PUBLIC SUBMISSION

As of: 11/7/19 4:24 PM
Received: October 23, 2019
Status: Posted
Posted: October 25, 2019
Tracking No. 1k3-9cwh-bv7i
Comments Due: October 28, 2019
Submission Type: Web

Docket: MSHA-2016-0013
Respirable Crystalline Silica/Quartz

Comment On: MSHA-2016-0013-0001
Respirable Silica (Quartz) - Request for Information

Document: MSHA-2016-0013-0051
Comment from Paul Schulte,

Submitter Information

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General Comment

Comment from Paul Schulte, NIOSH

Attachments

NIOSH Comments to MSHA 10-22-19

AB36-COMM-36

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
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National Institute for Occupational
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October 22, 2019

MSHA
Office of Standards, Regulations, and
Variances
201 12th Street South, Suite 4E401
Arlington, Virginia 22202-5452

Docket No. MSHA—2016—0013
RIN 1219—AB36

Dear Sir/Madam:

The National Institute for Occupational Safety and Health (NIOSH) has reviewed the Mine Safety and Health Administration (MSHA) Request for Information on *Respirable Silica (Quartz)* published in the *Federal Register* on August 29, 2019 [84 FR 45452]. Our comments are enclosed.

Please do not hesitate to contact me at (513) 533-8302 if I can be of further assistance.

Sincerely yours,

Paul A. Schulte, Ph.D.
Director
Division of Science Integration

Enclosures

National Institute for Occupational Safety and Health

Comments to the Mine Safety and Health Administration (MSHA)

Formal comments from the National Institute for Occupational Safety and Health (NIOSH) on "Respirable Silica (Quartz)" Request for Information (RFI)

Docket Number: MSHA–2016–0013; RIN 1219–AB36

October 22, 2019

Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

The National Institute for Occupational Safety and Health (NIOSH) has reviewed the Mine Safety and Health Administration (MSHA) Request for Information (RFI) *Respirable Silica (Quartz)* published in the *Federal Register* (FR) on August 29, 2019 (84 FR 45452). NIOSH supports the effort of MSHA to request information on the best practices to protect miners from exposure to quartz in respirable dust. NIOSH continues to conduct research on methods to reduce worker exposures to respirable crystalline silica (RCS). Our comments provide information about NIOSH research results and best practices applicable to mining in response to the four MSHA requests on FR page 45456. (Text from the FR notice is italicized.) https://www.govinfo.gov/content/pkg/FR-2019-08-29/pdf/2019-18478.pdf.

1. Please provide any information on new or developing technologies and best practices that can be used to protect miners from exposure to quartz dust.

The NIOSH publication "Best Practices for Dust Control in Coal Mining" summarizes dust control technologies applicable to continuous mining, longwall mining, and surface coal mining operations [NIOSH 2010]. Although the majority of controls discussed were not specifically evaluated for control of quartz dust exposure, the reductions in both coal and quartz dust were reported for some controls and show that the reduction efficiency for quartz dust was within a few percent of that for coal [USBM 1990; Goodman and Organiscak 2002; Goodman et al. 2006]. Subsequently, NIOSH identified and evaluated additional control technologies designed to reduce respirable coal mine dust. Select publications discussing the results of these technology evaluations include: flooded-bed scrubber performance [NIOSH 2011, 2013], filtration and pressurization systems for enclosed cabs [NIOSH 2018a], a mobile dry scrubber [Organiscak et al. 2016], a canopy air curtain for roof bolters [Listak and Beck 2012; Reed et al. 2017], wet head sprays for continuous miners [Listak et al. 2010], wetting agents [Organiscak 2013], and an air blocking shelf for surface drills [Potts and Reed 2011].

The 2019 NIOSH publication "Dust Control Handbook for Industrial Minerals Mining and Processing" is a comprehensive summary of currently available respirable dust control technologies applicable to all phases of minerals mining and processing [NIOSH 2019]. (The publication is cited in footnote 1 on FR page 45453.)

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.

NIOSH supports the use of engineering controls as the primary means of protecting mine workers from exposure to respirable quartz [NIOSH 2019]. As noted on the NIOSH respirators topic page [NIOSH 2018b]: "Respirators should only be used when engineering control systems are not feasible. Engineering control systems, such as adequate ventilation or scrubbing of contaminants, are the preferred control methods for reducing worker exposures." Still, NIOSH would be supportive of strict adherence to an approach similar to that taken in the Occupational Safety and Health Administration (OSHA) respirable crystalline silica standard, as specified in paragraphs 29 CFR 1910.1053 (f)(1), 29 CFR 1910.1053 (g)(1) and in various parts of the regulation detailing requirements for regulated areas "where an employee's exposure to airborne concentrations of respirable crystalline silica exceeds, or can reasonably be expected to exceed, the PEL [permissible exposure limit]." The standard specifies: "Where respiratory protection is required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph and 29 CFR 1910.134.

