

Understanding the new OSHA standards for Silica dust in the construction industry.

Summary of Key Provisions and Response to August 2016 Construction Silica workshop on OSHA 29 CFR 1926.1153

To help the industry better understand and comply with the new OSHA standards for Silica dust, CPWR (The Center for Construction Research and Training) and nxtMOVE Corporation were invited to conduct a “OSHA Silica Dust” workshop at Hilti North America’s corporate headquarters in Plano, Texas and co-author this whitepaper on behalf of the consortium members. The purpose of this meeting was to give a group of construction industry leaders the opportunity to learn from OSHA about the new construction standard, and address their biggest compliance questions with OSHA and a panel of health and safety researchers. The discussion would drive the creation of this white paper, intended to help others in the industry digest the new standard

Companies that contributed to the 2016 Construction Silica Consortium

Baker Concrete Construction
Balfour Beatty Construction
Bechtel
CECO Concrete Construction
The Center for Construction Research and Training (CPWR)
Clark Construction
Concrete Frame Associates, LLC
DPR Construction
Harvey Construction
The HEICO Companies
Hensel Phelps
Hilti
JE Dunn Construction
Laborers’ Health & Safety Fund of North America (LHSFNA)
Manganaro Mid-Atlantic Construction LLC
McCarthy Construction
National Institute for Occupational Safety and Health
nxtMOVE Corporation
Occupational Safety and Health Administration
Schindler Elevator
Sheet Metal Occupational Health Institute Trust (SMOHIT)
Skanska Construction Company
University of California-San Francisco – Department of Ergonomics
Valley Interiors
Walters Healthcare Resources, Inc.
Zachry Industrial, Inc.
Turner Construction

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KEY POINTS FROM THE NEW SILICA DUST STANDARD

- The new standard requires a more stringent “permissible exposure limit”, moving from approx. 250 micrograms / m³ over an 8 hour day (time weighted average) to 50 micrograms / m³ over an 8 hour day.
- OSHA has provided three options for compliance in the new standard
 1. **Table 1:** a table of pre-defined applications and approved control solutions available in the market today
 2. **Performance or Objective data:** Providing objective data proving the control method used reduces silica dust exposure below the stated permissible exposure limit (50 micrograms / m³)
 3. Self-monitoring program to ensure employees are not exposed to applications exceeding 50 micrograms / m³ in an 8-hour work day
- **Employers are required to have a written exposure control plan**
- Medical surveillance (exams) must be offered for employees required by the standard to wear a respirator for 30 or more days per year

INTRODUCTION

On March 25, 2016, the Occupational Safety and Health Administration (OSHA) issued a final rule on respirable crystalline silica dust (silica¹). The new rule updated regulations established more than 40 years ago and introduced requirements for reducing an employee's exposure to silica dust. The final rule is written as two standards: one for construction and one for general industry and maritime.

This white paper provides a brief overview of the requirements in the new construction standard as well as notes from the Aug. 19 silica workshop discussions with responses to select questions. The participants in the August workshop, representing 20 general and specialty trade contractor organizations, identified two main topics from the new standard that they were most interested in learning more about. They were:

- 1) Exposure control methods and
- 2) Medical surveillance requirements.

Along with an overview of the new rule, the two topics identified will be the main focus of this paper.

Resources to assist with compliance are included as well at the end of the paper.

SECTION 1 - OVERVIEW

Under the existing silica rule established in 1971, employers were responsible for testing exposure and finding ways to limit exposure below ~250 micrograms/m³ averaged over an 8-hour workday. The new standard aligned the permissible exposure limit (PEL) for the construction industry and general industry to the **NIOSH recommended limit of 50 µg/m³ averaged over an 8-hour workday (time weighted average, or "TWA") – a level already adopted by several European countries.** It is important to remember that when OSHA claims that a PEL is feasible (for example, under Table 1) they are saying that the PEL can be met most of the time. According to OSHA, the new PEL is expected to prevent hundreds of silica-related deaths and illnesses each year – including 900 new cases of silicosis.

Additionally, OSHA has included a layer of flexibility for employers, which was not a part of the 1971 standard. Under the new OSHA rules, an employer will have three options for compliance in addition to a medical protocol for workers that perform activities involving higher levels of silica dust exposure.

