APHA | OCCUPATIONAL HEALTH AND SAFETY SECTION

Mr. David G. Zatezalo
Assistant Secretary of Labor
for Mine Safety and Health
U.S. Department of Labor
201 12th Street South
Arlington, VA 22202–5452

October 28, 2019

SUBJECT: Request for Information on Respirable Silica
RIN 1219-AB36; Docket No. MSHA-2016-0013

Dear Assistant Secretary Zatezalo:

We are writing on behalf of the Occupational Health and Safety Section of the American Public Health Association in response to the Mine Safety and Health Administration's Request for Information on respirable silica. APHA is a diverse community of public health professionals who champion the health of all people and communities. Members of APHA's OHS Section provide the expertise on work-related injury and illness surveillance and prevention. APHA has long called on MSHA and OSHA to prevent silica-related disease. In 1995, we adopted a policy statement that urged both Department of Labor agencies to adopt the occupational exposure limit recommended by the National Institute for Occupational Safety and Health, as well as requirements for exposure monitoring and medical surveillance.[1]

Stronger silica standard needed to protect mine workers

MSHA's response to the epidemic of miners with severe lung disease—in the form of the Request for Information—is wholly inadequate. We concur with the United Mine Workers and the United Steelworkers that MSHA must immediately propose a rule to protect miners from respirable silica. (We will use the word silica and quartz interchangeably. We recognizing the current coal dust regulations address quartz—by far the most commonly found form of silicon dioxide—but it can occur in nature as cristobalite and tridymite.)

[1] American Public Health Association. Policy Statement: Prevention of Silicosis. Policy No. 9512, adopted November 1995. https://tinyurl.com/y6tnngg4

In 1974, the National Institute for Occupational Safety and Health published a recommendation that no worker be "exposed to a time-weighted average concentration of respirable silica greater than 50 *u*g/m^3 as determined by a full-shift sample for up to a 10-hour workday, 40-hour workweek."[2] When NIOSH made its recommendation, the exposure limit enforced by the Occupational Safety and Health Administration and MSHA exposure was 100 *u*g/m^3. In 2002, NIOSH reiterated its recommendation for an occupational exposure limit for crystalline silica of 50 *u*g/m^3 to reduce the risk of developing silicosis, lung cancer, and other adverse health effects.[3]

It was not until 2016 that OSHA adopted a standard that conforms with NIOSH's recommended exposure limit of 50 *u*g/m^3. The OSHA standard applies to workers who are employed in construction, maritime, oil/gas, and general industries. MSHA has failed, however, to adopt an exposure limit for respirable silica that is at least as protective as the NIOSH recommendation. As a result, employers who operate aggregate, metal, coal and other mines are permitted to expose workers to twice as much respirable silica dust than workers in any other industry. MSHA must immediately address this disparity with a protective occupational health standard.

The regulation adopted by MSHA in 2014 on respirable coal mine dust includes important provisions that were long overdue. These include the reduction in the concentration limit for respirable coal mine dust from 2.0 mg/m^3 to 1.5 mg/m^3; single, full-shift sampling rather than an average of samples; enhanced definition of a production shift; the use of continuous personal dust monitors; among other improvements. The rule, however, did not take adequate steps to address miners' exposure to respirable silica (including quartz). We note an analysis by NIOSH that demonstrates the *inadequacy* of regulating respirable quartz in coal mines through the "reduced standard" method based on the percentage quartz in an air sample.[4] The severe lung disease observed among coal miners is consistent with exposure to respirable silica.[5,6,7,8]

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[2] NIOSH (1974). Criteria for a Recommended Standard for Occupational Exposure to Crystalline Silica. HEW Pub. No. (NIOSH) 75-120.
[3] NIOSH (2002). Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica. DHHS (NIOSH) Pub. No. 2002-19.
[4] Joy GJ. Evaluation of the approach to respirable quartz exposure control in U.S. coal mines. J Occup Environ Hyg. 2012;9(2):65-8.
[5] Laney AS, Petsonk EL, Attfield MD.Pneumoconiosis among underground bituminous coal miners in the United States: is silicosis becoming more frequent? Occup Environ Med. 2010 Oct;67(10):652-6.
[6] Hall NB, Blackley DJ, et al. Continued increase in prevalence of r-type opacities among underground coal miners in the USA. Occup Environ Med. 2019 Jul;76(7):479-481.
[7] Cohen RA, Petsonk EL, et al. Lung pathology in U.S. coal workers with rapidly progressive pneumoconiosis implicates silica and silicates. Am J Respir Crit Care Med. 2016;193(6):673–80.

