CONSTRUCTION INDUSTRY SAFETY COALITION

February 11, 2014

The Honorable David Michaels
Assistant Secretary of Labor
Occupational Safety and Health Administration
U.S. Department of Labor
Room S-2002
200 Constitution Ave., NW
Washington, DC 20210

Re: Construction Industry Safety Coalition
Comments to NPRM on Occupational Exposure to Crystalline Silica
(Docket No. OSHA 2010-0034)

Dear Dr. Michaels:

I write on behalf of the Construction Industry Safety Coalition ("CISC"). CISC respectfully files the enclosed written pre-hearing comments on OSHA's Proposed Rule on Occupational Exposure to Crystalline Silica, 78 FR 56274 (Sept. 12, 2013). CISC appreciates OSHA's consideration of the information and data presented in these comments.

Sincerely,

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Enclosures

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Construction Industry Safety Coalition

Comments to NPRM on Occupational Exposure to Crystalline Silica (Docket No. OSHA 2010-0034)

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Construction Industry Safety Coalition
Comments to NPRM on Occupational Exposure to Crystalline Silica
(Docket No. OSHA 2010-0034)

The Construction Industry Safety Coalition ("CISC") respectfully files the following written pre-hearing comments on OSHA's Proposed Rule on Occupational Exposure to Crystalline Silica, 78 FR 56274 (Sept. 12, 2013). The CISC appreciates OSHA's consideration of the information and data presented in these comments, as well as the CISC's written hearing testimony attached as Exhibit A and also filed separately in the docket for the proposed rule.

The CISC is comprised of 25 trade associations representing virtually every aspect of the construction industry. The members of the CISC are as follows:

American Road and Transportation Builders Association
American Society of Concrete Contractors
American Subcontractors Association
Associated Builders and Contractors
Associated General Contractors
Association of the Wall and Ceiling Industry
Building Stone Institute
Concrete Sawing & Drilling Association
Construction & Demolition Recycling Association
Distribution Contractors Association
Interlocking Concrete Pavement Institute
International Council of Employers of Bricklayers and Allied Craftworkers
Leading Builders of America
Marble Institute of America
Mason Contractors Association of America
Mechanical Contractors Association of America
National Association of Home Builders
National Association of the Remodeling Industry
National Demolition Association
National Electrical Contractors Association
National Roofing Contractors Association
National Utility Contractors Association

Natural Stone Council
The Association of Union Constructors
Tile Roofing Institute

Attached as Exhibit B to these comments are brief descriptions of the CISC participating associations, their membership, and the job tasks their members perform.

The CISC was formed to provide OSHA thoughtful, data-driven comments on the proposed rule. By pooling resources and members from the wide range of trades affected by the proposal, the participating construction industry trade associations believe that stronger and more detailed comments can be submitted to OSHA during the rulemaking process. The CISC speaks for small, medium, and large contractors; general contractors; subcontractors; union contractors; etc. The CISC respectfully suggests that no group in the construction industry is better positioned to provide OSHA information regarding the appropriateness of the proposed rule on construction employers.

The CISC has its roots in a long-standing group of construction industry trade associations who for decades have met to discuss safety and health initiatives in the construction industry. The Construction Association Safety and Health Information Network or "CASHIN" has historically been involved in employee safety and health matters. CASHIN members meet periodically to discuss injury and illness trends in construction, outreach and assistance, and OSHA initiatives that impact the construction industry.

The CISC and its member associations recognize the hazards posed by crystalline silica at construction worksites. Crystalline silica is ubiquitous on construction sites throughout the country. It is omnipresent in almost everything that is done on a construction site. The CISC recognizes that it is incumbent upon the construction industry to take measures to protect employees from exposure to crystalline silica. Notwithstanding this rulemaking, the CISC participating associations will continue to take steps to educate members and work to control exposure to crystalline silica at all construction worksites.

The CISC's comments are divided into several sections. Part II provides an Executive Summary. Part III gives a high-level synopsis of the CISC's interpretation of the proposed rule. Part IV discusses certain procedural issues with OSHA's preparation of the proposal, including a discussion of the Small Business Regulatory Enforcement and Fairness Act ("SBREFA") process and OSHA's involvement with the Advisory Committee on

Construction Safety and Health ("ACCSH") *vis-à-vis* the proposed rule. Parts V and VI discuss the CISC's analysis of OSHA's technological and economic feasibility conclusions. In Part VII, the CISC comments on the major proposed ancillary provisions and their application to the construction environment. Part VIII addresses the regulatory alternatives put forward by the Agency and Part IX provides a brief discussion of OSHA's risk assessment from the CISC's perspective. And finally, Part X responds to a few questions and issues posed by OSHA – upon which comment was requested – of relevance to the construction industry and not otherwise addressed in other sections.[1]

II. Executive Summary.

OSHA's proposed crystalline silica rule for construction is potentially the most far-reaching regulatory initiative proposed by OSHA for the industry. Crystalline silica is everywhere on a construction site. It is found in numerous building materials and a number of job activities result in the release of a certain amount of respirable crystalline silica.

OSHA is proposing to reduce the permissible exposure limit ("PEL") for silica for construction work from the current level of 250 $\mu g/m^3$ to 50 $\mu g/m^3$. The Agency is also proposing an action level ("AL") of 25 $\mu g/m^3$, which will trigger the standard's exposure monitoring provisions. Exposure monitoring is just one of numerous ancillary provisions in the proposal. Other provisions include requirements for regulated areas or written access control plans; prohibitions on work practices on construction sites such as compressed air, dry sweeping, and dry brushing; medical surveillance; respiratory protection; training and hazard communication; and recordkeeping. OSHA has also proposed an alternative to the

[1]The CISC was disappointed that the Agency would not give a 90-day extension of the pre-hearing comment period to interested stakeholders. The CISC hoped to be able to gather additional data and information to provide OSHA regarding, in particular, exposure monitoring and the effectiveness of controls. The very limited time available has precluded the CISC from providing this information in these comments. In the CISC's view, the time constraints put on stakeholders to review OSHA's proposal, economic and technological feasibility analysis and supporting documentation and prepare comments, generate feedback and data from invested stakeholders, etc., were unnecessarily constrained by the Agency. By doing so, the CISC respectfully states that the rulemaking record will not represent the best available evidence. In addition, the CISC notes that OSHA's last minute, second extension of the comment period due to errors with the website accepting stakeholder comments did nothing to address the CISC's concerns. That further extension was only for an additional two weeks and was granted too late in the process (three days before the January 27 comment deadline) to allow stakeholders time to expand upon their comment drafts in a meaningful way.

exposure monitoring provisions through a "Table 1." Table 1 sets forth specific job activities, engineering and work practice controls, and respiratory protection that if followed, would exempt employers from compliance with the standard's monitoring requirements.

In the proposed rule, OSHA has preliminarily concluded that this regulatory scheme is required to reduce the significant risk of silicosis and other adverse health outcomes. For construction, OSHA concludes that the rule is technologically feasible in ten out of 12 construction activities, with abrasive blasting and tuckpointing/grinding being the only exceptions. The Agency also concludes that the proposal would be economically feasible, resulting in an overall annual cost to the construction industry of approximately a half a billion dollars.

The CISC has reviewed the proposed rule and supporting analyses and, for numerous reasons, believes that the Agency has not met its burden of demonstrating that the proposal is technologically and economically feasible. In addition, OSHA's proposed ancillary provisions – which are very similar to the ancillary requirements included in other OSHA health standards – are unworkable in the construction environment.

The CISC does not believe that OSHA has shown that the proposed PEL is technologically feasible (i.e., that it can be met by the construction industry in most operations most of the time). OSHA's overall analysis falls short for several reasons:

- OSHA has not identified all of the construction tasks and worker job categories that would be affected by the proposed rule, nor has OSHA addressed the omitted tasks and job categories in the technological and economic feasibility analyses.

- OSHA is incorrect and has no justification in assuming for all construction worker exposure samples of less than full-shift duration that the sampled workers have no exposure for the unsampled remainder of their shift.

- OSHA's analysis does not consider the broad range of tasks and variety of settings and environments in which construction work occurs.

- OSHA's assumption about compliance on multi-employer worksites does not account for exposure effects.

In addition, a detailed examination of each individual assessment of the identified construction activities shows that OSHA has not met its burden of proving technological feasibility. Ironically, the flaws in OSHA's technological feasibility analysis can best be seen through Table 1. Of the 13 operations included in Table 1, eight of the operations provide for some form of respiratory protection under certain conditions of use. Using respiratory protection in two-thirds of construction operations does not constitute reaching the PEL with engineering and work practice controls in most construction operations most of the time.

Moreover, OSHA's economic feasibility analysis understates by significant margins the true cost and impacts of the proposal on the construction sector. OSHA has omitted 1.5 million workers in the construction industry who routinely perform dusty tasks with silica-containing materials from its analysis of the economic costs and impacts of the proposed rule. These workers – members of large construction trades such as plumbers and plumber helpers, roofers, electricians, and electrician helpers, and including specialty trades such as plasterers and stucco masons and helpers and tile and marble setters – perform many tasks nearly identical to those performed by occupations included by OSHA, such as bricklayers, concrete finishers, and construction laborers. Together, the additional occupations increase OSHA's base estimate of the affected construction workforce by approximately 50 percent.

In addition, by relying on highly unrealistic assumptions about control equipment deployment and use in the construction industry, OSHA underestimates the costs of complying with the engineering requirements of its proposed rule. Furthermore, OSHA's calculations of the percentage losses in time, or productivity penalties, involved in conducting a task with controls (e.g., LEV or wet methods) relative to conducting the task without controls are understated and only relate to productivity losses for labor, but not for equipment. OSHA has incorrectly estimated costs for engineering controls by assuming a more limited number of at-risk workers, than will be truly affected by any final rule.

In total, the CISC estimates that the costs of the proposed rule are understated approximately by a factor of at least four.

The CISC participant associations also discussed the ancillary provisions of the proposal with their members to gauge the extent to which they are necessary and workable in the construction industry. Unfortunately, the feedback was not positive on several levels. The exposure monitoring provisions, which are based on other health standards, are unworkable given the range of exposure conditions, environments, operations, and materials including silica in the construction environment. The establishment of regulated areas or written access control plans, while well-meaning, does not work on most construction sites due to multiple operations and environmental conditions that are constantly shifting and changing. OSHA's prohibition on dry sweeping is unsupported by evidence showing that such a practice significantly contributes to silica-related disease.

The CISC appreciates OSHA's attempts to make compliance simple in construction with Table 1. Having said this, the CISC believes that Table 1 as proposed misses the mark for several reasons. As currently drafted Table 1 is unworkable for most construction employers. Primarily, this is due to the "Notes" included in the "Engineering and work practice control methods" section of the Table. In the view of member companies, these Notes will prevent Table 1 from being utilized as a compliance option. The CISC understands that OSHA wants Table 1 to be effective and used by construction employers, at least in part to avoid many of the other thorny compliance issues of the proposal and its exposure monitoring requirements. Unfortunately, what OSHA has proposed falls short of this.

