110 dB, loader-dumpers 97 to 102 dB and chain conveyers 97 to 100 dB. Haul trucks regularly emit 90 to 100 dB.

To the layman, the solution seems obvious and even simple: make sure workers are wearing ear protection. But those who spend their careers examining this problem say it's nowhere near that cut-and-dry.

Though earmuffs and plugs do work, they rely on human uptake, and human error is common. "Research time and time again shows they are less effective than other solutions," said Azman. "People don't always use them correctly. Earplugs take a little bit of finesse to get into your ear correctly and people often remove them and then don't put them back in – they forget."

Mitigating noise at the source

Outside of personal protective gear, NIOSH guidelines recommend shorter shifts around loud equipment to limit exposure and that mines control the excessive noise and dampen it at the source.

These are easier said than done, according to Andrew Dobson, a senior consultant with Ontario-based HGC Engineering, who noted that applying noise-control measures to machinery in underground mining can be "difficult, costly and sometimes actually impossible." HGC Engineering, a consultancy firm with offices in Ontario and Alberta has been brought in by mining and other industrial facilities to provide

advice on how to minimize noise levels and reduce workers' exposure.

Dobson said there are three general ways to mitigate noise from a piece of equipment in a contained environment. "First and foremost is by replacing it with quieter, newer equipment that has noise control measures integrated into the design," he said. But this is not always feasible, when you have already invested millions of dollars in, say, a massive fan.

Next is to block, or contain and dissipate, the noise by introducing a barrier or enclosure between the worker and the machine. A company can build walls or try to completely enclose the machine, but this may not be possible if the nature of the task requires the worker to be interacting with the machine.

Lastly, Dobson said, a company can try to reduce reverberation in an enclosed environment, but this can require a huge amount of sound-absorbent material, pose problems in damp environments, and not actually provide a significant benefit if a worker is consistently in close proximity to the noise source.

Courtesy of NIOSH

Amanda Azman, of NIOSH's Mining Program, monitoring equipment noise levels.

Still, organizations are developing new technology to combat noise. Close to half of longwall shearer operators in the American coal industry were affected by hearing loss between 2002 and 2011. NIOSH conducted research on how to make the two rotating drums used for cutting quieter, resulting in structural modifications that did not affect performance but reduced noise overall by three dB at the operator location. NIOSH also collaborated with two companies to develop drill bit isolators to reduce noise overexposure associated with roof bolting machines underground.

General advancements in mining technology are having spin-off benefits for workers' hearing too. Equipment manufacturers such as Ontario's MacLean Engineering and Sweden's Epiroc AB are designing fleets of electric vehicles for underground mines. In addition to decreasing diesel and underground ventilation costs, these vehicles are much quieter than their diesel-powered precursors.

Despite these new technologies, Dobson strongly advocates workers take their personal protective equipment seriously.

Quebec entrepreneur Nick Laperle has been working on ear protection for close to two decades, developing next-generation ear muffs and ear buds for workers. A wearable bionic ear technology called Sonix, with built-in fit-checking, developed by Laperle and his team, won first place at the U.S. Department of Labor's Hear and Now Noise Safety Challenge in 2016. Cognizant of the common misuse of traditional ear plugs, part of Laperle's design philosophy, he told an audience at a McEwen Mining Lunch that October, is "comfort drives compliance."

There are a variety of computer-based programs now available, Azman said, that allow miners to check if their ear protection is the right fit, testing each ear with noise comparison methods. "They can be used as an on-the-spot way to see if someone's getting the amount of protection they need," she said.

The long view on noise exposure

According to Azman, NIOSH gets many requests for information about occupational noise-induced hearing loss. When visiting mines to conduct research, the federal agency will help mines identify specific problems, provide recommendations, and often assist them to implement solutions. However, Azman said, it can be hard for mines to maintain their vigilance over time. "The bottom line with noise is that it really affects the workers' long-term quality of life, which is certainly an issue, but some other issues that cause more immediate, greater threats – like disease or potential injury or even death – often are at the forefront of these workers' minds. And, understandably so."

Yet hearing-impaired workers may suffer more than the frustrations of not being able to hear what is happening around them. With hearing loss, the brain works harder to process sound, balance is thrown off while walking as subtle cues normally picked by the ears are muted, and people begin experiencing social isolation due to the disability. Doctors at Johns Hopkins Medicine conducted a study tracking 639 adults over 12 years and found that mild hearing loss may double dementia risk, moderate loss may triple the risk, and severe hearing impairment may make dementia five times more likely.

Azman believes the ground is starting to shift generationally with regard to noise exposure, largely because of workplace safety education and training. "I think especially with a lot of the younger workers who've been bombarded with health and safety things for a lot of their life, it's something that they're paying more attention to," Azman said. "Some of the guys who've worked there for maybe 30 or 40 years probably don't pay as much attention to it, but with the newer workforce coming in, I see a greater focus on protecting themselves all around, not just their hearing." CIM