The compliance options are:

¹ Codified as 29 CFR 1926.1153

Option 1: Commonly referred to as “Table 1”

OSHA lists control methods in Table 1 – by application type – to reduce silica exposure. For each of these applications – and the corresponding number of hours that the application may be performed during a normal shift – this option lists tool types and descriptions that OSHA expects will control silica exposure to the permissible exposure limit (‘PEL’).

Example: **By using a listed dust control system it is presumed that a contractor has taken appropriate measures to protect its workers and meet the standard outlined in the rule.**

Option 2: Performance or Objective data

OSHA allows employers to rely on objective data, providing evidence that the control method in place reduces the exposure level below 50 micrograms/m³ over an 8-hour TWA work period.

Option 3: Self-monitoring

If a control method is not listed in Table 1, and no objective data is available, OSHA requires that employers implement a monitoring program to show that the employees have exposure levels below the PEL of 50 micrograms/m³, when workers are performing applications with exposure over the Action Level of 25 µg/m³ over an 8-hour TWA work period. Control methods and monitoring are required when applications require exposure over the action level of 25 micrograms/m³.

This was done to achieve two goals. First, it serves to lower exposure levels, and secondly, it helps to increase actual compliance to the standard.

All employers covered by the standard must have a written plan that identifies silica-generating tasks, engineering controls, work practices, respiratory protection (for exposures above the PEL), housekeeping practices used to limit exposures, and procedures that will be followed to restrict access to areas where silica-generating tasks will be performed. The “restrict access” requirement is intended to eliminate exposure of unprotected bystanders. The plan must be implemented by a “competent person” (as defined in the standard).

Employers are also required to follow a medical surveillance plan for workers that are required to wear a respirator – under the new standard – for 30 or more days per year. Under the surveillance plan, each worker that meets the requirement for testing must be offered an exam within the first 30 days of the assignment, and every three years after the initial exam if the worker continues to meet the trigger for the exam. A Physician or Other Licensed Health Care Professional (PLHCP) must conduct the exam. Within 30 days of the exam, the employer must ensure: (1) the PLHCP explains the exam results and gives a “*medical report*” to the employee; and (2) the PLHCP provides the “*medical opinion*” to the employer. The medical opinion will trigger limitations on respirator use, and to the extent that the employee agrees, limitations on exposure to respirable silica and/or examination by a specialist.

SECTION 2: KEY PROVISIONS

Leading up to the August meeting, workshop participants were asked to identify the provisions in the new standard that they would like to learn more about.

Two provisions were identified:

- 1) Exposure control methods, and
- 2) Medical surveillance requirements.

During and following the meeting, several questions were raised which are addressed in the following sections.

A. MEASURING AND CONTROLLING EXPOSURE

The new standard requires employers to ensure their employees are not exposed to silica above the Permissible Exposure Limit (PEL). Before and during the OSHA rulemaking process, the construction industry told OSHA that conducting air monitoring (collecting and analyzing the results) is not always practical due to the short duration of some tasks, and the fact that air monitoring can be time consuming and costly. To address this concern and provide contractors with greater flexibility, OSHA included three options for ensuring that workers are not exposed to Silica dust above the PEL:

- **Option 1:** Follow the specified exposure control methods in Table 1,
- **Option 2:** Performance or Objective data,
- **Option 3:** Conduct air monitoring.

Option 1 -- Section (c) “Specified exposure control method,” or what is now commonly referred to as “Table 1”

The **Table 1** option eliminates the need for air monitoring **if a contractor follows and properly implements the equipment and task-controls listed in the table.** There are 18 recommended product solutions and controls listed in the table, reflecting common silica-generating construction tasks with corresponding control methods that have been documented to be effective. The table notes when and if respiratory protection is required. The respiratory protection requirements are linked to the length of time a task is performed (4 hours or less or more than 4 hours.) OSHA only included tasks and controls for which it had sufficient data to demonstrate that workers would be protected if the controls were maintained and used properly.

When a contractor properly implements a solution from Table 1 – in other words **maintains the equipment and ensures that employees use it as directed by the manufacturer** – OSHA considers the employer to

be in compliance with the PEL. **Employers who use the equipment/task and control methods on Table 1 do not have to provide objective data or conduct air monitoring.** This is the easiest way for contractors to comply with the standard.