We note that during MSHA's rulemaking on respirable coal mine dust, experts retained by the mining industry argued that the agency was regulating the wrong contaminant. Instead of coal dust (a mixed dust), MSHA should focus attention on silica. Testimony by the industry included this statement: "The evidence is convincing that increased quartz exposure is an important, if not the explanatory factor in these rapidly progressive cases of CWP"[9] and more on respirable silica (quartz) being the contributor to the recent cases of severe lung disease.[10] We take these statements as affirmation that the industry agrees that MSHA should have a more protective standard for respirable silica.

Significant Risk of Impairment at Current OEL

The best available evidence on the mortality and morbidity risk from a working lifetime exposure to respirable silica is the peer-reviewed quantitative risk assessment prepared by OSHA to support its 2016 health standard on silica. At the current 100 ug/m^3 occupational exposure limit applicable to U.S. mine workers, the risk of non-malignant respiratory diseases, including chronic bronchitis emphysema, is 85 deaths per 1,000 workers. This estimate includes deaths from non-malignant respiratory disease where silicosis was a contributing factor but was not listed as the cause of death.[11]

Respirable silica dust is also human carcinogen. Therefore, the quantitative risk assessment also includes an estimate of excess lung cancer deaths. At the current 100 mg/m^3 exposure limit applicable to U.S. mine workers, the risk of death from lung cancer ranges from 11 to 54 deaths per 1,000 workers.[11,12,13] Moreover, exposure to respirable silica is associated with renal impairment and autoimmune disorders.

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[8] Hall NB, Blackley DJ, et al. Current review of pneumoconiosis among US coal miners. Curr Environ Health Rep. 2019 Sep;6(3):137-147.

[9] Presentation by Gamble JF, Reger RB, Glenn RE. A review of the scientific basis for MSHA's proposal for lowering the coal mine dust standard. (AB64-Comm-74-5). See exhibit posted at: https://www.regulations.gov/document?D=MSHA-2010-0007-0384

[10] MSHA. Transcripts of Proceedings: Lowering miners' exposure to respirable coal mine dust, proposed rule. Washington, DC. February 15, 2011.

[11] OSHA (2013). Occupational exposure to respirable crystalline silica: Review of health effects literature and preliminary quantitative risk assessment. https://www.regulations.gov/document?D=OSHA-2010-0034-1711

[12] Eastern Research Group. External peer review of OSHA's draft "OSHA preliminary health effects section for silica" and "preliminary quantitative risk assessment for silica", Peer Review Comments. January 2010. https://www.regulations.gov/document?D=OSHA-2010-0034-1716

[13] OSHA (2016). Occupational exposure to respirable silica, final rule. 81 Federal Register 16286. See pp. 16299 – 16399.

We urge MSHA to respond affirmatively to the petition submitted by the United Mine Workers and the United Steelworkers and immediately propose a rule to protect all mine workers from respirable silica.

We provide below responses to questions posed by MSHA in the Request for Information.

Question #1: Information on best practices that can be used to protect miners from exposure to quartz dust.

The sources of respirable dust in mining operations, from aggregate and dimension stone to metal and coal mines, are the same as they have been for decades. The effective and feasible means to eliminate or substantially control miners' exposure to respirable silica (quartz) are well understood. There are several comprehensive handbooks and documents published by NIOSH, in collaboration with stakeholders, which represent best practices for effective dust controls. These include:

(a) "Dust Control Handbook for Industrial Minerals Mining and Processing, 2nd edition"[14] is a document developed by the Industrial Minerals Association of North America, NIOSH and MSHA. The 362-page handbook was released in March 2019. The handbook is designed primarily for producers of industrial minerals and contains detailed descriptions and diagrams on the most effective dust control technologies for all stages of the mineral handling process. The handbook describes state-of-the-art best practices to control respirable dust—in order to protect miners' health—during drilling, crushing, screening, conveyance, bagging, loadout, and transport.