In addition, OSHA has decided to propose an extremely narrow use for Table 1. Table 1 is not a safe harbor for construction employers. It is only utilized in lieu of exposure monitoring requirements. A construction employer who opts to utilize Table 1 would still be required to ensure that all exposures are below the proposed PEL.

The CISC recognizes that it is "easy to criticize" but harder to come up with alternatives and the CISC appreciates that OSHA has put forward a number of alternatives for stakeholder consideration and comment. The CISC believes that OSHA needs to rethink the way it formulates health standards for the construction industry in order to devise a workable rule for crystalline silica. Relying on approaches used in previous health standards does not work here, given how ubiquitous silica is on construction worksites. Because virtually all of the Regulatory Alternatives keep OSHA's historical approach, in the CISC's view none address the concerns expressed in these comments.

The CISC respectfully requests that OSHA withdraw its proposed rule until it can put forth a proposal that addresses the concerns set forth in these comments. OSHA must first do a better job to demonstrate that a lower PEL is needed and that whatever PEL is adopted is both technologically and economically feasible. OSHA's requirements also must be workable in the field. The CISC is prepared to – and welcomes the opportunity to – sit down with the Agency and engage in a dialogue as to what would be an appropriate approach to dealing with the hazards of crystalline silica on construction worksites.

III. OSHA's Proposed Rule For The Construction Industry.

OSHA has proposed a comprehensive and complicated regulatory structure for the control of crystalline silica in the construction environment. The proposed regulatory structure, however, is unworkable because crystalline silica is ubiquitous in construction. For construction, it is found in numerous building materials and can be disturbed by a very wide range of job tasks and activities performed on worksites. Unlike other health hazards that have been regulated by OSHA in the construction industry, such as asbestos and lead, silica is prevalent to a certain degree in almost every job on a construction site. It cannot be "separated out" from day-to-day job activities or "avoided" at the worksite. It also cannot be limited to a few specialty workers on a job. It is part of what nearly all construction employers must deal with day-in and day-out in virtually every work task for every employee.

A. Current construction Permissible Exposure Limit ("PEL") and proposed PEL.

The crux of OSHA's proposed rule for crystalline silica is lowering the PEL. As OSHA explains in the proposed rule, the current construction PEL is expressed in terms of a particle count methodology, as opposed to the gravimetric method utilized for general industry. 78 FR 56445. OSHA concludes in the proposed rule that the current construction PEL, measured as an 8-hour time weighted average (TWA), is 250 $\mu g/m^3$:

> Based on its review of published studies comparing the particle count and gravimetric methods, NIOSH recommended a conversion factor of 0.1 mg/m^3 respirable dust to 1 mppcf. OSHA has determined that this conversion factor should be applied to silica sampling results used to characterize exposures in construction and shipyard operations. Appendix E to CPL 03-00-007, OSHA's National Emphasis Program for Crystalline Silica, illustrates how the conversion factor is applied to enforce the current PEL for crystalline silica in the construction and shipyard industries. Applying the conversion factor to a sample consisting of pure (i.e., 100%) crystalline silica indicates that the current PEL for construction and shipyards is approximately equivalent to 250 $\mu g/m^3$.

Id.

OSHA is proposing to lower the PEL to 50 $\mu g/m^3$ "because the Agency has preliminarily determined that occupational exposure to respirable crystalline silica at the current PEL results in a significant risk of material health impairment among exposed workers, and that compliance with the proposed standard will substantially reduce that risk." Id. at 56446. OSHA asserts that a level of 50 $\mu g/m^3$ is the lowest limit that is technologically feasible in construction. Id. The Agency also states that this level can be measured with a "reasonable degree of precision." Id.

For construction, as well as the other industries affected, OSHA is also proposing an AL of 25 $\mu g/m^3$. Id. at 56494. The AL, as described fully below, triggers certain ancillary provisions that construction employers must follow. Id.

B. Proposed ancillary provisions.

In addition to the reduction in the PEL and the implementation of an AL, OSHA has proposed a number of ancillary requirements on construction employers in the proposed rule. Many of these ancillary provisions mirror the requirements proposed for general industry and maritime. They also are similar to ancillary provisions finalized by OSHA in previous health standards. See, e.g., 29 CFR 1926.1101 (Asbestos); 29 CFR 1926.1126 (Chromium); 29 CFR 1926.1127 (Cadmium). A high-level review of these requirements follows.

OSHA is proposing that construction employers assess workplace exposure of employees to crystalline silica for those employees "expected to be exposed to respirable crystalline silica at or above the action level." Proposed 1926.1053(d)(1). The exposure assessment must determine the 8-hour TWA that "reflect[s] the exposures of employees on *each* shift, for *each* job classification, in *each* work area." Proposed 1926.1053(d)(1)(iii) (emphasis added).

The proposal requires an "initial" exposure assessment and "periodic" assessments, depending upon the results of the initial assessment. Proposed 1926.1053(d)(2) and (d)(3). "If initial monitoring indicates that employee exposures are at or above the action level, the employer shall repeat air monitoring to assess employee exposures to respirable crystalline silica" under either a fixed schedule or a performance option. Proposed 1926.1053(d)(3). Employees must be notified of the exposure monitoring results within five working days after completing an exposure assessment and the employer must provide "affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to respirable crystalline silica." Proposed 1926.1053(d)(6) and (d)(7).

As an alternative to the exposure assessment requirements, OSHA is permitting employers to comply with "Table 1" of the proposed rule.[2] Table 1 identifies 13 different job operations, engineering and work practice control methods, and required respiratory protection that, if followed, obviate the requirement that employers perform exposure assessments. "For the purposes of complying with all other requirements of this section, the employer must presume that each employee performing an operation listed in Table 1 that requires a respirator is exposed above the PEL, unless the employer can demonstrate otherwise in accordance with the exposure assessment requirement" of the proposed rule. Proposed 1926.1053(d)(8)(ii).

OSHA would also require construction employers to establish either "regulated areas" or "written access control plans" whenever an "employee's exposure to airborne concentrations of respirable crystalline silica is, or can reasonably be expected to be, in excess of the PEL." Proposed 1926.1053(e)(1). Regardless of the option taken, construction employers would be required to take a variety of measures to (1) limit employee access to the affected areas, (2) provide respirators to employees, and (3) provide protective clothing or a means to remove silica dust that has accumulated on clothing. Proposed 1926.1053(e)(2) and (e)(3).

The proposal also includes several "prohibitions" on work practices on a construction site. "Compressed air, dry sweeping, and dry brushing shall not be used to clean clothing or surfaces contaminated with crystalline silica where such activities could contribute to employee exposure to respirable crystalline silica that exceeds the PEL." Proposed 1926.1053(f)(4)(ii). Where accumulations of crystalline silica at a worksite need to be cleaned, employers are required to use HEPA-filter vacuums or wet methods where such accumulations could, if disturbed, contribute to employee exposure to respirable crystalline silica that exceeds the PEL. Proposed 1926.1053(f)(4)(i). Employee rotation as a means of compliance with the PEL is prohibited. Proposed 1926.1053(f)(5).

As it has done with other health standards, OSHA also proposes medical surveillance requirements for construction employees exposed to crystalline silica above the PEL for 30 or more days per year. Proposed 1926.1053(h)(1)(i). These requirements include an initial examination with a chest x-ray, a pulmonary function test, a latent tuberculosis infection test, and any other test deemed appropriate by a physician or licensed health care professional

[2] Following Table 1 would also constitute compliance with the proposed provisions related to engineering and work practice controls found in proposed 1926.1053(f).

("PLHCP"). Proposed 1926.1053(h)(2). Periodic examinations would also be required – at least every three years or as otherwise recommended by a PLHCP. Proposed 1926.1053(h)(3).

The PLHCP would be required to provide a written opinion to the employer and the employee. Proposed 1926.1053(h)(5). The proposal describes the specific information that must be included in the written opinion, such as a "statement that the employee should be examined by an American Board Certified Specialist in Pulmonary Disease." Proposed 1926.1053(h)(5)(i)(C). In the case of the pulmonary specialist, if the written opinion contains such a statement, the employer must make such an examination available to an employee within 30 days after receiving the PLHCP's opinion. Proposed 1926.1053(h)(6).

Finally, OSHA's proposal includes requirements related to respiratory protection, training and hazard communication, and recordkeeping. Proposed 1926.1053(g), (i), and (j). The rule would become effective 60 days after publication in the *Federal Register*. Proposed 1926.1053(k)(1). However, employer obligations would not begin until 180 days after publication, except for engineering controls and laboratory requirements, which would become effective one year and two years, respectively, after the final rule is published. Proposed 1926.1053(k)(2).

C. Technological Feasibility.

OSHA has preliminarily concluded that the proposed rule is technologically feasible in the construction industry. In reaching this preliminary conclusion, OSHA organized the construction industry into 12 general construction activities. 78 FR 56353. It established its exposure profile in this manner because "construction workers often perform multiple activities and job titles do not always coincide with the sources of exposure." Id.

OSHA states that "much" of the data analyzed consisted of full-shift samples collected over periods of 360 minutes or more. Id. In those instances where full-shift samples were not identified, OSHA has assumed that the exposure to silica was zero for the remaining unsampled time. Id.

After reviewing "published literature, OSHA inspection reports, NIOSH reports and engineering control feasibility studies, and information from other federal agencies, state agencies, labor organizations, industry associations, and other groups," OSHA states that "the proposed PEL of 50 $\mu g/m^3$ is feasible in 10 out of 12 of the affected activities" in construction. Id. at 56355.

OSHA also concludes that it is technologically feasible to reliably sample and analyze crystalline silica exposures at the proposed PEL and AL. Id. at 56353. OSHA examined a commercially available personal sampling cyclone and determined that they were able to allow a sufficient quantity of silica to be collected from atmospheric concentrations as low as the proposed AL. Id. It also concludes that two analytical methods – X-Ray Diffraction and Infrared Spectroscopy – are sufficiently sensitive to "quantify levels of quartz and cristobalite that would be collected on air samples taken from concentrations at the proposed PEL and action level." Id. at 56354.

D. Economic Feasibility.

According to OSHA, the proposed rule is also economically feasible based on its assessment of the costs of compliance and the impacts those costs would have on the construction industry. OSHA estimates that the annualized costs of compliance for the construction industry from the proposed rule would be $511,165,616. Id. at 56358. The majority of these costs are included in the engineering controls that will be required. Id.