The following is an example of a Table 1 entry. In this example, if a worker is performing a silica-generating task outdoors for 4 hours or less, such as cutting concrete block, using a handheld power saw with an integrated water delivery system, and the tool is maintained and used in accordance with the manufacturer’s specifications, the worker would not be required to wear a respirator and the contractor would be in compliance with the PEL. If the worker is performing the task indoors, he or she would be required to wear the respiratory protection specified in the table for the duration of the task. No air sampling would be required for either scenario.

Example of a Table 1 Entry

Equipment/ Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hr/shift	> 4 hr/shift
Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturers’ instruction to minimize dust - When used outdoors - When used indoors or in an enclosed area	None	APF 10
		APF 10	APF 10

If an Equipment/Task and Control method is not listed in Table 1 or a contractor **chooses** not to rely on Table 1, they can follow section (d) “Alternative exposure control methods” to ensure that their employees are not exposed above the PEL, as described below in Options 2 and 3. **For either option, the employers must use engineering or work practice controls to bring exposures down to the PEL or lower. Where work practices or control methods do not bring exposure down to the PEL, the employer must also provide respiratory protection to workers engaged in the task.**

Option 2 -- Section (d)(2)(ii) “Performance” commonly referred to as **Objective Data**. Under this option the employer can use any combination of **air monitoring data or objective data** to show that a task when performed using a specific equipment/control method (with respiratory protection if needed) under specific working conditions will not expose workers above the PEL.

This “objective data” can be compiled from exposure data the contractor has generated from their own air monitoring efforts or **data generated by a third party such as a tool manufacturer**, a raw material supplier, or a research organization. If objective data is used, it must closely resemble or have a higher exposure potential than the employer’s workplace conditions, including the processes (e.g., cutting, grinding, etc.), the type of silica-containing material being used (brick, concrete, etc.), the control methods (e.g. water, vacuum), work practices, and environmental conditions (windy, dry, etc.),

Employers also have the option of following the exposure monitoring requirements found in all of OSHA’s previous standards.

Option 3 -- Section (d)(2)(iii) “Scheduled monitoring.” If an employer chooses to perform scheduled air monitoring for a task, they must follow the schedule outlined in the standard:

- If initial results indicate exposures are below the action level (25 µg/m³), no additional monitoring is necessary.
- If the monitoring results indicate exposures are above the action level, but below the PEL, additional monitoring would be required within 6 months.
- If the exposure monitoring indicates exposures above the PEL, additional monitoring must be repeated within 3 months.
- If subsequent monitoring (not the initial monitoring) indicates exposures are below the action level, the employer must repeat the monitoring until two consecutive measurements (taken 7 or more days apart) are below the action level. At that point, the employer can discontinue monitoring.

Just like with objective data, the conditions of air sampling must closely resemble typical (or higher exposure) conditions. It is important to note the air monitoring samples must be analyzed in accordance with the procedures laid out in Appendix A of the standard, which specifies the use of OSHA, NIOSH or MSHA methods, and that the analysis be conducted by an accredited laboratory that follows specific quality control procedures.

Questions from Meeting Participants on Measuring and Controlling Exposures²:

Question: If a contractor uses equipment and a control that is not listed on Table 1, but is effective in controlling exposures will OSHA add it to Table 1?

Response: Although Table 1 includes a significant number of tasks contractors would engage in, it does not include every task and type of control. At this point, OSHA does not have plans for updating Table 1, because doing so would require a lengthy regulatory and review process. Over time, OSHA may consider updating Table 1 and welcomes additional data from employers related to existing Table 1 equipment/tasks as well as equipment/tasks not currently listed in Table 1.

Question: Do employers have to follow Table 1?

Response: **No.** Table 1 is just one of three options contractors can use to comply with the standard. However, because Table 1 specifies the equipment/tasks and controls, and if fully and properly implemented, eliminates the need for air monitoring, employers may want to give serious consideration to relying on Table 1.

Question: If equipment and controls are used that are not listed on Table 1 does the contractor have to perform air monitoring to prove to OSHA they're complying with the PEL?

Response: No. If an equipment-control option is not listed on Table 1, the employer can perform scheduled air monitoring, but they do not have to. Instead, the employer can take advantage of **Option 2 – Objective Data.** This option allows you to use the data that your company has generated or use a third party's data for the equipment-control combination, or a combination of your data and a third party's data, to demonstrate that you are controlling exposures to the PEL.

