

Miner health

by Eric A. Lutz, Ph.D. CMSP, BSC, Faculty Associate, Lowell Institute for Mineral Resources, University of Arizona

Due to societal, regulatory, labor and organizational pressures, combined with advances in technology and processes, mining has made great strides in safety improvements across the sector. During the past decade, mine fatalities have fallen by approximately 40 percent, and lost-time injury rates have decreased by almost half (2.4 to about 1.4 per 100 full-time equivalents).¹

However, mitigating miner health risks and managing negative health outcomes continues to be a significant challenge for many operators. Historically, the greatest health risk in mining has been associated with chronic respiratory exposures to dusts, particulates, gases, vapors and fumes. The National Institute for Occupational Safety and Health (NIOSH) tells us, "Miners are at risk of developing lung diseases called pneumoconioses because of their regular exposure to airborne dust, and miners with five or more years of mining experience who are exposed to exhaust from diesel engines have an increased risk of dying from lung cancer."²

While lung diseases most commonly associated with respiratory exposures in mining include silicosis, chronic obstructive pulmonary disease, lung cancer and coal worker pneumoconiosis, tremendous improvements in these diseases have been made (Fig. 1). Yet, as seen in the graph for 25-plus years of tenure, 1995 to 2014, the combination of changes in geology, mining methods and workforce demographics has resulted in increasing disease rates for some populations.

Additionally, there are many other health challenges associated with mining that have not seen dramatic improvements, including hearing loss, musculoskeletal diseases and fatigue. For example, Weston et al. reported that for 2009-2013, the U.S. Mine Safety and Health Administration data for U.S. mines, these musculoskeletal diseases were reported mostly for workers with less than five years or more than 20 years of mining experience. The highest number of days lost was associated with shoulder and knee injuries, which increased with age.³

There are correlated factors, such as an aging workforce, and lifestyle influences, such as smokeless tobacco use, rising addictions to methamphetamine and opioid drugs, obesity and the increasing use of marijuana paralleling legalization, that are further complicating risk mitigation strategies and creating mine sites where fitness-for-duty is questioned. Mining environments are becoming more challenging as surface mines become larger and more remote, underground mines grow deeper and hotter, the

workforce ages and changes, and automation creates new, and sometimes unanticipated, health challenges associated with the worker-machine interface.

We talk a lot about safety culture, but health culture is not really part of our vernacular. As we edge toward the quarter-century mark, mine operators continue to be significantly challenged to mitigate known health risks, have access to the tools needed to accurately and fairly confirm fitness-for-duty, control the unknown hazards associated with expanding automation and create a "just culture" where any miner in need who seeks proactive care can do so with the confidence and *real* support of his or her employer.

These miner-health challenges underscore the great need for increased cross-organizational transparency and sharing of best practices, sector-wide enhanced pipeline of well-trained, highly professional employees, and expanded focus on, and underwriting of, targeted, practical research with rapid lab-to-mine translation that benefits both large and small mine operators. With greater understanding of automation at the human-machine interface, additional tools for controlling exposures, and effective technologies for evaluating fitness for duty in real time, we can make dramatic strides toward eliminating occupational diseases in mining and send our miners home every shift across their career at least as healthy as they arrived.

References

1. <https://www.cdc.gov/niosh/mining/statistics/allmining.html>.
2. <https://www.cdc.gov/niosh/mining/topics/respiratorydiseases.html>.
3. *Identification of Work-Related Musculoskeletal Disorders in Mining*, Eric Weston, Mahiyar F. Nasarwanji, Ph.D. and Jonisha P. Pollard, M.S. ■

Percentage of examined miners with CWP Category 1 or greater by tenure in coal mining

(NIOSH Coal Workers' Health Surveillance Program, 1970-2014)