Despite these costs, which are significantly underestimated, the Agency concludes that the proposed rule does not come close to approaching infeasibility:

> [The data] shows that in no construction industry do the annualized costs of the proposed rule exceed one percent of annual revenues or ten percent of annual profits. NAICS 238100 (Foundation, structure, and building exterior contractors) has both the highest cost impact as a percentage of revenues, of 0.13 percent, and the highest cost impact as a percentage of profits, of 2.97 percent. Based on these results, even if the costs of the proposed rule were 50 percent higher than OSHA has estimated, the highest cost impact as a percentage of revenues in any affected construction industry would be less than 0.2 percent. Furthermore, the costs of the proposed rule would have to be more than 650 percent higher than OSHA has estimated for the cost impact as a percentage of revenues to equal 1 percent in any affected construction industry. For all affected establishments in construction, the estimated annualized cost of the proposed rule is, on average, equal to 0.05 percent of annual revenue and 1.0 percent of annual profit.
>
> Therefore, even though the annualized costs of the proposed rule incurred by the construction industry as a whole are almost four times the combined

> annualized costs incurred by general industry and maritime, OSHA preliminarily concludes, based on its screening analysis, that the annualized costs as a percentage of annual profits are below the threshold level that could threaten the economic viability of any of the construction industries.

Id. at 56379.

IV. Procedural Issues.

A. Background on rulemaking.

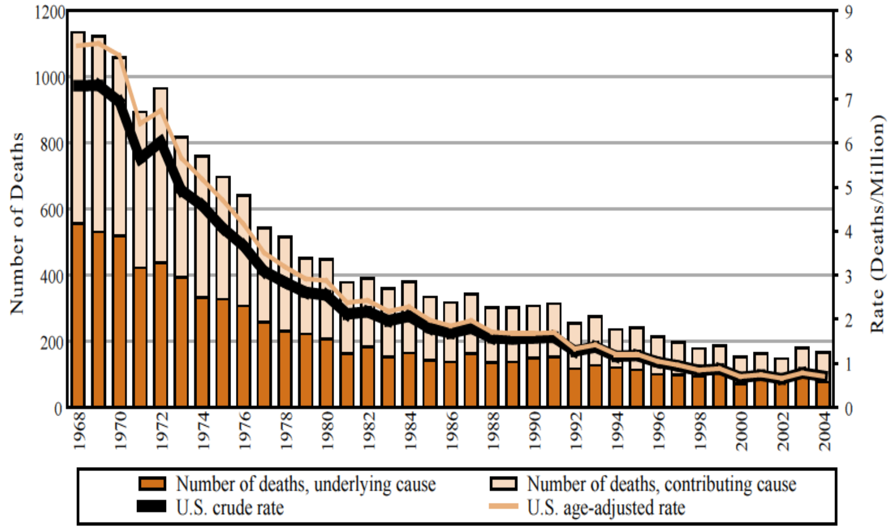
In the preamble to the proposed rule, OSHA describes its long history with respect to crystalline silica. In December 1974, OSHA published an Advance Notice of Proposed Rulemaking ("ANPRM") related to crystalline silica based on recommendations made by the National Institute for Occupational Safety and Health ("NIOSH"). Id. at 56292. Despite this early interest in crystalline silica, OSHA did not pursue a new rule at that time, nor did it address crystalline silica from a regulatory perspective over the next 15 years. Id. at 56293.

OSHA next addressed the PEL for silica in 1989 in its Air Contaminants Rule for general industry (54 FR 2332), which was a broad-based rule reducing the PEL for numerous chemicals in OSHA's Z Table. Id. Interestingly, in that rulemaking OSHA did not reduce the PEL for crystalline silica, choosing at the time to simply replace the gravimetric formula utilized in the Z Table with a respirable crystalline silica PEL of 100 $\mu g/m^3$ for quartz and 50 $\mu g/m^3$ for cristobalite and tridymite. Id. Because the Eleventh Circuit vacated the Air Contaminants Rule, OSHA's changes to the Z Table (including the changes to the silica PEL formula) were never implemented.

Over the course of the next 10-15 years, OSHA did not engage in rulemaking on this issue, but did attempt some modest enforcement efforts to reduce hazardous exposures to crystalline silica. In the meantime, the Centers for Disease Control ("CDC") issued data that indicates that deaths stemming from silicosis have significantly declined in recent years.

Silicosis: Mortality

Figure 3-1. Silicosis: Number of deaths, crude and age-adjusted death rates, U.S. residents age 15 and over, 1968–2004



NOTE: See selected limitations for general cautions regarding inferences based on small numbers of deaths, and see appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause-of-death data. Population estimates from U.S. Census Bureau.

Despite the downward trend in silicosis deaths and OSHA's failure to effectively enforce the current PEL, the Agency concluded that a comprehensive rule was needed to address silica exposures in general industry, maritime, and construction. OSHA's crystalline silica rulemaking thus became a standard entry on OSHA's Unified Regulatory Agendas starting in the late 1990's. Id. at 56294.

B. SBREFA process.

In 2003, OSHA initiated the Small Business Regulatory Enforcement Fairness Act ("SBREFA") process to examine the proposed rule, as required by statute. Id. at 56295. The SBREFA Panel discussed OSHA's proposed approach with designated small entity representatives ("SERs") and presented them with a copy of a draft proposed standard. Id.

As related specifically to the construction industry, the SBREFA Panel made numerous recommendations to OSHA, including the following:

- OSHA carefully review the basis for its estimated hygiene compliance costs, consider the concerns raised by the SERs, and ensure that its estimates are revised as appropriate, to fully reflect the costs likely to be incurred by potentially affected establishments.

- OSHA specifically consider cost issues in construction resulting from the high turnover rate in the industry.

- OSHA (1) carefully review the basis for its estimated labor costs, and issues related to the use of full-time equivalents (“FTEs”) in the analysis, (2) consider the concerns raised by the SERs, and (3) ensure that its estimates are revised, as appropriate, to fully reflect the costs likely to be incurred by potentially affected establishments.

- OSHA apply a 30-day exclusion for implementing engineering and work practice controls, as was reflected in the draft standard for general industry and maritime.

- OSHA consider and seek comment on the need to prohibit employee rotation as a means of complying with the PEL and the likelihood that employees would be exposed to other serious hazards if the Agency were to retain this provision.

- OSHA carefully consider the need and feasibility for certain prohibitions (e.g., compressed air, brushing, and dry sweeping) contained in the draft proposed rule.

- OSHA carefully consider whether regulated area provisions should be included in the draft proposed standard and, if so, how they should be established.

- OSHA clarify how the regulated area requirements would apply to multi-employer worksites in the draft standard or preamble.

- OSHA carefully consider the extent to which respiratory protection will be needed in construction.

- OSHA carefully address the issues of reliability of exposure measurement for silica and laboratory requirements.

- OSHA explicitly examine the availability of specialists required under certain circumstances in the medical surveillance requirements.

- OSHA carefully consider the need for pre-placement physicals in construction and the possibility of delayed initial screening.

See id. at 56429-35.

Much of the discussion among the SERs related to Table 1 of the draft proposed standard for construction. The SERs generally felt that the Table should be expanded to include all construction activities or the scope of the standard should be limited to just those activities included in Table 1. In addition, the SERS requested that OSHA better define the control measures utilized and require less use of respiratory protection. Id. at 56434.

While a few provisions of the draft proposed standard put forth during the SBREFA process were the same as the proposed rule, much is different including Table 1. Table 1 in the proposed rule is bifurcated with respect to respiratory protection and the number of hours worked, which Table 1 in the draft proposed rule was not. Table 1 in the proposed rule also contains additional specifications for compliance with the control methods (e.g., "no visible dust"), which were not included in the draft proposed rule's Table 1.

Table 1 is a lynchpin of the proposed rule for the construction industry, in OSHA's view and in the CISC's view. Table 1 is *so* important that OSHA presumes that most construction employers will follow Table 1 as a compliance option. Id. at 56362. Unfortunately, the SERs did not have an opportunity to provide feedback to OSHA on what it has proposed as Table 1 here. Having SERs comment to OSHA on the current Table 1 may have prevented the compliance difficulties that CISC believes will prevent construction employers from utilizing Table 1 at all and are discussed in detail below.

The CISC objects to OSHA's reliance on a ten-year old SBREFA review to fulfill its obligations under the Regulatory Flexibility Act, particularly with such a rule that as applied to construction affects a significant number of small businesses. The CISC understands that, by its nature, the SBREFA process must take place before a proposed rule is issued and that time period can extend for months or years. But a decade long gap is well beyond the norm and causes the SBREFA process to be essentially useless to the Agency and the rulemaking record. While OSHA continued to refine its proposed approach to the rule during this ten year period, it could have convened a second SBREFA panel or reached out informally to small businesses to obtain additional feedback on an appropriate approach to crystalline silica at construction sites across the country. Unfortunately, OSHA decided not to do so.

C. Advisory Committee on Construction Safety and Health ("ACCSH").

Leading up to the issuance of the proposed rule, OSHA also states that it "presented information to, and consulted with" ACCSH "[t]hroughout the crystalline silica rulemaking process." Id. at 56295. OSHA describes the consultation process as follows:

> In December of 2009, OSHA representatives met with ACCSH to discuss the rulemaking and receive their comments and recommendations. On December 11, ACCSH passed motions supporting the concept of Table 1 in the draft proposed construction rule and recognizing that the controls listed in Table 1 are effective . . . . ACCSH also recommended that OSHA maintain the protective clothing provision found in the SBREFA panel draft regulatory text and restore the "competent person" requirement and responsibilities to the proposed rule. Additionally, the group recommended that OSHA move forward expeditiously with the rulemaking process.

Id.

While the CISC appreciates that OSHA approached ACCSH regarding the draft proposed rule that was put forward to the SERs during the SBREFA process, the CISC respectfully asserts that this interaction did not fulfill the requirement that OSHA consult with ACCSH on proposed construction rules.

OSHA's procedural regulations regarding the commencement of rulemaking for construction standards states that OSHA must "provide [ACCSH] with any proposal" of its own, along with all pertinent factual information available and ACCSH must submit recommendations back to OSHA within the time frame allotted for same. 29 CFR 1911.10(a).

In this instance, OSHA did not provide a copy of its "proposal" or anything similar. OSHA essentially provided a copy of the draft proposed standard submitted as part of the SBREFA process, but as stated above that was significantly different than the proposed rule ultimately issued. The draft proposed standard given ACCSH did not even specifically indicate that OSHA was going to propose a PEL of 50, instead alluding to proposed PELs of 50 and 100. The draft proposed standard never contemplated an AL for silica for construction if the PEL were set at 50. ACCSH was never asked to comment on the appropriateness of an AL of 25.

The CISC does not believe that OSHA must submit for ACCSH review a word-for-word copy of the proposed rule before it is issued. The CISC understands that a proposal will always change – up until publication. However, the CISC respectfully asserts that OSHA's own requirements mandate submission of a proposal that incorporates the main requirements of what is ultimately published in the *Federal Register*. In this instance, at a minimum, that would include (1) the actual proposed PEL, (2) the fact that there is an AL of 25 $\mu g/m^3$, and (3) the proposed Table 1, including the "Notes." In the CISC's view, by failing to do this here, OSHA has failed to comply with its own procedural regulations. Moreover, OSHA has not fundamentally engaged interested stakeholders in a meaningful way.