Question: If a contractor uses the "objective data" option do they still have to do air monitoring.

Response: **No.** The contractor may do air monitoring to develop objective data for certain tasks they routinely perform with the same equipment and controls under similar (or worse) conditions, or they can rely on similar data collected by a third party. If they use reliable objective data, then they do not have to have an ongoing air monitoring program.

Question: If a contractor follows Table 1, do they still have to comply with other parts of the standard?

² Note these responses from OSHA representatives are the expected position of OSHA, although OSHA's enforcement arm will be responsible for the final definitive position.

Response: The simple answer is yes. However, if Table 1 is used and the requirements listed are fully and properly implemented then the contractor **will not** have to perform air monitoring for the tasks covered. In addition, if respiratory protection is not required for the silica-generating tasks the contractor's employees engage in then the contractor **will not** have to have a medical surveillance program. **The medical surveillance requirement is only mandatory when a worker is required to wear a respirator when performing work (per this standard) for 30 days or more a year.**

Question: What is meant by the reference in the standard to “employees engaged” in a Table 1 task?

Response: The **individual operating the equipment and any other workers assisting with the operation would be considered “employees engaged”** in the task. For example, if you have an employee using a walk-behind-saw and another worker guiding the operator of the saw, then both would be considered engaged in the task.

Question: If respiratory protection is required for a task, would all of the workers considered “engaged” in the task be subject to the respiratory requirements?

Response: Yes

Question: What are the requirements for protecting workers performing unrelated work nearby?

Response: The intent of the standard is to prevent all workers from being exposed to silica over the PEL. Workers and other individuals who happen to be in the vicinity of a silica-generating task are **not** considered “engaged” in the task. The requirement in the written exposure control plan for a restricting access is intended to protect these workers. If you have a worker performing a silica-generating task that requires them to wear a respirator, then you should not put other workers nearby when silica dust is being generated.

Question: *What exactly is the definition of a dust collection system?*

Response: Dust collection systems are designed and manufactured by different companies for different purposes and with different requirements for effectiveness. While there are common technologies in use, **minimum filter efficiencies and airflow requirements vary based on the application. There is not one design that is mandated by the OSHA standard.** See table 1 for specific dust collection requirements by application

B. MEDICAL SURVEILLANCE

Providing medical surveillance to employees exposed to silica on the job is an important step in ensuring that work is performed without endangering their health. Detecting the existence of health conditions that are either related to or may be exacerbated by silica exposure, permits medical providers to recommend and take appropriate intervention measures. This information also enables employees to make informed choices about safeguarding their own health.

OSHA's inclusion of medical surveillance in this rule is consistent with the requirements under the OSH Act. The OSH Act, (Section 6(b)(7)) "requires that, where appropriate, medical surveillance programs be included in OSHA standards to determine whether the health of employees is adversely affected by exposure to the hazard addressed by the standard." Paragraph (h) of the construction standard lays out the requirements for medical surveillance. The purpose of the medical surveillance clause in the new OSHA rule is three-fold:

- Find silica-related disease "so that appropriate intervention measures can be taken";
- Determine if an employee has a condition that might make him/her more sensitive to silica exposure; and
- Determine fitness to use a respirator.

The standard requires construction employers to offer a medical examination to workers who will be required to wear a respirator under the new standard for 30 or more days per year. Workers that fall into this category are considered highly exposed workers. Each worker that meets this criterion must be given the opportunity to have the examination required under the standard within 30 days after the initial work assignment of work "unless the employee has received a medical examination that meets the requirements ... within the last three years." If the employee can demonstrate that they have already had an exam within the last three years, the employer does not have to offer another medical exam.

The medical exam must be conducted by a Physician or Other Licensed Health Care Professional (PLHCP) and include

- 1) a medical and work history;
- 2) a physical exam with "special emphasis on the respiratory system;"
- 3) a chest X-ray interpreted by a NIOSH-certified B Reader;
- 4) a pulmonary function test administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course;
- 5) a test for latent tuberculosis (only for the initial test); and
- 6) any "other tests deemed appropriate by the PLHCP." Note: *in certain states* – nurse practitioners and physicians assistants may be licensed to act as PLHCPs.