(b) "Best Practices for Dust Control in Coal Mining" is a 75-page handbook published by NIOSH in 2010.[15] The document prepared in recognition of the ongoing incidence of severe lung diseases among coal miners and its relationship to respirable coal and silica dust. The authors' intent was to present the best practices to control respirable dust levels in both surface and underground coal mining operations. The dust control techniques described in the handbook are well-recognized and proven effective. In addition, we also refer you to a 2010 paper by NIOSH researchers on the explicit hazard of respirable quartz for roof

[14] NIOSH (2019). Dust Control Handbook for Industrial Minerals Mining and Processing, 2nd edition. https://www.cdc.gov/niosh/mining/works/coversheet2094.html
[15] NIOSH (2010). Best Practices for Dust Control in Coal Mining. https://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2010-110.pdf

bolters[16] and a paper on the inadequacy of regulating respirable quartz in coal mines through the "reduced standard" method based on the percentage quartz in an air sample.[17]

(c) "Best Practices for Dust Control in Metal/Nonmetal Mining" is a 75-page handbook published by NIOSH in 2010.[18] The handbook describes best practices to eliminate or reduce miners' exposure to respirable dust in more than a dozen operations with high likelihood of dust exposure. These include drilling, conducting production shots, mucking, conveying, screening, bagging, and working inside of cabs and control booths.

We also point to the preamble to the final rule adopted by MSHA in 2014 to address coal mine dust which illustrates the agency's recognition of respirable dust as a hazard and the means to control it. With respect to roof bolters, MSHA explains:

> "roof bolting machine operators can be overexposed to dust from drilling, cleaning the dust collector, not maintaining the dust collector, or working downwind of the continuous mining machine. According to NIOSH, the largest source of operator dust exposure can occur from working downwind of the continuous mining machine. NIOSH states that if the dry dust collector is properly maintained and if the roof bolting machine is not working downwind of the continuous mining machine, very little dust should be measured in the roof bolting machine operator's work environment."[19] (Emphasis added)

Likewise, MSHA is well-versed in methods to protect continuous miner operators from respirable dust. In the 2014 final rule, the agency describes the primary means for reducing exposure to respirable dust, which include the use of water spray systems, ventilation, and mechanical equipment (scrubbers). The agency also emphasized the importance of maintenance of scrubbers, water sprays, cutting bits and/or drill bits in order for a dust control strategy to be effective.[19]

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[16] Joy GJ, Beck TW, Listak JM. Respirable quartz hazard associated with coal mine roof bolter dust. Proceedings of the 13th U.S./North American Mine Ventilation Symposium, Sudbury, Ontario, Canada, June 13-16, 2010.
[17] Joy GJ. Evaluation of the approach to respirable quartz exposure control in U.S. coal mines. J Occup Environ Hyg. 2012;9(2):65-8.
[18] NIOSH (2010). Best Practices for Dust Control in Metal/Nonmetal Mining. https://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2010-132.pdf
[19] MSHA. Final Rule: Lowering Miners' Exposure to Coal Mine Dust Including Continuous Personal Dust Monitors. 79 Federal Register 24814 (May 1, 2014).

Question #2: Please provide any information on how engineering controls, administrative controls, and personal protective equipment can be used, either alone or concurrently, to protect miners from exposure to quartz dust.

Hierarchy of Controls

The Federal Mine Safety and Health Act mandates that engineering controls be the primary means to prevent miners from exposure to respirable silica. This is consistent with the public health principle of addressing a hazard at its source. Engineering controls are much more effective than personal protective equipment (i.e., respirators). Those who argue that respirators should be more widely used want to permit mine operators to forego their duty to invest in, install, and properly maintain engineering controls---controls that are proven effective if used vigilantly and in accordance with manufacturers' recommendations.