V. OSHA Has Not Established That The Proposed PEL And AL Are Technologically Feasible In Construction.

OSHA has concluded that for ten of 12 construction activities that generate respirable crystalline silica, the proposed rule is technologically feasible. This includes the proposed PEL of 50 $\mu g/m^3$ and – presumably – the AL of 25 $\mu g/m^3$. The basis for this preliminary conclusion is OSHA's review of the following data sources:

- Published literature;
- OSHA silica Special Emphasis Program ("SEP") inspection reports;
- NIOSH reports, including health hazard evaluations, control technology assessments, in-depth surveys, recommendations for exposure control, and engineering control feasibility studies;
- Workplace evaluation reports related to programs on "sentinel event notification system for occupational risks" for silica from the state of Michigan, New Jersey, and Ohio;
- Eastern Research Group ("ERG") and OSHA site visits;

- Unpublished information (e.g., unpublished data and research obtained through personal communications, meetings, and presentations); and

- Information available from other federal agencies, state agencies, labor organizations, industry associations, and other groups.

PEA Chapter IV, p. IV-3. It is important to emphasize, however, that in developing its analysis, "OSHA primarily relied on the contractor reports, ERG-C (2008) and ERG-GI (2008)." Id. OSHA's conclusions for technological feasibility in the construction industry are summarized in the following table:

Summary of Technological Feasibility of Control Technologies in Construction Activities

Construction Activity	Total number of affected operations	Overall Feasibility Finding
Abrasive Blasters	2	Not Feasible.
Drywall Finishers	1	Feasible.
Heavy Equipment Operators	1	Feasible.
Hole Drillers Using Hand-Held Drills	1	Feasible.
Jackhammer and Impact Drillers	1	Feasible.
Masonry Cutters Using Portable Saws	3	Feasible.
Masonry Cutters Using Stationary Saws	1	Feasible.
Millers Using Portable and Mobile Machines	3	Feasible.
Rock and Concrete Drillers	1	Feasible.
Rock-Crushing Machine Operators and Tenders	1	Feasible.
Tuckpointers and Grinders	3	Not Feasible.
Underground Construction Workers	1	Feasible.

In order to sustain a rule regulating a health hazard, OSHA must show that the standard as a whole is technologically feasible for the industries affected. The Supreme

Court has defined "feasibility" as "capable of being done, executed, or effected." American Textile Mfrs. Inst. V. Donovan, 452 U.S. 490, 506 n. 25 (1981). The established test for technological feasibility is whether OSHA can prove, through substantial evidence in the rulemaking record, the reasonable possibility that the typical company will be able to develop and install engineering and work practice controls that can meet the PEL in most of its operations. A standard is technologically feasible if the protective measures it requires already exist, can be brought into existence with available technology, or can be created with technology that can reasonably be expected to be developed. Id. at 513. OSHA must analyze whether a standard is technologically feasible on an industry-by-industry basis and reviewing courts expect that different operations within an industry be individually analyzed if necessary to determine if those operations can meet the revised PEL in most of the operations most of the time. United Steelworkers v. Marshall, 647 F.2d 1189, 1279-1308 (D.C. Cir. 1980), cert. denied, 453 U.S. 913 (1981).

The CISC has thoroughly reviewed OSHA's technological feasibility analysis and respectfully states that OSHA has fallen short of the legal standard articulated above. OSHA's overall analysis and assumptions do not support a finding that reaching a PEL of 50 $\mu g/m^3$ is "capable of being done" in most operations most of the time. A detailed review of the findings of each job activity analyzed by OSHA – with the obvious exceptions of abrasive blasting and tuckpointing/grinding which OSHA concedes are not technologically feasible – show that OSHA's conclusions are not supported by the best available evidence. CISC's examination of technological feasibility is set forth below.

A. OSHA has not identified and evaluated all of the construction tasks that would be affected by the proposed rule.

As stated above, OSHA is required to demonstrate that an industry affected by a rule can comply with its provisions in most of its operations most of the time. It cannot handpick a few operations from an industry and then summarily conclude that the rule is "generally" technologically feasible. Unfortunately, that is what OSHA has done here. OSHA has identified 12 construction activities that it believes could result in some exposure to silica and then, after determining that ten of those can meet a PEL of 50 $\mu g/m^3$ most of the time, concludes that its technological feasibility burden is met.

While CISC appreciates OSHA's efforts in this regard, it respectfully states that OSHA has not examined all operations performed in the construction industry in which meaningful quantities of respirable crystalline silica may be generated and, as a result of which, there may be meaningful worker exposures. The following list of silica-generating construction activities would all be regulated under the Proposed Standard, but OSHA has considered neither the technological nor the economic feasibility of compliance when performing these activities. OSHA must examine the following operations in order to establish technological and economic feasibility:

- Cement mixing
- Overhead drilling
- Handling and installing pavers
- Compaction of interlocking pavers
- Dowel drilling
- Mixing mortar
- Mixing stucco
- Demolition of concrete and masonry structures
- Loading, hauling, dumping, and placing rocks, stones, sand, gravel
- Placing and compaction of aggregate base
- Placing bedding sand
- Cutting concrete pavers
- Sweeping joint sand into paver joints
- Compacting joint sand
- Cleaning and preparing surfaces for sealing
- Demolishing drywall or plaster walls/ceilings
- Installing erosion control
- Pouring concrete footers, slab foundation, and/or foundation walls and the removal of formwork
- Finishing concrete, such as screeding, bullfloating, jointing, floating, troweling, patterned-stamping the surface, and installing control or expansion joints.
- Post-tension concrete slab work
- Attaching sill plates to foundation
- Installing and/or removing of ceramic tile roofs, slate, and asphalt shingles
- Installing fiber-cement board prior to installation of ceramic tiles or stucco
- Grouting floor and wall tiles
- Erecting and installing pre-cast concrete beams, columns, and panels
- Installing concrete and clay tiles on roof
- Removing and recycling construction materials

- Wide range of activities specifically in a remodeling or renovation setting that involve cutting, drilling, abrading, crushing or demolishing silica-containing materials

The CISC will continue to try to identify tasks and activities that are affected by the proposed rule and not included in the technological and economic feasibility analyses. However, it is incumbent upon the Agency to do a better job of identifying the vast range of affected activities on a construction worksite and actually analyze to what extent it is technologically and economically feasible for employers to reach the proposed PEL.

B. OSHA is incorrect and unjustified in assuming for all exposure samples of less than full-shift duration that there is no exposure after the sampling period ends.

OSHA has systematically underestimated the exposures to respirable crystalline silica for workers performing various construction tasks and has overestimated the employer's ability to reduce employee exposures to at or below the proposed PEL with currently-available engineering controls. It has done so by adopting an assumption that workers sampled for significant portions of the data underlying the feasibility analysis experienced *zero* exposure to silica for the remainder of the shift for which they were sampled. PEA Chapter IV, p. IV-9. OSHA makes this universal assumption for almost all of its samples that are less than full shift. Id.

This approach systematically understates, often substantially, the 8-hour TWA to which the sampled construction workers were actually exposed. By way of example, consider an exposure sample taken for one hour while a brick mason performed various tasks, including cutting bricks, which showed his exposure during that period to be at 1,000 μg/m³. OSHA would report this sample result as 125 μg/m³ on an 8-hour TWA basis, consisting of the one monitored hour at 1,000 μg/m³ and an assumed exposure of 0 μg/m³ for the remaining seven hours of the worker's shift. Absent any information indicating that the sampled worker performed unusual or atypical activities during the period while his exposure was monitored, we would think it entirely reasonable to assume the opposite of what OSHA assumes – that the worker would likely continue for the rest of his shift whatever activities he was performing while he was monitored. In all likelihood, during the remainder of the brick mason's shift, he cut some more bricks, maybe he mixed some mortar, maybe he opened a bag of sand, and maybe he chiseled or broke some additional bricks. Without further information about the worker's activities after the sampling ceased, OSHA's assumption has no basis in fact, and the accuracy of the exposure sampling cannot be confirmed. We judge that OSHA's assumption of no exposure during the remainder of the sampled worker's shift will far more often be wrong than right. Most instances where a worker has been performing some unusual activity or some usual activity with unusual intensity (e.g., sawing bricks continually, one after another, during the monitoring period) are designed studies that can be identified by their title and content. By reviewing the documentation associated with the monitoring result and/or by judging why someone caused the monitoring to occur, it is usually possible to infer or determine whether the worker was performing normal activities that would likely continue during the remainder of his work shift, or was participating in some sort of study to assess exposure while he intentionally worked in an unusual manner.

OSHA's assumption that exposure after sampling was zero in all instances for construction workers is the complete opposite of what it assumed for general industry workers. For general industry, OSHA assumes that the workers' exposure for the sampled and un-sampled portions of the workers' shifts remained the same throughout:

> To determine an 8-hour TWA, the exposure level for the period sampled is assumed to have continued over any unsampled portion of the shift. OSHA has preliminarily determined that this sample criterion is valid because workers in general industry are likely to work at the same general task or same repeating set of tasks over most of their shift; thus unsampled periods generally are likely to be similar to the sampled periods.

Id. at IV-7. Thus, assuming the brick-cutting worker were in general industry instead of construction, his/her one-hour exposure rate of 1,000 μg/m³ would be assumed to be the same for the remainder of his/her shift, resulting in an exposure level of 1,000 μg/m³ under an 8-hour TWA basis.

As a result of OSHA's assumption, most of the 8-hour TWA exposure data – for both baseline exposures *and* for exposures with controls – for construction workers is underestimated by several-fold in the CISC's view. For a 240-minute sample, for example, the worker's true 8-hour TWA was likely twice what OSHA now reports it to have been. The Agency's rationale for this assumption is that it reflects "real construction site working conditions" and is the "best of the available options." Id. at IV-8 and IV-9. OSHA states the following:

> Construction workers perform variable combinations of tasks that generate silica dust. They also perform these tasks for varying amounts of time, depending on the job. Many workers only occasionally perform one of the construction industry tasks discussed in this technological feasibility analysis, or they perform the task daily, but for only a portion of the shift. Other

> workers spend the entire shift intermittently performing the same task or a mix of several of these dusty tasks. A few construction workers perform tasks that frequently continue uninterrupted over an entire work shift (e.g., heavy equipment operator). However, like most construction workers, these workers often spend a portion of the shift in transit between job sites, setting up or preparing to depart a site, or idle while waiting for another construction trade to complete an activity.

Id. at IV-8.

In the Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis ("PEA"), OSHA has provided no support or references for these statements. They appear to be nothing more than general "thoughts" of the Agency with respect to how construction job sites work. OSHA is not permitted to simply guess about how work is performed on a construction site in justifying the impact of its rules on a particular industry.

Even these unsupported statements, however, concede that construction workers *do* at times perform the same silica-generating tasks over the course of an 8-hour shift. Id. ("Other workers spend the entire shift intermittently performing the same task or a mix of several of these dusty tasks. A few construction workers perform tasks that frequently continue uninterrupted over an entire work shift (e.g., heavy equipment operator).").

