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Part II

Department of Labor

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Occupational Safety and Health Administration

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29 CFR Parts 1910, 1915, and 1926

Occupational Exposure to Respirable Crystalline Silica; Final Rule

**DEPARTMENT OF LABOR****Occupational Safety and Health Administration****29 CFR Parts 1910, 1915, and 1926**

[Docket No. OSHA–2010–0034]

RIN 1218–AB70

**Occupational Exposure to Respirable Crystalline Silica**

**AGENCY:** Occupational Safety and Health Administration (OSHA), Department of Labor.

**ACTION:** Final rule.

**SUMMARY:** The Occupational Safety and Health Administration (OSHA) is amending its existing standards for occupational exposure to respirable crystalline silica. OSHA has determined that employees exposed to respirable crystalline silica at the previous permissible exposure limits face a significant risk of material impairment to their health. The evidence in the record for this rulemaking indicates that workers exposed to respirable crystalline silica are at increased risk of developing silicosis and other non-malignant respiratory diseases, lung cancer, and kidney disease. This final rule establishes a new permissible exposure limit of 50 micrograms of respirable crystalline silica per cubic meter of air (50 µg/m<sup>3</sup>) as an 8-hour time-weighted average in all industries covered by the rule. It also includes other provisions to protect employees, such as requirements for exposure assessment, methods for controlling exposure, respiratory protection, medical surveillance, hazard communication, and recordkeeping.

OSHA is issuing two separate standards—one for general industry and maritime, and the other for construction—in order to tailor requirements to the circumstances found in these sectors.

**DATES:** The final rule is effective on June 23, 2016. Start-up dates for specific provisions are set in § 1910.1053(l) for general industry and maritime and in § 1926.1153(k) for construction.

**Collections of Information**

There are a number of collections of information contained in this final rule (see Section VIII, Paperwork Reduction Act). Notwithstanding the general date of applicability that applies to all other requirements contained in the final rule, affected parties do not have to comply with the collections of information until the Department of Labor publishes a separate notice in the **Federal Register**

announcing the Office of Management and Budget has approved them under the Paperwork Reduction Act.

**ADDRESSES:** In accordance with 28 U.S.C. 2112(a), the Agency designates Ann Rosenthal, Associate Solicitor of Labor for Occupational Safety and Health, Office of the Solicitor of Labor, Room S–4004, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210, to receive petitions for review of the final rule.

**FOR FURTHER INFORMATION CONTACT:** For general information and press inquiries, contact Frank Meilinger, Director, Office of Communications, Room N–3647, OSHA, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693–1999; email [meilinger.francis2@dol.gov](mailto:meilinger.francis2@dol.gov).

For technical inquiries, contact William Perry or David O'Connor, Directorate of Standards and Guidance, Room N–3718, OSHA, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693–1950.

**SUPPLEMENTARY INFORMATION:** The preamble to the rule on occupational exposure to respirable crystalline silica follows this outline:

- I. Executive Summary
- II. Pertinent Legal Authority
- III. Events Leading to the Final Standards
- IV. Chemical Properties and Industrial Uses
- V. Health Effects
- VI. Final Quantitative Risk Assessment and Significance of Risk
- VII. Summary of the Final Economic Analysis and Final Regulatory Flexibility Analysis
- VIII. Paperwork Reduction Act
- IX. Federalism
- X. State-Plan States
- XI. Unfunded Mandates
- XII. Protecting Children From Environmental Health and Safety Risks
- XIII. Consultation and Coordination With Indian Tribal Governments
- XIV. Environmental Impacts
- XV. Summary and Explanation of the Standards
  - Scope
  - Definitions
  - Specified Exposure Control Methods
  - Alternative Exposure Control Methods
  - Permissible Exposure Limit
  - Exposure Assessment
  - Regulated Areas
  - Methods of Compliance
  - Respiratory Protection
  - Housekeeping
  - Written Exposure Control Plan
  - Medical Surveillance
  - Communication of Respirable Crystalline Silica Hazards to Employees
  - Recordkeeping
  - Dates
  - Authority and Signature

**Citation Method**

In the docket for the respirable crystalline silica rulemaking, found at <http://www.regulations.gov>, every submission was assigned a document identification (ID) number that consists of the docket number (OSHA–2010–0034) followed by an additional four-digit number. For example, the document ID number for OSHA's Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis is OSHA–2010–0034–1720. Some document ID numbers include one or more attachments, such as the National Institute for Occupational Safety and Health (NIOSH) prehearing submission (see Document ID OSHA 2010–0034–2177).