Interviews with miners provide excellent insight on the reasons why respiratory protection is the least effective method to protect miners' health. In 2018, for example, National Public Radio conducted lengthy individual interviews with 34 miners who have progressive massive fibrosis.[20] (We are submitting to the record the data from the interviews.) The men worked at 321 coal mines in five states (Kentucky, Pennsylvania, Tennessee, Virginia and West Virginia.) Twenty-eight of the 34 miners said they wore respiratory protection sometimes or all of the time. Fourteen of these miners offered specific remarks about their experience with respirators:

—They "didn't work"

—Made it "hard to breathe"

—Had a "paper-like mask"

—"They'd get stopped up within 20-25 minutes"; "it was hard to breathe"

—"Once you ran out of filters you didn't get more"

—"They didn't work"; "clogged up"

—The "filters clogged"

—The "filters would get stopped up; very hot; restricted breathing"

[20] National Public Radio. Data from interviews with 34 miners who have been diagnosed with progressive massive fibrosis. (Interview recap submitted to record.) https://www.npr.org/2019/07/23/743152782/coal-miners-to-demand-congress-restore-full-black-lung-benefits-tax

—I “kept two [respirators] on-hand because they filled up—got hard to breathe through”

—They were "hard to wear"

—I would “wear when cutting through rock”, but “uncomfortable”

—They were “uncomfortable”

—I “had to take them on and off”; “uncomfortable”; “distracting”

—The filters would get "white and dusty"

In a separate investigation, NIOSH researchers interviewed 19 miners with progressive massive fibrosis to better understanding their mining experiences with respect to respirable dust.[21] Many of these miners also wore respirators during their careers. NIOSH reports that despite using respiratory protection, the devices did not protect these individuals from developing large opacities consistent with PMF. As NIOSH notes:

> “The responsibility of maintaining safe respirable dust levels in the mines lies with the coal mine operators, not the individual miner. In general, using personal protective equipment such as respirators is the least preferred method to control hazardous occupational exposures. To reliably reduce exposures, the correct type of respirator must be worn at the correct time and must fit and function properly. Breakdowns can occur with any of these steps. This is why engineering controls to reduce respirable dust exposures to safe levels are preferred.”[21]

MSHA acknowledges the same in its Request for Information:

> “Engineering controls are more effective than respirators in continuously protecting miners from respirable crystalline quartz. Many factors affect the effectiveness of respirators to protect miners. The protection of a respirator is reduced dramatically or voided when the respirator is improperly worn such as with facial hair that interferes with the seal or when the respirator is removed in contaminated atmospheres during periods of exposure, even for short durations.”[22]

[21] Reynolds LE, Blackley DJ, et al. Work practices and respiratory health status of Appalachian coal miners with progressive massive fibrosis. J Occup Environ Med. 2018 Nov;60(11):e575-e581.
[22] MSHA. Request for Information on Respirable Quartz. 84 Federal Register 45452 (August 29, 2019).

Current Coal Mine Dust Exposures

MSHA reports that 99% of samples are in compliance with the coal mine dust standards.[23] The agency also reports that the average respirable coal mine dust concentrations in continuous and longwall mining sections are less than 1.0 mg/m^3.[24] Given this, we are troubled by extensive language in MSHA's Request for Information about respiratory protection.

The answer to an inadequate OEL for quartz (i.e., 100 *u*g/m^3) is not respiratory protection. The agency should acknowledge that the coal mining industry is capable of controlling dust (or choses to does so on sampling days) and that a more protective OEL for quartz is achievable.

Respirable Silica Dust in Taconite Mines

We are submitting for the record a 2017 paper on respirable dust and respirable silica exposure in six taconite mines in Minnesota. The samples were collected in 2010-2011 to evaluate how different mining processes affect exposures. The authors present data on nearly 700 personal samples with respect to the current MSHA PEL for respirable silica (100 *u*g/m^3) and the ACGIH TLV for respirable silica (25 *u*g/m^3).

Question #4. Please provide any other experience, data, or information that may be useful to MSHA in evaluating miners' exposures to quartz.