The Agency's assumption is strangely counter to its hypothesis in the preamble that the costs of the rule are likely to be understated as the construction industry will become more specialized in response to the rule, and thus, presumably, a significant percentage of workers exposed to crystalline silica tasks will be exposed for a longer portion of the day than is currently the case:

> In response to the proposed rule, many employers are likely to assign work so that fewer construction workers perform tasks involving silica exposure; correspondingly, construction work involving silica exposure will tend to become a full-time job for some construction workers.

78 FR 56357.

Under OSHA's own thinking, after the rule is finalized more workers will be exposed to silica for longer period of times during their work shift. Yet, OSHA assumes in determining whether its rule is technologically feasible that workers really do not do tasks for entire shifts or even for significant portions of the day.

It is even more alarming that OSHA makes this assumption for *all* construction activities, without analyzing specifically the work patterns of each trade affected. In OSHA's view, drywall finishers have the same work patterns as tuckpointers, as operators of walk-behind masonry saws, or as heavy equipment operators. This does not reflect "real construction site working conditions," contrary to OSHA's assertion in the PEA.

By way of example, OSHA specifically identifies "heavy equipment operators" as a group of employees who "perform tasks that frequently continue uninterrupted over an entire shift." PEA Chapter IV, IV-8. Given this information, the CISC would assume that OSHA would at least change its exposure assumptions when looking at this task. However, OSHA does not do so, instead falling back on its baseline thinking. Id. at IV-396 ("[A]ll results included in the exposure profile are 8-hour time-weighted averages (8-hour TWAs) calculated assuming no additional exposure during any unsampled portion of the shift.").

It is also inconsistent with certain other assumptions OSHA has made in this rulemaking, and in others. Most notably, OSHA has made an assumption regarding its risk and health assessments that workers are exposed to silica for eight hours a day, every day, for a 45-year working lifetime. 78 FR 56311. This, of course, is highly unlikely in the context of today's construction environment. OSHA makes this assumption based upon its interpretation of the Occupational Safety and Health Act of 1970 ("OSH Act"). It is a conservative assumption, which may in fact be accurate in a few instances, but is certainly not the norm in the construction industry.

Putting aside the reasonableness of OSHA's assumption related to risk and health effects, OSHA did not take a similarly conservative approach to its assumption of technological feasibility in the construction industry. Instead, OSHA took an aggressive assumption which in the Agency's own words is "likely" to result in some underestimates of exposure. PEA Chapter IV, p. IV-9.[3] Even if OSHA is correct that some construction workers are not performing silica generating tasks all eight hours of an eight-hour shift, this

[3] The CISC questions the extent to which the Agency has relied on non-full shift samples in its analysis. In the preamble to the proposed rule, OSHA suggests that these are few and far between. 78 FR 56353. However, the PEA does not characterize OSHA's use of this data as so limited. Instead, the Agency emphasizes that duration of the sampled exposure varies "widely" within the data set, causing the Agency to make its underlying assumptions. PEA Chapter IV, p IV-9.

does not lead inexorably to the conclusion that they are performing *no* silica-generating tasks after the period sampled.

OSHA is required by law to show that an industry can comply with the standard in most of its operations most of the time. This burden is not met by assuming that workers that are sampled for a short period of time have *no* additional exposure to silica during the course of their shift. OSHA's logic and assumption are flawed and the Agency should – consistent with its approach to risk and health and its statement in the PEA that the construction industry will become specialized if the rule is finalized – assume exposures throughout the course of an eight-hour shift and determine if it is feasible to meet the PEL in most operations most of the time under those circumstances.

C. OSHA's analysis does not consider the broad scope of tasks and environments affected.

OSHA's technological feasibility assessment attempts to analyze "most" of the construction operations "most" of the time, which is what is required by the OSH Act. Respirable crystalline silica, however, presents some unique challenges for the Agency. Exposure to respirable crystalline silica is *so* ubiquitous in the construction environment and *so* varied that it is virtually impossible to conclude that a particular control measure can feasibly be implemented in the variety of work environments encountered by construction workers throughout the United States. In many ways, OSHA's contractor ERG described it best:

> The construction industry presents several challenges that affect both exposure analysis and the task of controlling exposure. Important considerations include irregular schedules, variability in the silica content of work materials, different types of mechanical actions that generate silica-containing dusts, secondary exposure from adjacent activities, and the effect of weather (e.g., wind direction, rain, freezing temperatures) on work that is frequently performed outdoors.

ERG Report, p. v.

For construction, silica is unlike any other health hazard that has been regulated by OSHA. It is everywhere and in virtually everything, and the percentage that exists in construction or building material differs. OSHA's technological feasibility analysis, however, does not recognize this fact.

As an example, OSHA or NIOSH could sample an employee performing cutting of block with a hand-held masonry saw. The percentage of silica in the block could vary significantly, from just a small percentage to greater than 50 percent of the block being cut. The exposure of the employee could change dramatically based on the silica content. An OSHA technological feasibility assessment that relies on a low percentage of silica content in a particular block is not able to speak to the range of potential exposures from silica-containing material.

Another pertinent example of this exists in OSHA's review of the literature related to rock crushing machines. In that review, OSHA identified an international study that examined the effectiveness of local exhaust ventilation ("LEV") in reducing crystalline silica exposure to employees controlling and working around rock crushing machines. Aside from the underlying conclusion, of importance here OSHA found how the difference in silica content drastically impacted the exposure of construction workers and the effectiveness of controls:

> Bahrami et al. (2008) also sampled the respirable quartz exposure among rock crushing workers after the LEV systems were installed. Because of the high percentage of silica in rock in the Iranian quartz powder production region, worker silica exposure levels were not reduced to the extent that they might have been in another area. Among 20 personal silica samples for process and hopper-filling workers associated with rock crushers after LEV was installed, the mean PBZ respirable quartz results were 190 μg/m^3 to 400 μg/m^3 (Bahrami et al., 2008). Despite the LEV systems, rock crushing workers' personal exposure levels continued to exceed 100 μg/m^3.
>
> These levels would likely have been lower if the rock had not been nearly pure silica. As a hypothetical example, if the respirable dust sample had contained the more typical 12 percent silica on the filter, OSHA estimates that the corresponding initial uncontrolled airborne silica concentrations would have been 92 μg/m^3 to 178 μg/m^3.

PEA Chapter IV, IV-492.

In many instances, the technological feasibility analysis does not include an analysis of the bulk silica content of the material being disturbed by a worker. This means that the same task could be judged as being able to meet the PEL when its *real* ability to meet any

PEL is contingent on the percentage of silica in the material being disturbed. OSHA simply does not account for this in the technological feasibility analysis. Nor does the analysis consider in a meaningful way differences in weather conditions that could affect exposure results, as ERG so clearly recognized in its report. While ERG states that weather could be a factor, the report does nothing to control for that factor in its analysis. The same job activity performed on the same material in different areas of the country will produce different results, due solely to what part of the country the activity took place in. Cutting block in Phoenix, AZ is not the same as cutting block in Seattle, WA, or Portland, ME, for meteorological and climate conditions (precipitation, humidity, etc.) can potentially impact the extent and quantity of airborne dust.

An example of how weather can impact exposure can also be found in the Agency's analysis of rock crushing machines. In determining that such machines could reach the PEL of 50 $\mu g/m^3$, OSHA relied heavily on an ERG site visit of a stationary crusher at a temporary concrete recycling facility that utilized multiple water sprays and a control booth to reduce exposures to silica. PEA Chapter IV, p. IV-488. Even with these controls, OSHA found a full-shift exposure to silica slightly above the proposed PEL (54 $\mu g/m^3$). But, then OSHA admitted in the PEA that the sampling took place during a day with "wet ground conditions" caused by a patch of wet weather. Id. In the Agency's view, this "might have helped minimize airborne dust" as the "concrete being crushed was wetter than usual." Id. After noting this, however, the Agency does not adjust its analysis in any meaningful way or suggest that performing this operation in consistently dry conditions may produce median exposures significantly above the 54 $\mu g/m^3$ level – a level that is still *above* the PEL.

Particularly for those construction job activities where OSHA is relying on only a handful of samples to demonstrate feasibility, it is incumbent upon the Agency to broaden the data upon which it is relying and incorporate assumptions that reflect the variety of tasks performed on construction sites and the different environments in which the tasks are performed. At this time, the CISC is not suggesting that for the technological feasibility analysis for crystalline silica, the OSH Act requires the Agency to adopt "worst-case" scenarios for its assessment. It does require, though, that the Agency thoughtfully examine the extent to which construction contractors across the United States performing work in a number of different scenarios and environments can reach the proposed PEL and AL in most of their operations most of the time.

Interestingly, for tuckpointing/grinding OSHA actually *does* recognize that it is not appropriate to rely on ideal conditions in assessing technological feasibility. As set forth in more detail below, after examining certain data points suggesting that a PEL of 50 μg/m^3 is able to be reached, OSHA finds – rightly – that such a level could only be reached in ideal conditions – and construction work is not performed in ideal conditions:

> A vacuum and shroud system with all the characteristics presented here, used by trained workers under ideal conditions, where a gap of 0.5 inch or less can be maintained, would reduce the exposure level of most tuckpointers to levels approaching 50 μg/m^3. Workplace conditions are not ideal, however, and OSHA preliminarily concludes that this level cannot reliably be achieved for tuckpointers most of the time, and that respiratory protection will be required.

Id. at IV-514. It is not clear why OSHA would adopt such an assessment for one activity – tuckpointing/grinding – but not for other activities. Notwithstanding the reason, however, it shows the inconsistencies and flaws in OSHA's overall assessment of all of the construction activities studied.

D. OSHA's assumption about compliance on multi-employer worksites does not account for exposure effects.

As the ERG report stated, one of the unique aspects of the construction industry is the extent to which worker exposures to silica are impacted by adjacent silica-producing activities. One employee jackhammering concrete pavement could be doing so immediately adjacent to an employee utilizing a stand-behind masonry saw to make large cuts in the same concrete. And these two individuals may be working alongside another heavy equipment operator. This is a common occurrence on many construction worksites.

Despite this reality, much of OSHA's exposure data does not reflect exposures from several ongoing silica-generating tasks at a worksite, which potentially originate from other employees who may work for other employers. OSHA's contractor, when making its Technological Feasibility Conclusions, assumes no secondary exposure from adjacent work activities, based on its theory that all silica exposure on a construction site will be effectively controlled:

> Exposure from adjacent sources of silica influenced worker respirable silica levels in many job categories. Although ERG noted certain extreme cases, the exposure profile does not generally distinguish between a worker's primary source of exposure and the contribution of secondary exposure from an adjacent source. However, the Technological Feasibility Conclusions assumed

> a comprehensive effort to control silica throughout the site, *eliminating secondary exposure sources*. ERG based all technological feasibility conclusions for each job category on the assumption that the adjacent sources of exposure were also controlled to the acceptable level. Thus, all of the controls depend on control of the surrounding operations as described for that industry.

ERG Report, p. 1-4 (emphasis added).