The employer must ensure the PLHCP has a copy of the construction standard and:

- 1) A description of the employee's former, current, and anticipated duties that relate to the employee's occupational exposure to respirable silica, as well as former, current, and anticipated levels of occupational exposure to silica;
- 2) A description of personal protective equipment used or to be used by the employee, including when and for how long the employee has or will use it;
- 3) Any employment related medical examination records for the employee that are currently within the control of the employer.

The employer must also ensure that the PLHCP explains the results of the exam to the employee. If the PLHCP recommends that the employee see a specialist, and the employee chooses to do so, the employer must make the examination by a specialist available to the employee within 30 days of receiving the opinion and the employee's consent.

The construction standard's PLHCP reporting requirements differ from other health standards. In this standard, within 30 days of the exam, the PLHCP must provide the employee and the employer with information. The new silica dust standard requires the PLHCP:

- 1) To provide the employee with a detailed written medical report, and
- 2) To provide the employer with a more limited written medical opinion. This medical opinion **only describes limitations on respirator use -- any additional information such as limitations on exposure to respirable crystalline silica or referral to be seen by a specialist can only be given if the worker provides written consent**

Questions from Meeting Participants on Medical Surveillance

Question: Since the standard requires that X-Rays be read by a NIOSH-certified B Reader, how would you find one?

Response: NIOSH maintains a list of B Readers on its website that is searchable by state. This list can be found at <http://www.cdc.gov/niosh/topics/chestradiography/breader-list.html>

Question: When hiring a new worker, what can an employer require in terms of previous medical testing?

Response: One simple solution is to make sure that employees have a copy of the PLHCP's written medical opinion (the document given to employers by the PLHCP), which the employee can then provide to their next employer. Alternatively, an employer could work with an industry association, union or other third party to keep a record of the exams.

Question: **Won't the medical exams increase liability issues for the employer?**

Response: As OSHA stated in the preamble (background) on the new standard: “The purpose of medical surveillance is not to identify which employer is responsible for illnesses resulting from respirable crystalline silica exposures or must offer financial compensation... the main purposes of medical surveillance are early detection of disease related to... silica exposure so appropriate intervention methods can be taken, to let employees know if they have a condition that might make them more sensitive to ...silica exposure, and to assess fitness to wear a respirator.”

They further state that “because of the long latency period of most respirable crystalline silica-related diseases, a diagnosis of such an illness in an employee will not provide useful information about current controls or exposure conditions. Employers should be basing their actions on exposure assessments and ensuring properly functioning controls, such as those listed and required for employers using Table 1. In the case where an employee may have disease related to respirable crystalline silica and the employer has properly implemented engineering controls, the only further action by the employer would be to follow PLHCP recommendations to protect the worker who may be especially sensitive to continuing exposure and need special accommodation.”

Question: What if an employee refuses the medical exam?

Response: A worker can refuse the medical exam. If the employee refuses, as stated in OSHA’s preamble, “no liability for non-participation arises so long as the employer does not discourage such participation.”

Question: What if an employee wears a respirator for another other task that is unrelated to silica exposure, does that time wearing a respirator count toward the 30 days?

Response: No. **The only time that counts towards the 30 days is when the worker is wearing a respirator for a task covered by the silica standard.** If an employee wears a respirator for 30 days, but only 15 of those days were due to the silica standard then the medical surveillance requirement would not kick in.

Question: Why didn’t OSHA include a symptoms trigger in the standard for medical exams?

Response: As stated in the OSHA preamble to the standard, a symptom trigger was not included “because symptoms of silica-related lung diseases (e.g., cough, shortness of breath, and wheeze) are very common and non-specific, unlike symptoms resulting from exposures to other chemicals OSHA has regulated.”

Question: What if an employer has employees covered by more than this standard and each standard requires a medical exam?

Response: In the preamble to the standard OSHA stated that it recognizes “that some employees might be exposed to multiple OSHA-regulated substances at levels that trigger medical surveillance and requirements for written opinions. The PLHCP can opt to prepare one written medical opinion for the employer for each

employee that addresses the requirements of the relevant standards. However, the combined written medical opinion for the employer must include the information required under each relevant OSHA standard.” Requirements for both respiratory protection *medical evaluations* required under the Respirator Standard (29 CFR 1910.134(e)) and *medical surveillance* the silica standard can be offered at the same time. It should be noted however, that the respirator standard applies upon assignment to a job where respirator use is required.