1) Interviews with miners

Mine workers provide valuable insight on the circumstances to which they are exposed to respirable quartz. For example, NIOSH researchers interviewed 19 miners with progressive massive fibrosis (PMF) to better understanding their mining experiences with respect to respirable dust.[21] The miners ranged in age from 48 to 62 years at the time of their diagnosis with PMF. Among other findings, NIOSH reported:

—Eighteen of the 19 miners reported that the "continuous miner cut rock during their careers and 13 reported that a substantial amount of rock was cut"

—Nine of the 19 miners indicated their primary job was a roof bolter. Eight of the nine reported "regularly working downwind of the continuous miner operator more than once per shift."

[23] Testimony of David Zatezalo before the Subcommittee on Workforce Protections, House Education and Labor Committee, June 29, 2019.
[24] Meikle, G. 2017. Presentation from the Chief of Health for Coal Mine Safety and Health, MSHA to Committee on the Study of the Control of Respirable Coal Mine Dust Exposure in Underground Mines, Morgantown, WV, June 29, 2017.

—Six of the 19 miners reported that the "continuous miner cut through sections of pure rock for extended periods of time (up to 3 months.)"

The miners shared their experiences and observations. One miner said:

"All the big seams of coal are gone, and they're cuttin' rock everywhere, and it's just...the silica...It's just unreal. You can't breathe it."

Another miner, who worked primarily as a roof bolter, recalled an occasion when the continuous miner cut through four feet of sandstone for a week. He also perceived his greatest source of exposure to respirable dust was while emptying the roof bolter collection box four or five times during each shift.

An investigation by National Public Radio about the resurgence of black lung disease included interviews in 2018 with 34 coal miners.[20] Over their careers, the men worked at 321 coal mines in five states (Kentucky, Pennsylvania, Tennessee, Virginia and West Virginia.) We are submitting to the record the data from the interviews. All of the men were diagnosed with progressive massive fibrosis, including 3 miners who worked 15 or fewer years.

Among the 34 miners, 27 reported operating a roof bolter during some or all of the mining careers, and 17 reported running a continuous miners during some or all of their mining careers. Although effective dust controls are available for both bolters and miners, the men reported that operating this equipment was their greatest source of exposure to respirable dust. Twenty-five of the 34 miners specifically mentioned "cutting rock" as the source of the dust.

In addition, four of the miners interviewed by NPR mentioned "slope mining" as the greatest source of their exposure to respirable silica. This is consistent with a report from a physician in eastern Kentucky who diagnosed 60 cases of progressive massive fibrosis (PMF) between January 2015 and August 2016. In obtaining the work history of these patients, he noted a common thread reported by some was "slope mining."[25] The physician collaborated with NIOSH to confirm the 60 cases of PMF. Their investigation found 26 (43%) and 20 (33%) of the patients reported their primary mining occupation was roof bolter and continuous miner operator, respectively.

The information provided in these and other reports reiterates what MSHA and the mining industry have long understood. That is, there are numerous tasks and operations that have the potential to generate respirable dust and the methods to eliminate exposure to respirable dust must be in place at all times.

[25] Blackley DJ, Crum JB, et al. Resurgence of progressive massive fibrosis in coal miners, eastern Kentucky, 2016. Morb Mortal Wkly Rep. 2016 Dec 16;65(49):1385-1389.

2) "Valid Sample" in coal mine dust sampling

We urge MSHA to revisit definitions in its 2014 final rule on respirable coal mine dust to determine their adequacy on shifts that are not normal production. Conversations with miners indicate that some of their highest periods of exposure to respirable silica were during shifts when they were "cutting a lot of rock" such as during shaft and slope work. Miners also express concern that the definitions, such as "representative sample" and "normal production shift," may not be adequate for the times when there is not actually a lot of coal being produced. One miner suggested to us that with the CPDM's, mines have a lot of voided samples because of low production, but those are not the samples that are analyzed for quartz. He said someone needs to look into that so we are relaying this information on his behalf.

Conclusion

We strongly urge MSHA to immediately propose a standard to protect all mine workers from exposure to respirable crystalline silica. The agency should use the peer-reviewed quantitative risk assessment prepared by OSHA for its 2016 health standard on silica and note the demonstrated feasibility of dust controls as demonstrated by NIOSH and MSHA itself. It is wholly unacceptable that our nation's mine workers—who have some of the highest exposure to respirable silica—do not have the same health protection as all other workers in the U.S.

Sincerely,

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