There are multiple problems with ERG's thinking on this issue. The CISC does not believe it is reasonable to assume full and effective control throughout a construction work site after the rule is finalized, given the extent of non-compliance with OSHA's current PEL. Even if this assumption were correct, however, ERG's conclusion that secondary exposure would be "eliminated" makes no sense: if all silica-generating tasks are controlled below 50 $\mu g/m^3$, secondary or tertiary silica-generating tasks will likely still contribute to exposures that employees are receiving.

By way of example, let's assume that a grinder at a worksite may generally reach a PEL of 45 $\mu g/m^3$ in certain circumstances with no other silica generating activities around. Performing this same operation adjacent to three other grinders also at 45$\mu g/m^3$ may significantly affect the exposures that an employee actually experiences. Employers will need to consider all of this information when establishing engineering and work practice controls to protect employees. In effect, to ensure compliance, employers will need to make certain worst-case assumptions of exposure – based on an examination of likely exposures from the particular job task *and* exposures from other workers at a job site.

An examination of the impact of adjacent activities can be seen clearly in OSHA's assessment of "Jackhammer and Impact Drillers." In determining baseline exposure conditions for this job category, OSHA expressly recognizes how other activities performed can impact sampling data:

> OSHA also added to the exposure profile two results that NIOSH (NIOSH EPHB 247-15a, 2001) obtained for two demolition workers intermittently using 15- and 40-pound chipping hammers. Although working side by side, the silica results reported for these two workers varied greatly: 120 $\mu g/m^3$ and a result below the limit of detection (LOD) (33 $\mu g/m^3$ in this case). NIOSH did not explain the difference, but OSHA judges that it could be due to a

> combination of factors including work practices, ventilation, and *other adjacent activities*.

PEA Chapter IV, IV-411 (emphasis added).

Two pages later in the analysis, OSHA gives another example:

> In addition, the "Other Conditions" category includes 20 outdoor results, 12 of which exceeded 250 μg/m^3, from bridge deck job sites (NJDHSS, 2000). These unusually elevated results might result from having multiple jackhammers working side by side, using compressed air as a cleaning technique, and cross exposure from other highway equipment.

Id. at IV-413.

In order for OSHA to determine that the proposed rule can be met in most operations most of the time, OSHA also needs to consider this scenario, particularly since ERG found that "secondary exposure from adjacent activities" to be a significant analytical challenge. OSHA certainly cannot meet its technological feasibility obligations by assuming no additive effect on exposures from adjacent operations.

Of course, failure to consider exposures from secondary or adjacent sources is of greatest concern where OSHA relies upon laboratory or other non-real world exposure circumstances to justify technological feasibility. This occurs throughout the technological feasibility analysis, often to justify the effectiveness of certain control measures. See, e.g., id. at IV-383 (studying abrasive blasting under test conditions); IV-406 (studying vacuum dust control devices for hole drillers under test conditions); IV-434 (studying effectiveness of ventilated booths for stationary saws); IV-446 (studying effectiveness of wet methods for stationary saws); and IV-465 (studying effectiveness of dust extractors for portable milling machines).

The CISC understands that there may be multiple ways for OSHA to address this reality in adjusting its technological feasibility findings. There is likely no "right" way to factor in secondary exposures when determining feasibility. However OSHA determines to do this, it is not acceptable in the CISC's view to assume that with full compliance with a comprehensive crystalline silica rule that secondary exposure sources will be "eliminated." ERG Report, p. 1-4.

E. OSHA's Table 1 unequivocally shows that the proposed rule is infeasible.

There is no better evidence of the flaws in OSHA's technological feasibility analysis than one of the principle aspects of the construction proposal – Table 1. The CISC substantively comments on Table 1 below. However, it is important to discuss here how it shows more than anything else that the construction industry cannot meet the requirements of the proposed standard.

Table 1 provides a means of compliance with the exposure monitoring and methods of compliance provisions of the proposed rule. It identifies 13 operations, along with engineering and work practice control methods and required respirators, for employers to follow to be in partial compliance with the rule. The control methods typically involve wet methods or dust collection with work practice controls, such as operating equipment so that no visible dust is emitted. In addition to these engineering and work practice controls, OSHA requires respiratory protection to be used in certain circumstances. So, for example, for an employer wishing to utilize the practices in Table 1 when using a hand-operated grinder, the employer could utilize a grinder equipped with commercially available shroud and dust collection system, along with a half-mask respirator. 78 FR 56497.

Table 1 belies OSHA's conclusion that the PEL can be reached with engineering and work practice controls in most construction operations most of the time. Of the 13 operations included in Table 1, eight of the operations provide for some form of respiratory protection under certain conditions of use. There is no way that the use of respiratory protection in two-thirds of construction operations constitutes reaching the PEL with engineering and work practice controls in most of the operations most of the time.

To illustrate this, OSHA has concluded that it is technologically feasible for jackhammer operations to meet the PEL. PEA Chapter IV, p. IV-420. As a result, the CISC would anticipate that Table 1 would include engineering controls and work practice controls – without respiratory protection – to be considered in compliance with the exposure monitoring and methods of compliance section of the rule. That is not the case, however. Apparently, an employee who operates a jackhammer for just over four hours, utilizing a continuous stream or spray of water at the point of impact such that **no visible dust** is emitted from the process, must still use a half-mask respirator with an Assigned Protection Factor ("APF") of ten.

As another example, OSHA has concluded that the use of stationary masonry saws can meet the proposed PEL. Id. at IV-439. However, after utilizing a saw equipped with a water delivery system, changing water to prevent wet slurry from accumulating and drying, operating the equipment such that no visible dust is emitted, and ensuring saw blades are not excessively worn, employees are still required to wear a respirator under certain circumstances.

This makes no sense and is entirely inconsistent with OSHA's conclusions that the rule is technologically feasible. If that were truly the case – and assuming full compliance with the engineering and work practice controls of Table 1 – OSHA would not be requiring employees to wear respirators.

The preamble to the proposed rule is replete with the Agency's admissions with respect to the feasibility of meeting the proposed PEL in the operations identified in Table 1:

- "Information available to the Agency suggests that overexposures still occur when using wet methods and that there are additional challenges such as limited applications." 78 FR 56458.

- "These values suggest that workers would sometimes achieve levels below the proposed PEL with LEV. However, the Agency recognizes that elevated exposures occur even with the use of LEV in these operations based on the fact that 8 out of 13 samples collected exceed the proposed PEL . . . ." Id.

- "When employers perform [jackhammering] for more than four hours, silica exposures may occasionally exceed the PEL." Id. at 56459.

It appears that OSHA is attempting to deviate from its past practice of basing feasibility conclusions on engineering and work practice controls *without* regard to the use of respirators. OSHA also appears to be embarking on a new era of feasibility where respiratory protection is an integral part of meeting a proposed PEL, as a way for OSHA to justify lowering its PEL to levels that it would not otherwise be able to justify under its historical approach to feasibility. If this is the case, OSHA has not explained this shift in approach or justified it by any means.

If anything, the preamble to the proposed rule suggests that OSHA has *not* changed its approach. In justifying why it preliminarily determined *not* to propose a PEL of 25 $\mu g/m^3$ – which OSHA believes is supported by its significant risk analysis – it concludes "that many industries and operations could not achieve an alternative PEL of 25 $\mu g/m^3$ with engineering and work practice controls alone." Id. at 56446. While CISC agrees with that statement, the same is true for meeting a PEL of 50 $\mu g/m^3$ in the construction industry. Table 1 makes clear that "many" "operations" cannot meet the proposed PEL "with engineering and work practice controls alone."

F. OSHA's analysis includes *no* finding whatsoever that it is technologically feasible to reach the AL.

OSHA has included an AL in the construction proposed rule to trigger the rule's requirements related to exposure monitoring. The AL is set for one-half the PEL or 25 $\mu g/m^3$. Employers do not have to reach levels of exposure down to the AL but if they do not reach these levels they have continuing obligations under the standard.

In the preamble to the proposed rule, OSHA explains its thought-process related to the AL:

> 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 PEL on days when no exposure measurements are made. Even when all measurements on a given day may fall below the PEL (but are above the action level), there is some chance that on another day, when exposures are not measured, the employee's actual exposure may exceed the PEL. When exposure measurements are above the action level, the employer cannot be reasonably confident that employees have not been exposed to respirable crystalline silica concentrations in excess of the PEL during at least some part of the work week. Therefore, requiring periodic exposure measurements when the action level is exceeded provides the employer with a reasonable degree of confidence in the results of the exposure monitoring.
>
> The action level is also intended to encourage employers to lower exposure levels in order to avoid the costs associated with the exposure assessment

> provisions. Some employers would be able to reduce exposures below the action level in all work areas, and other employers in some work areas. As exposures are lowered, the risk of adverse health effects among workers decreases.

Id. at 56426.

The CISC does not necessarily disagree with OSHA that triggering certain requirements off of an AL may drive employers to reduce exposure levels below the AL to either (1) have greater confidence that they are in compliance with the PEL, or (2) try to avoid obligations under the standard altogether. OSHA's analysis suggests, however, that reaching the AL is not attainable at least to a certain degree. And that is what is striking to the CISC. A review of OSHA's technological feasibility analysis – with the exception of drywall finishing using silica-free joint compound – *never* specifically concludes that any construction activity can meet 25 $\mu g/m^3$ in most of the operations most of the time.

For construction employers, trying to get to 25 $\mu g/m^3$ is not realistic, as OSHA's own technological feasibility analysis shows. All construction employers will need to perform continuous exposure monitoring (or follow Table 1) all of the time. OSHA has not met its burden of showing otherwise in the proposed rule and related analyses.[4]

[4] Another significant concern of the CISC relates to the underlying sampling and analytical methods used by the various researchers and regulators to quantify the exposures of employees or others sampled. OSHA notes in the PEA the challenges and capabilities of commercially-available sampling devices and the acceptable analytical methods for assessing the samples taken. PEA Chapter IV, IV-13 – IV-44. In particular, OSHA emphasizes the unreliability of the Colorimetric analytical technique *vis-à-vis* X-Ray Diffraction and Infrared Spectroscopy. Id. at IV-32. There appears to be no dispute that there is some variability and uncertainty with silica sampling and analytical methods and that this variability and uncertainty was more pronounced years ago than it is today, although the CISC believes that even today the variability and uncertainty in silica sampling and analysis raises significant feasibility questions. The feasibility questions are greater, however, when OSHA relies on samples analyzed decades ago, which it has done for the construction industry. What were the sensitivity and precision points of those samples? How does that impact the integrity of the exposure data? Given the time constraints placed on stakeholders to analyze the record, the CISC has not had an opportunity to review the underlying sampling and analytical methods utilized by OSHA for each exposure data point relied upon in the technological feasibility analysis. The CISC will attempt to do so throughout the course of the rulemaking, but doubts that the data presented will include in all instances the detailed information regarding sampling and analytical variability needed for the CISC to assess the impact of known variability on exposure monitoring results. In order for OSHA to establish technological feasibility of the proposed rule on construction operations, the CISC respectfully

G. OSHA's analysis of each individual construction activity is flawed.

The points above demonstrate generally how OSHA's technological feasibility analysis is flawed and insufficient to meet the legal standards for OSHA rulemaking. Admittedly, attempting to regulate crystalline silica on construction worksites is unlike any other health standard OSHA has imposed on the industry. Assumptions that may have been used by OSHA to justify the feasibility of past standards simply cannot be used by the Agency here. OSHA needs to fundamentally retool its analysis and rethink its approach for OSHA's silica rule to be effective and legally sustainable.