When citing exhibits in the docket, OSHA includes the term "Document ID" followed by the last four digits of the document ID number, the attachment number or other attachment identifier, if applicable, page numbers (designated "p." or "Tr." for pages from a hearing transcript), and in a limited number of cases a footnote number (designated "Fn"). In a citation that contains two or more document ID numbers, the document ID numbers are separated by semi-colons. For example, a citation referring to the NIOSH prehearing comments and NIOSH testimony obtained from the hearing transcript would be indicated as follows: (Document ID 2177, Attachment B, pp. 2–3; 3579, Tr. 132). In some sections, such as Section V, Health Effects, author names and year of study publication are included before the document ID number in a citation, for example: (Hughes *et al.*, 2001, Document ID 1060; McDonald *et al.*, 2001, 1091; McDonald *et al.*, 2005, 1092; Rando *et al.*, 2001, 0415).

**I. Executive Summary**

This final rule establishes a permissible exposure limit (PEL) for respirable crystalline silica of 50 µg/m<sup>3</sup> as an 8-hour time-weighted average (TWA) in all industries covered by the rule. In addition to the PEL, the rule includes provisions to protect employees such as requirements for exposure assessment, methods for controlling exposure, respiratory protection, medical surveillance, hazard communication, and recordkeeping. OSHA is issuing two separate standards—one for general industry and maritime, and the other for construction—in order to tailor requirements to the circumstances found in these sectors. There are, however, numerous common elements in the two standards.

Requirements under new rule for Crystalline Silica

including the age of fractured surfaces of the crystal particle and clay occlusion of the particle. OSHA recognizes that the risk to employees exposed to a given level of respirable crystalline silica may not be equivalent in different work environments due to differences in physical factors that affect the potency of crystalline silica. OSHA also recognizes that workers in these industries (e.g., brick manufacturing) may experience lower rates of silicosis and other health effects associated with exposure to respirable crystalline silica. However, OSHA finds that these employees are still at significant risk of developing adverse health effects from exposure to respirable crystalline silica. The Agency is therefore not excluding brick, tile, or fly ash from the scope of the rule based on physical characteristics of crystalline silica.

OSHA also received multiple studies, along with testimony and comments from the Sorptive Minerals Institute (SMI) (Document ID 2377; 4230). SMI stated that sorptive clays are limited to a specific and discreet subset of deposits in the U.S., including specifically: The Monterey formation (California), the Porters Creek formation (Mississippi Valley), the Twiggs and Meigs fullers earth (southeastern U.S.), the Wyoming or Western-type sodium bentonite deposits, the calcium bentonite deposits (north-central Florida), and the fullers earth deposits of eastern Virginia (Document ID 4230, p. 3). As discussed in Section V, Health Effects, SMI contended that silica in sorptive clays exists as either amorphous silica or as geologically ancient, occluded quartz, and that neither form poses the health risk described in OSHA's risk assessment (Document ID 4230, p. 2). After evaluation of the evidence SMI submitted to the record, OSHA finds that quartz originating from bentonite and similar sorptive clays is considerably less toxic than unoccluded quartz, and evidence does not exist that would permit the Agency to evaluate the magnitude of the lifetime risk resulting from exposure to silica in sorptive clay deposits. OSHA is therefore excluding sorptive clays from the scope of the rule, as described in paragraph (a)(1) of the general industry and maritime standard. The PEL in 29 CFR 1910.1000 Table Z-3 (i.e., the formula that is approximately equivalent to 100  $\mu\text{g}/\text{m}^3$ ) will continue to apply to occupational exposure to respirable crystalline silica from sorptive clays. The exemption covers exposures resulting from the processing, packaging, and distribution of sorptive clays originating from the geological

deposits described above (and intended for sorptive clay-specific use such as absorbents for oil, grease, and animal waste, as a carrier for pesticides and fertilizers, or in cosmetics, pharmaceuticals, and animal feeds).