SECTION 3: ADDITIONAL DETAILS ON THE NEW RULE

A. REGULATORY PATH TO THE STANDARD

Announcement of the new standard prompted some in the industry to question the need for the standard since OSHA already had a permissible exposure level (PEL) for silica. According to OSHA, while they have had a PEL for silica since 1971, the PEL for the construction industry of approximately 250 $\mu\text{g}/\text{m}^3$ as an 8-hour time weighted average (TWA) (*two and half times that of general industry 100 $\mu\text{g}/\text{m}^3$*), was based on an out-of-date sampling method, and did not adequately protect workers. In fact, just three years later, in 1974, the National Institute for Occupational Safety and Health (NIOSH), whose mission includes conducting research to inform OSHA rulemaking, recommended that the exposure limit be reduced to 50 $\mu\text{g}/\text{m}^3$ based on a growing body of research on the health effects of silica exposure. Despite NIOSH's findings and recommendation, no change was made to the OSHA PEL until the issuance of the new standard in 2016.

The new comprehensive silica standard for the construction industry was developed based on input gathered over more than two decades from industry stakeholders including workers and contractors, safety and health researchers, the medical community, and manufacturers,:

- In the mid-90s OSHA listed silica as a priority for rulemaking and created a Special Emphasis Program to Prevent Silica Exposure. Around the same time, the World Health Organization's International Agency on Cancer Research classified silica as a human carcinogen.
- In the early 2000s OSHA held stakeholder meetings on what should be included in a comprehensive silica standard, and submitted a draft standard for review and comment to a Small Business Regulatory Fairness Enforcement Act (SBREFA) panel.
- In February 2011, OSHA submitted a draft standard to the Office of Management and Budget (OMB) reflecting the input from stakeholders and the SBREFA panel, research findings on the health risks, exposure data, and the availability of control technology.
- OSHA responded to questions and requests from OMB and on August 23, 2013 issued a proposed standard to the public and the industry for comment.
- Between August 2013 and March 2016, when the final standard was issued, OSHA conducted hearings that were open to all stakeholders and the general public and provided multiple opportunities for comments and evidence to be submitted.

The lengthy preamble in the Federal Register notice announcing the new rule contains detailed information on how the research, testimony, comments, and evidence influenced the provisions in the final standard. This detail was included as background for stakeholders interested in understanding OSHA's reasoning and justification for the requirements in the standard. The final standard is only 26 pages long, including roughly 12 pages devoted to the exposure control methods recommended on Table 1 (see Table 1 discussion beginning on page 7).

B. OVERVIEW OF KEY SECTIONS IN NEW RULE

The following is a brief summary of the requirements in the 11 sections which make up the new construction standard:

- (a) **Scope** – The construction standard covers all occupational exposures to respirable crystalline silica, unless the exposure is going to remain under 25 µg/m³ of air as an 8-hour TWA for the foreseeable future. During the rulemaking process, OSHA heard from some stakeholders who said that use of tools that generate silica dust is just an incidental part of their job, for example, they occasionally drill holes into silica-containing materials. **Such incidental tasks are not covered by the standard.**
- (b) **Definitions** – This section explains the terminology used in the standard, such as “competent person,” “employee exposure”, and “objective data”.
- (c) **Specified control methods & (d) Alternative exposure control methods** – address how employers will demonstrate compliance with the new PEL. The new standard offers contractors several options and greater flexibility for establishing and controlling their employees’ silica exposure including:
- Following the equipment and task-controls listed in Table 1;
 - Relying on objective data; and/or
 - Conducting traditional air monitoring.

A contractor may choose to use more than one of these methods depending on the types of silica-generating tasks performed. For example, a contractor may be engage in two tasks covered by Table 1 and one that does not. For those tasks covered by Table 1 the contractor could elect to follow Table 1 and for the task not covered by Table 1 could rely on objective data or decide to do air monitoring. A contractor can select the approach that works best for their company. See pages 5-7 for a more detailed explanation of these provisions based on the consortium discussion.