In addition to these general issues, the CISC has carefully reviewed OSHA's findings for each individual construction activity and has similarly found that OSHA's analysis is flawed. Even for the two activities that OSHA concluded could *not* meet the proposed PEL – abrasive blasting and tuckpointing/grinding – OSHA's analysis is lacking.

1. Abrasive Blasters.

This activity includes all workers who perform abrasive blasting operations in construction. OSHA describes the workers affected, as follows:

> Workers use portable abrasive blasting equipment to deliver a high-pressure stream of abrasive media to a surface. According to a review of the OSHA Special Emphasis Program (SEP) inspection reports (1990-1997), construction companies use abrasive blasting mainly to remove surface coatings or clean the surfaces of structures and equipment, such as oil tanks, water tanks, gasoline tanks, bridges, and steel beams. Workers in this industry perform abrasive blasting as part of their job or assist an abrasive blaster by refilling the abrasive blasting machine's reservoir or helping to maneuver the hoses.

PEA Chapter IV, IV-372.

OSHA concedes that the proposed PEL is not technologically feasible for abrasive blasting operations. In support of its position, OSHA relies on 17 abrasive blasting operator exposure samples where wet blasting methods were used. Id. at IV-378-380. The exposures ranged from 36 μg/m³ to 407 μg/m³, with a median of 125 μg/m³ and a mean of 161 μg/m³

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asserts that, at a minimum, OSHA must review the sampling and analytical methods used for each exposure sample relied upon to justify feasibility and *only* rely upon those samples that meet the underlying sampling and analytical criteria established in the proposed rule.

and eight abrasive blasting helper exposure samples – under one study – where wet blasting methods were used, and ranged from under 25 µg/m^3 to 104 µg/m^3, with a median of 68 µg/m^3 and a mean of 60 µg/m^3. Id. OSHA concludes that 82 percent of abrasive blasting operators and 54 percent of abrasive blasting helpers using wet methods would exceed the proposed PEL of 50 µg/m^3. Id. at IV-384-385.

While wet methods cannot get construction employers below the PEL, OSHA asserts that blasting with wet methods or other processes can reduce or eliminate dust generation. In support of this assertion, OSHA relies upon a 2008 report from Germany's Institute for Occupational Safety and Health of the General Social Accident Insurance, which indicates that when modest amounts of water are used during abrasive blasting, a reduction in some exposures will be seen but silica levels will still be extremely high. Id. at IV-380. For example, in one instance, the airborne quartz concentrations were still as high as 6,000 µg/m^3 when blasting media was moistened with 10 percent water to abrasively blast concrete. Id. The study further indicated that increased water content to form a slurry improves dust control. Id. Creating a slurry, however, may create an environmental problem under the EPA's Clean Water Act of 1987 and may not be a viable solution in many circumstances. The study further recognized that the type and quantity of water feed will influence the type of dust emissions. Id.

OSHA further relied upon a 1999 NIOSH study in which workers blasted exterior concrete surfaces of a parking garage with a mixture of 20 percent water and 80 percent silica sand. Id. However, this study did not determine the extent to which wet methods reduced exposures associated with abrasive blasting, and exposures for abrasive operators remained significantly above the proposed PEL, with one exposure as high as 395 µg/m^3. Id. The Hietbrink field study could not identify what effect wet methods had in reducing silica exposures and it noted that excessive water application could be a problem on some worksites. Id.

As OSHA correctly noted, the effective use of wet methods during abrasive blasting depends on the device used and the application. There have not been any studies that indicate what is the most effective water flow rate in relation to dust emissions and some scientists have called for controlled laboratory testing to develop recommended water application rates for wet blasting. In addition, different environments and conditions, such as subfreezing weather, have not been analyzed to determine the effectiveness of wet methods. Id. at IV-380-381. These things should be studied to fully understand when and how wet methods should be implemented.

OSHA has also asserted that enclosures and local exhaust ventilation also reduce exposure to respirable crystalline silica, and it appears to require that enclosures be used when abrasive blasting operations are conducted using crystalline silica-containing blasting agents, or where abrasive blasting operations are conducted on substrates that contain crystalline silica. Id. at IV-381. However, OSHA does not present any exposure monitoring results, studies, or data to show the extent to which ventilated enclosures or LEV systems reduce silica exposure in workers. OSHA does recognize that local exhaust ventilation alone is not expected to control the silica exposures of workers below the proposed PEL. OSHA further recognizes that employees will still need to be protected by hoods and airline respirators or by positive-pressure air helmets even when ventilated enclosures are used. Id.

Relying on one NIOSH study, OSHA asserts that a prohibition on dry sweeping of abrasive blasting media and debris can reduce workers' exposure to silica. Id. at IV-382. That study, however, was not related to abrasive blasting in construction and concerned workers who spent the entire sampling period dry sweeping material from surfaces using a hand broom or a whiskbroom, where their faces would be significantly closer to the dust than with a longer, more traditional broom. Id. While OSHA asserts that vacuums, shovels, and scrapers to clean surfaces introduce less dust in the air than dry sweeping, it recognizes that such methods have not been analyzed for abrasive blasting media and debris. Id.

OSHA further recognizes that silica sand as a blasting agent has significantly decreased in the construction industry and that employers are using high-pressure water-jetting techniques and non-silica sand substitutes. Id. at IV-379. However, as OSHA recognizes, the choice of substitutes is critical and even materials with a small amount of silica may still result in high exposure levels in certain conditions. Id. at IV-374. In addition, substitution can create other possible health hazards and OSHA does not have any studies identifying effective substitutes that do not create other health hazards that have been tested in a real world environment in construction.

The CISC agrees with OSHA's conclusion that it is not feasible for abrasive blasting to reach a PEL of 50 μg/m^3 in most of the operations most of the time. Looking deeper, however, the flaws in OSHA's analysis are symptomatic of the flaws the CISC sees throughout OSHA's assessment of technological feasibility. More importantly, the CISC questions the extent to which OSHA's analysis supports OSHA's presumed position that employers must still implement engineering and work practice controls to reduce silica exposures in abrasive blasting as far as is technologically feasible and then place employees in respirators.

2. Drywall Finishers.

The second category OSHA identified and examined was drywall finishing, including workers who install drywall and use a joint compound to seal the cracks between segments.

> After segments of drywall have been installed, drywall workers use a joint compound paste to seal the cracks between segments and to cover divots from nails. Once the joint compound is dried, workers sand the surface by hand to create a smooth finish.

Id. at IV-389.

OSHA concludes that employers can reach the proposed PEL of 50 μg/m³ in all instances where drywall finishing is performed and that the proposed PEL is technologically feasible for this job task.[5]

At the outset, the CISC does not dispute that there are certain circumstances where contractors can utilize "silica-free" joint compound and perform drywall installation in a manner that creates exposures below the proposed PEL. However, this is only true if in fact the compound is *truly* silica free. There is a significant concern that "silica-free" joint compound in fact contains more than just trace amounts of silica and thus could result in significant exposures to silica under some conditions of use.

As an example, in its technological feasibility analysis, OSHA describes a study from NIOSH for ten drywall sanders working at two worksites (two workers from an office renovation job and eight workers from a project renovating a low-income public housing apartment complex) where workers were using "silica-free" joint compounds or compounds with very low silica content and performing sanding with a pole sander and occasional hand sanding when needed. Id. at IV-389-390. Under this NIOSH study, OSHA states that the median 8-hour TWA of respirable quartz was 12 μg/m³ and the mean was 17 μg/m³. Id. One result from the study, however, was over the proposed PEL of 50 μg/m³ and that was for a worker performing overhead sanding. Id.

The alarming thing about this study relates to the one sample of a worker performing overhead sanding that resulted in exposures above the proposed PEL. This suggests that the silica-free joint compound being used in that instance contained quite a bit of silica and the

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[5] As noted above, this is also the only task where OSHA makes an affirmative finding that it is technologically feasible to meet the AL of 25 μg/m³.

resulting exposure reflects that. OSHA should evaluate the extent to which silica-free joint compound is actually free of silica and how that may impact a contractor's compliance obligation under the standard if it adopts work practices that create airborne dust exposure, after reasonably relying on a manufacturer's assurance that a particular joint compound does not contain silica.

While the CISC recognizes the ability to comply with the PEL under certain conditions when using silica-free joint compound, the CISC does not believe that OSHA has shown technological feasibility when work is performed using joint compound that contains silica.[6] A comprehensive examination of the underlying data demonstrates the problems with OSHA's analysis.

Aside from using silica-free joint compound, OSHA has essentially proposed two control options for contractors to achieve compliance with the PEL. Option 1 requires the use of a pole sander or hand sander equipped with a dust collection system. Id. at IV-392-393. NIOSH tested five commercially-available ventilated sanding systems during drywall finishing – three for pole sanding and two for hand sanding. Id. NIOSH concluded that all five systems were effective for reducing total airborne dust by at least 80 percent. Id. The study, however, was performed in a laboratory with one worker and did not specifically address exposure to respirable crystalline silica. Id. It is certainly not representative of drywall finisher tasks performed throughout the country and in the variety of conditions encountered by contractors. The study also acknowledged that some commercially available ventilated sanders lacked sanding head flexibility. Id.

OSHA asserts that the effectiveness of using a commercially-available ventilated sanding system was confirmed in a study by Young-Corbett and Nussbaum. Id. This study concluded that using a ventilated sander reduced respirable dust in the personal breathing zone of the worker by 88 percent compared with no controls. Id. The study was performed in a laboratory instead of under real world conditions with university students rather than construction workers, and it did not measure *respirable crystalline silica* or employees' exposure to same while performing drywall finishing tasks. In addition, the study is based upon five minute increments, which is hardly enough time to determine the viability of the control measure.

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[6] An example of this can be seen in the Rozanowski (1997) study, where 22 percent of samples collected by OSHA in the 1980s and early 1990s (when silica-free compounds were not readily used) exceeded the general industry PEL of 100 μg/m³. PEA Chapter IV, p IV-390.

Option 2 requires the use of wet methods while sanding or smoothing drywall. Id. Young-Corbett and Nussbaum concluded that a wet sponge sander reduces respirable dust in the personal respirable dust by 60 percent compared with no controls. Id. However, the study did not recommend the use of wet methods for dust control purposes because the wet sponge sander performed poorly in terms of ease of use and perceived productivity. Id. OSHA recognizes that there are other studies that have highlighted concerns with using wet methods, such as problems with the finished texture of the wall, the increased work time, the mess, and the harm that adding water to the product may cause. Id.