*Relationship to other OSHA standards.* EEI and the American Iron and Steel Institute (AISI) sought clarification from OSHA regarding how the silica rule would affect the existing coke oven emissions standard or the PEL for coal dust. EEI said that OSHA should expressly exempt coal dust from the rule (Document ID 2357, p. 4). AISI similarly stated that the rule potentially conflicts with the coal dust PEL and is duplicative of existing steel industry standards. AISI stated that OSHA's existing coke oven emissions standard protects employees working in the regulated area around metallurgical coke ovens and metallurgical coke oven batteries where exposures to emissions are of greatest concern. AISI believes that workers covered by OSHA's coke oven emissions standard are therefore already protected adequately from the dangers of crystalline silica exposure and such operations should be exempt from the rule (Document ID 3492, p. 2).

The respirable crystalline silica rule has no effect upon OSHA's standard for coke oven emissions, the existing PEL for coal dust, or any other substance-specific standard. None of these requirements provide the full range of protections afforded by the respirable crystalline silica rule. The PEL for coal dust is only a PEL; it does not provide any additional protections, such as medical surveillance. Other requirements therefore do not provide protection equivalent to the respirable crystalline silica rule. Accordingly, the silica rule applies to these situations to the extent there is silica exposure and the conditions for excluding them from the rule's scope are not met.

#### Definitions

Paragraph (b) of the standard for general industry and maritime (paragraph (b) of the standard for construction) provides definitions of terms used in the standards.

"Action level" means a concentration of airborne respirable crystalline silica of 25 micrograms of respirable crystalline silica per meter cubed of air ( $\mu\text{g}/\text{m}^3$ ), calculated as an 8-hour time-weighted average. The action level triggers requirements for exposure assessment and, in the standard for general industry and maritime, medical surveillance. The definition is unchanged from the proposal.

Because of the variable nature of employee exposures to airborne

concentrations of respirable crystalline silica, maintaining exposures below the action level provides reasonable assurance that employees will not be exposed to respirable crystalline silica at levels above the permissible exposure limit (PEL) on days when no exposure measurements are made. Even when all measurements on a given day fall below the PEL but are above the action level, there is a reasonable chance that on another day, when exposures are not measured, the employee's actual exposure may exceed the PEL (Document ID 1501). The importance of the action level is explained in greater detail in the summary and explanation of *Exposure Assessment* and summary and explanation of *Medical Surveillance*.

The action level in this rule is set at one-half of the PEL. This is the same ratio of action level to PEL that has been used and been effective in other standards, including those for inorganic arsenic (29 CFR 1910.1018), ethylene oxide (29 CFR 1910.1047), benzene (29 CFR 1910.1028), methylene chloride (29 CFR 1910.1052), and chromium (VI) (29 CFR 1910.1026).

Following the publication of the proposed rule, OSHA received a number of comments pertaining to the definition of the action level. Some commenters, such as National Council for Occupational Safety and Health (NCOSH), American Federation of Labor and Congress of Industrial Organizations (AFL-CIO), International Brotherhood of Teamsters, United Steelworkers (USW), Center for Effective Government (CEG), American Public Health Association (APHA), American Thoracic Society (ATS), and Cara Evens, a private citizen, supported OSHA's proposal to include an action level of 25  $\mu\text{g}/\text{m}^3$  (e.g., Document ID 1801, p. 2; 2173, pp. 2-3; 2175, p. 5; 2178, Attachment 1, p. 2; 2318, p. 10; 2336, p. 5; 2341, pp. 2-3; 4204, pp. 42-45, 51-52). For example, USW supported the inclusion of an action level that is half the PEL (25  $\mu\text{g}/\text{m}^3$ ) because:

This action level will further reduce exposure to respirable crystalline silica by workers and will incentivize employers to implement best-practice controls keeping exposures at a minimum as well as reducing costs of monitoring and assessments. The USW believes measuring airborne concentrations of silica at 25  $\mu\text{g}/\text{m}^3$  will prove feasible given current sampling techniques (Document ID 2336, p. 5).