Respiratory protection is required: (i) Where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls; (ii) Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible; (iii) During tasks for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL; and (iv) During periods when the employee is in a regulated area." In addition, "Where respirator use is required by this section, the employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134." However, it is important to emphasize that the standard requires the following: "The employer shall use engineering and work practice controls to reduce and maintain employee exposure to respirable crystalline silica to or below the PEL, unless the employer can demonstrate that such controls are not feasible" [29 CFR 1910.1053(f)(1)].

Many mining operations use administrative controls as part of their regular operating procedures. Job rotation is one example: a miner operates a piece of mining equipment for the first half of a shift and then is replaced by another miner who operates that equipment for the second half of the shift. If this is a standard operating practice and is included in the ventilation/dust control plan (required for underground coal mining [30 CFR §75.371]), then there can be a benefit to collecting individual full-shift respirable dust samples on both miners participating in the job rotation. This would allow mines to use this administrative control but require additional sampling to verify that the respirable dust exposure of each miner was maintained below the applicable respirable dust standard over the entire shift.

3. Please provide any information on additional feasible dust-control methods that could be used by mining operations to reduce miners' exposure to respirable quartz during high-silica cutting situations, such as on development sections, shaft and slope work, and cutting overcasts.

During high-silica generating activities, upgrades to the existing control technologies can be considered as a feasible dust-control method. For example, increases in face airflow and water spray quantity could be applied to improve dust control during these activities. Also, more frequent maintenance will likely be required and includes increasing the frequency of bit changes and scrubber filter cleanings. Depending on operating conditions, other changes should also be considered such as requiring the ventilation curtain/tubing be extended closer to the face (e.g., 10-foot setback versus 20-foot setback) if the continuous miner is not equipped with a flooded-bed scrubber. MSHA should also consider requiring the use of PPE—as duplicative protection—during the high quartz cutting activities identified above.

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

NIOSH identified occupations associated with recent clusters of coal miners with advanced pneumoconiosis, including progressive massive fibrosis (PMF): underground roof bolter, continuous miner operator, and surface driller—occupations known to be at increased risk of quartz exposure [CDC 2012, 2016; Halldin et al. 2015; Blackley et al. 2018]. In interviews about their working careers, miners reported working in conditions where continuous miners cut substantial amounts of rock, particularly during work on development sections which included cutting slopes [Reynolds et al. 2018].

Chest radiographic findings in recently-identified case clusters of PMF in Appalachian coal miners are consistent with a causative role of RCS exposure. In two clinic-based studies of miners with PMF, more than one fourth of miners had background small opacities classified as r-type, which are associated with silicosis lung pathology [CDC 2016; Blackley et al. 2018]. In addition, compliance air sampling suggests a role for respirable crystalline silica. A recent analysis of MSHA inspector-collected samples of respirable coal mine dust in underground mines reported that mean percent quartz content in samples analyzed from central Appalachian coal mines was significantly higher ($P< 0.0001$) in central Appalachia (6.724%) compared with the rest of the United States (3.886%) for the period 1982–2017 [Doney et al. 2019]. NIOSH recently published a comprehensive review of pneumoconiosis among United States coal miners, which might be a useful resource [Hall et al. 2019].

In 1974 (FR page 45453), NIOSH established a Recommended Exposure Limit (REL) for respirable crystalline silica of 50 µg/m^3 for up to a 10-hour workday, 40-hour workweek [NIOSH 1974]. NIOSH continues to support this REL as a maximum exposure level. In addition, an accurate way to verify that mine workers are not being overexposed to respirable crystalline silica is through the continued use of personal sampling. At mines that exhibit historic and ongoing issues with elevated silica levels, increased silica sampling by MSHA should be considered as a means of providing greater protection for these workers with higher risks of overexposure.

One issue for MSHA to consider in addressing exposure to respirable crystalline silica is that the NIOSH REL and the OSHA Permissible Exposure Limit (PEL; 50 µg/m^3) both address more forms of respirable crystalline silica than just respirable quartz. The compound SiO_2 can crystallize into a variety of polymorphs, or forms. The three major forms of crystalline silica in natural settings are quartz, cristobalite, and tridymite. Quartz is so abundant in nature relative to the other forms that the specific term quartz is used by some writers in place of the more general term crystalline silica. However, cristobalite and tridymite may also be present in certain natural settings such as volcanic tuffs [USBM 1992; NIOSH 2002]. For consistency with the NIOSH REL and OSHA PEL, and to have the authority to address unusual situations where exposure to cristobalite and tridymite might occur, MSHA may wish to address respirable crystalline silica rather than only respirable quartz.

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