- (e) **Respiratory protection** – respirators are required under the standard when specified in Table 1, or by workers 1) while installing or implementing silica controls or work practices, 2) for tasks where silica controls or work practices are not feasible, or 3) when feasible controls cannot reduce exposures to the PEL. When respiratory protection is required, the contractor must comply with the Respiratory Protection standard (29 CFR 1910.134). Respiratory protection requirements are also discussed in the standard’s sections on exposure control methods (paragraphs (c) and (d)) and medical surveillance (paragraph (h)), as well as in the related sections of this white paper (pages 8-13).
- (f) **Housekeeping** – the standard restricts the use of housekeeping methods that can contribute to a worker’s exposure to silica, including dry sweeping or brushing, and use of compressed air for cleaning surfaces or

clothing (unless used with ventilation to capture the dust), *unless* there is no other alternative feasible methods.

- (g) **Written exposure control plan** – All employers covered by the standard must have a written plan that identifies the silica-generating tasks, engineering controls, work practices, and respiratory protection (for exposures above the PEL), housekeeping practices used to limit exposures, and procedures that will be followed to restrict access to areas where silica-generating tasks will be performed. The “restrict access” requirement is intended to eliminate exposure of unprotected bystanders.

The plan must be implemented by a competent person. A competent person is described in the standard as someone who is a) capable of identifying existing and foreseeable silica hazards, b) has the authority to take prompt corrective measures, and c) is able to make frequent and regular inspections to make sure that controls are being used and are in working order.

Although not spelled out in the standard, having a written exposure control plan can also help with communicating information on the hazard to employees and to other contractors on multi-employer sites. (See page 13 for information on a free online planning tool to help contractors create their written plan).

- (h) **Medical surveillance** – Contractors must offer medical exams to workers who will be required to wear a respirator under the silica standard for 30 or more days a year. If a worker wears a respirator performing a silica-generating task for only part of a day that time is counted as one day. Time spent using a respirator for work not covered by the standard, for example, as protection from welding fumes, does not count toward the 30 day requirement. See pages 11-13 for a more detailed explanation of this provision based on the consortium discussion.
- (i) **Communication of respirable crystalline silica hazards to employees** – states that employers must comply with the Hazard Communication Standard (29 CFR 1910.1200), including training workers on the silica hazard, the health effects of exposure, protective measures (controls used to reduce exposures), the identity of the competent person, and the medical surveillance program.
- (j) **Recordkeeping** – Contractors that rely on air monitoring data or objective data, and/or are required to have a medical surveillance program must keep records in accordance with the Recordkeeping requirements in 29 CFR 1910.1020.
- (k) **Dates** – specifies the dates when employers must comply:
- June 23, 2017 for all requirements in the standard except the methods for sample analysis
 - June 23, 2018 for the methods of sample analysis

SECTION 4: RESOURCES TO ASSIST WITH COMPLIANCE

There are numerous online resources that are being updated regularly with new information and materials to help contractors comply with the standard and educate their employees:

A. TABLE 1 FROM OSHA 29 CFR 1926.1153

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.	None	None
(ii) Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. – When used outdoors. – When used indoors or in an enclosed area.	None APF 10	None APF 10 APF 10

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(iii) Handheld power saws for cutting fiber- cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(iv) Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. – When used outdoors. – When used indoors or in an enclosed area.	None APF 10	None APF 10
(v) Drivable saws	For tasks performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(vi) Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	<p>Use drill equipped with commercially available shroud or cowl with dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	None	None
(viii) Dowel drilling rigs for concrete	<p>For tasks performed outdoors only:</p> <p>Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	APF 10	APF 10

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	None	None
	OR Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS			
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10
	OR		
	Use tool equipped with commercially available shroud and dust collection system.		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xii) Handheld grinders for uses other than mortar removal	For tasks performed outdoors only:		
	Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.	None	None
	Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.		
	OR Use grinder equipped with commercially available shroud and dust collection system.		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
	– When used outdoors.	None	None
	– When used indoors or in an enclosed area.	None	APF 10

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
	OR Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xv) Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	OR Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant.	None	None
	Operate and maintain machine to minimize dust emissions.		