AFL-CIO noted that action levels have long been incorporated into OSHA standards in recognition of the variability of workplace exposures and argued that the inclusion of an action level is particularly important in this

OSHA findings about BPM Wyoming Bentonite

TABLE Z-3—MINERAL DUSTS—Continued

Substance	mppcf <sup>a</sup>	mg/m <sup>3</sup>
Quartz (Respirable) <sup>f</sup> .....	250 <sup>b</sup>	10 mg/m <sup>3e</sup>
	%SiO <sub>2</sub> +5	% SiO <sub>2</sub> +2
Cristobalite: Use 1/2 the value calculated from the count or mass formulae for quartz <sup>f</sup>	.....	.....
Tridymite: Use 1/2 the value calculated from the formulae for quartz <sup>f</sup> .....	.....	.....
* .....	*	*
* .....	*	*

<sup>a</sup> Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.  
<sup>b</sup> The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.  
<sup>c</sup> Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2 .....	90
2.5 .....	75
3.5 .....	50
5.0 .....	25
10 .....	0

BPM Wyoming  
Bentonite exempt from  
OSHA Crystalline Silica  
Rule under this section

The measurements under this note refer to the use of an AEC (now NRC) instrument. The respirable fraction of coal dust is determined with an MRE; the figure corresponding to that of 2.4 mg/m<sup>3</sup> in the table for coal dust is 4.5 mg/m<sup>3k</sup>.  
<sup>f</sup> This standard applies to any operations or sectors for which the respirable crystalline silica standard, 1910.1053, is stayed or is otherwise not in effect.

■ 4. Add § 1910.1053 to read as follows:

**§ 1910.1053 Respirable Crystalline Silica.**

(a) *Scope and application.* (1) This section applies to all occupational exposures to respirable crystalline silica, except:

- (i) Construction work as defined in 29 CFR 1910.12(b) (occupational exposures to respirable crystalline silica in construction work are covered under 29 CFR 1926.1153);
- (ii) Agricultural operations covered under 29 CFR part 1928; and
- (iii) Exposures that result from the processing of sorptive clays.

(2) This section does not apply where the employer has objective data demonstrating that employee exposure to respirable crystalline silica will remain below 25 micrograms per cubic meter of air (25 µg/m<sup>3</sup>) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

(3) This section does not apply if the employer complies with 29 CFR 1926.1153 and:

- (i) The task performed is indistinguishable from a construction task listed on Table 1 in paragraph (c) of 29 CFR 1926.1153; and
- (ii) The task will not be performed regularly in the same environment and conditions.

(b) *Definitions.* For the purposes of this section the following definitions apply:

*Action level* means a concentration of airborne respirable crystalline silica of 25 µg/m<sup>3</sup>, calculated as an 8-hour TWA.

*Assistant Secretary* means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

*Director* means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

*Employee exposure* means the exposure to airborne respirable crystalline silica that would occur if the employee were not using a respirator.

*High-efficiency particulate air [HEPA] filter* means a filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.

*Objective data* means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee exposure to respirable crystalline silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

*Physician or other licensed health care professional [PLHCP]* means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be

delegated the responsibility to provide some or all of the particular health care services required by paragraph (i) of this section.

*Regulated area* means an area, demarcated by the employer, where an employee's exposure to airborne concentrations of respirable crystalline silica exceeds, or can reasonably be expected to exceed, the PEL.

*Respirable crystalline silica* means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle-size-selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality—Particle Size Fraction Definitions for Health-Related Sampling.

*Specialist* means an American Board Certified Specialist in Pulmonary Disease or an American Board Certified Specialist in Occupational Medicine.

*This section* means this respirable crystalline silica standard, 29 CFR 1910.1053.

(c) *Permissible exposure limit (PEL).* The employer shall ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of 50 µg/m<sup>3</sup>, calculated as an 8-hour TWA.

(d) *Exposure assessment*—(1) *General.* The employer shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above