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvi) Crushing machines	<p>Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points).</p> <p>Operate and maintain machine in accordance with manufacturer’s instructions to minimize dust emissions.</p> <p>Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</p>	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	<p>Operate equipment from within an enclosed cab.</p> <p>When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.</p>	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
	OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

B. HELPFUL LINKS AND ORGANIZATIONS**OSHA's website: Final Rule on Respirable Crystalline Silica** (<https://www.osha.gov/silica/index.html>)

This section of OSHA's website includes access federal register notice on the new standard, including the preamble, which includes detailed information on the data and rationale behind the language and provisions in the new standard. It also includes:

- The Regulatory Text for the Construction Standard (Including Table 1) (<https://www.osha.gov/silica/SilicaConstructionRegText.pdf>)
 - Appendix A – Sampling Methods (<https://www.osha.gov/silica/AppendixAtosect1926.1153.pdf>)
 - Appendix B – Medical Surveillance Guidelines (<https://www.osha.gov/silica/AppendixBtosect1926.1153.pdf>)
- OSHA Fact Sheets on the new standard:
 - Overview of the Rule (<https://www.osha.gov/Publications/OSHA3683.pdf>)
 - Fact Sheet on Construction (<https://www.osha.gov/Publications/OSHA3681.pdf>)
 - Frequently Asked Questions (in the process of being updated - https://www.osha.gov/silica/Silica_FAQs_2016-3-22.pdf)
- Related Links recommended by OSHA including CPWR's "Work Safely with Silica" website.
- **Please note:** OSHA is in the process of developing guidance documents on the standard, including one for small businesses. When these are available, they will be posted on OSHA's website and made available through CPWR's website.

Work Safely with Silica (www.silica-safe.org):

This website was designed as a one-stop resource for information on silica. The site includes background information on the regulatory process, the new standard, the health risks, what's working, training materials (toolbox talks, videos, handouts), and the latest research.

A central feature of the site is a free online planning tool "**Create A Plan**" to help contractors comply with the "Written Exposure Control Plan" requirement in the new standard. The planning tool includes:

- A three step process that generates a written plan that can be confidentially saved and retrieved at a later date for editing and distribution.
- Examples of commercially available equipment control options (with links to manufacturers information)
- Access to the latest research on silica controls, information on how to find a qualified lab to test material samples for silica and a qualified industrial hygienist to perform air monitoring

This site is being updated regularly to reflect the requirements in the new standard and interpretations released by OSHA.

NIOSH Silica Information webpage (<http://www.cdc.gov/niosh/topics/silica/>):

This section of the NIOSH website includes recommendations for preventing silicosis, access to information on the NIOSH B Reader program and how to find a B Reader, hazard reviews, information on sampling and analytical methods and spirometry (required in the standard), and other resources specific to construction and abrasive blasting.

American Lung Association: Silicosis webpage (<http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/silicosis/>)

The American Lung Association has devoted a section of its website to silicosis, including information on the symptoms and risk factors, diagnosis and treatment, living with silicosis, and questions to ask 'your' doctor about silicosis.

About CPWR. CPWR's mission is to advance the Construction Industry.

- To encourage the elimination or reduction of conditions constituting hazards to the safety or health of U.S. construction workers, and to promote the maintenance and improvement of safe and healthy working conditions for workers in the construction industry;
- To publicize the results of research findings, and to make them widely available to construction industry owners/users, employers, associations, unions, workers, academia, government, and others with an interest in construction industry safety and health;
- To provide training resources and technical services to apply research findings at the work site and to direct research in defining and addressing issues of importance to workers.
- To conduct research concerning the quality of working conditions; the social, economic, and psychological factors influencing work organization; the impacts on workers and working conditions of new technologies and industry change; and analyses of corporate and government policies and consensus standards that affect the worksite.

CPWR is headquartered in Silver Spring, MD – learn more at www.cpwr.com.

About nxtMOVE Corporation. nxtMOVE is a decision support firm that leverages market research and analysis to help businesses test their assumptions and strategies in order to achieve successful business outcomes. Through its industry experience, nxtMOVE understands its Clients' problems, develops an evidence-based solution, and makes informed recommendations that quickens the pace to success. nxtMOVE's Clients consider it a valued partner in helping to ensure the success of their strategies, in increasing their understanding, reducing their risk, and predicting the future.

nxtMOVE is headquartered in Herndon, VA – learn more at www.thenxtmove.com.