OSHA's data with respect to these two control options are simply not persuasive. They involve little to no real-world exposures. When implemented in the real world, the options will prove particularly difficult to implement, even if they would be effective in reducing exposures below the proposed PEL. Drywall work is frequently performed indoors. Even OSHA recognizes the challenges posed by introducing water into drywall installation. And as demonstrated above, the configuration of the work is such that use of a pole-sander or hand-sander with a dust collection system is not possible.

OSHA's analysis of drywall finishing also raises an overall point for OSHA's consideration with respect to technological feasibility, which OSHA has not directly addressed in the preamble to the proposed rule or underlying analyses. The CISC asserts that some of the control measures contemplated by OSHA will have an adverse effect on the quality of the ultimate work being performed. For example, performing sanding using wet methods may very well result in a finished texture that is inferior to traditional "dry" sanding of joint compound. For OSHA to demonstrate that a rule can be complied with in most operations most of the time, it must show that the control technologies implemented will not significantly affect the quality of the end product, in this case the construction activities performed. With just a few exceptions (e.g., using wet methods for sanding dry wall compound), OSHA's analysis does not address whether the control methods suggested for use will result in quality issues. The CISC believes that this needs to be considered by OSHA before finalizing any rule.

Due to all the problems discussed above, OSHA needs to do more work in showing that it is technologically feasible to reach the proposed PEL most of the time for most employers engaged in drywall finishing work.

3. Heavy Equipment Operators.

This category includes workers who drive crawlers or rubber-tired tractors and maneuver large attached construction tools. Id. at IV-395. "Attachments include (but are not limited to) augers, backhoes, buckets, cranes, hammer, dozer blades, draglines, forklifts, graders, rippers, rollers, scrapers, shovels, and trenchers." Id.

OSHA concludes that employers can reach the proposed PEL of 50 μg/m³ in all instances where heavy equipment operations are performed and that the proposed PEL is technologically feasible for this job task. Id. at IV-400. In support of this position, OSHA relies upon 24 respirable quartz samples – 17 of these represent drivers in unenclosed cabs, two represent drivers in enclosed cabs, and five had inadequate information on the status of the cabs. Employee exposures ranged from 11 μg/m³ to 170 μg/m³. Id. at IV-396-400. The 24 samples come from four NIOSH reports, five OSHA Special Emphasis Program (SEP) inspection reports, and one journal article. The CISC respectfully disagrees that the underlying data show that heavy equipment operators can meet the proposed PEL in most operations most of the time.

At the outset, OSHA's reliance on just two samples for enclosed cabs and 17 samples for unenclosed cabs is insufficient to assess heavy equipment operator tasks performed throughout the country in widely varying environments.

The Flanagan et al. study relied upon by OSHA to support its analysis is based on silica exposure monitoring data from 13 private, research, and regulatory groups. Id. at IV-398. The study recognizes that there are "considerable data gaps" in the regulatory data collected, which represent over half of the data set. The "considerable data gaps" include source data for three percent of trades, 17 percent of tasks, 26 percent of tools used, 43 percent of project type, 62 percent of environments, and 83 percent of control status unreported. The controls or sample durations for the data related to heavy equipment operators was not provided for in the study and the study relied upon many partial-shift samples for the majority of the time – with a median sample time of only 219 minutes. Relying on partial-shift samples with the assumption that no additional exposures occurred significantly underestimates exposure levels as discussed more thoroughly above, especially in light of OSHA's recognition that heavy equipment operators usually perform the same activity nearly constantly for seven hours per shift.[7] See id. at IV-395.

In support of its position that a properly sealed and ventilated enclosed cab under positive pressure with filtered air is the primary additional control for reducing exposure, OSHA relies upon a field study from ERG that acknowledges that the effectiveness of enclosed, ventilated cabs has not been evaluated for heavy equipment operators. ERG relies upon a study (Rappaport et al., 2003) regarding earth drillers who operate rigs from inside cabs. That study reported on earth driller operators performing highway construction activities and did not analyze whether the ventilated cabs were pressurized and/or filtered. Id. at IV-398. A single study that does not evaluate enclosed, ventilated cabs for heavy equipment operators is not a representative sample of heavy equipment operator exposure levels performed throughout the country in various and numerous environments.

OSHA also relies upon Pannel and Grogin to support its position that pressurized, enclosed cabs without high-efficiency filtration can provide a high degree of protection for operators performing excavation work. Id. at IV-399. First, the study did not analyze pressurized cabs with high-efficiency filtration. Second, OSHA recognized that this work site was atypical because workers in a semi-arid environment excavated 64,000 m^3 of soil containing up to 65 percent silica to construct a solid low-level radioactive waste disposal facility. The study recognized that there is considerable variation in the dust concentrations to which operators of heavy equipment are exposed including shifting winds and varying wind speeds, variable precipitation, operator variability, depth of earth moving, the tasks engaged in by the operator, and the cleanliness of the cabs. This "atypical" study is hardly sufficient data to show that enclosed cabs are technologically feasible to protect heavy equipment operators from exposure to respirable crystalline silica especially when different variable conditions come into play. Finally, the study showed that respirable dust results were still significantly above 50 $\mu g/m^3$ even when pressurized cabs were used, which undercuts OSHA's assertion that employers can reduce exposures to the proposed PEL for all equipment operators.

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[7]In addition, the Flanagan study recognizes that other factors are important in analyzing the exposure profile of workers – the degree of work area enclosure, the presence and degree of natural ventilation, adjacent dusty activities, and the continuous versus intermittent nature of the tasks. These factors were not thoroughly considered or analyzed in this study. The study further recognizes that differences in construction technique and differences in concentration of quartz can produce various results.

The very little data OSHA has put forward to assert technological feasibility for this activity simply cannot be universally applied. Furthermore, OSHA does not address the technological feasibility of retrofitting an existing unenclosed cab for purposes of complying with this rule. Throughout OSHA's analysis it relies on the effectiveness of enclosed cabs meeting certain detailed design specifications. OSHA does not discuss, however, whether most heavy equipment that is currently without enclosed cabs can be fully retrofitted to meet these design specifications. It is incumbent upon the Agency to make these findings, as well.

4. Hole Drillers Using Hand-held Drills.

This section includes workers using hand-held electrical drills, pneumatic drills, rotary hammers, or percussion hammers to drill holes:

> Workers use common electric drillers, pneumatic drills, rotary hammers, or percussion hammer drills to drill holes. The portability and light weight of hand-held drills allow the worker to operate them at any angle.

Id. at IV-402.

OSHA concludes that employers can reach the proposed PEL of 50 μg/m³ in all instances where hole drilling is performed and that the proposed PEL is technologically feasible for this job task. Id. at IV-407. In support of this position, OSHA relies upon 14 samples for hole drilling. Id. at IV-404. Seven of the samples represent hole drilling indoors under uncontrolled conditions, with a median exposure of 60 μg/m³ and a maximum reading of 286 μg/m³ for one worker performing concrete drilling in a parking garage where air circulation was poor. Id. The seven remaining samples represent hole drilling of rock or brick during outdoor drilling, with a median result of 30 μg/m³ and a maximum reading of 130 μg/m³ for a worker performing rock drilling using a large drill with a compressed air feature. Id.

Seven indoor and seven outdoor samples – especially in light of the fact that four outdoor samples consisted of rock drilling in the Colorado Rockies and five indoor samples stem from one parking garage project – is hardly a robust database representing hole drillers tasks throughout the country in various and numerous environments.

In one study utilized by OSHA to justify feasibility (Lofgren (1993)), OSHA used a sample from what appears to be three workers drilling holes in the floor of a concrete parking garage where air circulation was known to be poor. Id. All three samples were above the current PEL of 250 µg/m^3, resulting in one full-shift sample reading of 300 µg/m^3 (and not 286 µg/m^3 as OSHA states). The two other employees had a sample reading of 260 µg/m^3 and 110 µg/m^3 for a respirable sample size of 110 minutes and 177 minutes respectively. It does not appear that OSHA used the partial-shift samples since it concluded that only one sample was more than 250 µg/m^3. Essentially, OSHA "cherry-picked" which results it would rely upon and decided not to include the samples that show overexposures even when employees performed the tasks for less than eight hours.

The NIOSH report utilized by OSHA consisted of sampling for only two workers drilling holes through brick and steel and installing masonry anchors in exterior and courtyard walls on one summer day on one project. Id. at IV-403. The results were 12 µg/m^3 and 14 µg/m^3. These results are based on one-sample day where the employees spent 100 percent of their day drilling and installing masonry holes with one-half inch drills. Id. OSHA also examined data from two OSHA SEP Inspection Reports, which consisted of sampling of two workers drilling holes on an indoor concrete floor with a pneumatic drill, resulting in readings of 67 µg/m^3 and 69 µg/m^3. Id. Again, these results are from sampling over one day and do not represent the likely exposures of employees if they had been using a different drill, for example.

McKernan et al. sampled a single worker drilling concrete and brick without controls in order to install rebar at an indoor construction site. Id. The project consisted of seismic retrofitting of a historic mining engineering building at the University of California in April 2000. The sample duration was only for 194 minutes and only included time that the employee spent engaged in that particular activity on that day. The sample does not represent the exposure level of an individual if they had performed more drilling under a different day under different conditions and certainly does not represent drilling on a different project on different materials.

Finally, NIOSH sampled four workers during rock drilling operations over three days while operating a 75-pound and 30-pound gas powered drill. Id. The study evaluated respirable quartz exposure among workers at Rocky Mountain National Park in north-central Colorado while drilling holes into large rocks so they could be split and used as steps on sections of trails. The 75-pound drill forced compressed air through the drill shank as a means of keeping the drill hole free of dust and was faster than the 30-pound drill that did not include a forced air feature. Id. The use of the 75-pound drill resulted in worker exposures of 120 µg/m^3 and 130 µg/m^3 and the 30-pound drill resulted in worker exposures below the limit of detection of 30 µg/m³. Rock drilling operations in the Rocky Mountains can hardly be representative of hole drilling using hand-held drills for all of construction.[8]

Even if we were to assume that OSHA's data were accurate and sufficient to analyze the likely exposure of hole drill operators for respirable crystalline silica, OSHA's own data shows that eight out of 14 samples were above the proposed PEL. OSHA also did not evaluate the effects of overhead drilling. In the one study referenced by OSHA (Hallin, 1983) but not used in the baseline analysis of exposure levels, the respirable quartz exposure level for 120-minute drilling in a concrete ceiling with a percussion drill and a hammer drill was 1,740 µg/m³ and 720 µg/m³, respectively. Id. at IV-406. OSHA should determine how often hole drilling overhead is performed and whether it is feasible to meet the proposed PEL.

To support its position that dust collection systems are effective at reducing silica exposure, OSHA relies on Shepard et al. which tested two cowls and two vacuums in multiple 1-hour trials. Id. During the trials, three-inch holes were drilled using a 6.9 amp hammer drill with a 3/8-inch bit with a dust collection system attached. Id. Half of the drillings were performed in a large enclosed space and the other half were performed outdoors. Id. The Shepard et al. report found that exposures were 28 µg/m³ or less during periods of drilling based on a four-person sample size. Id. OSHA also relied on Hallin which evaluated rotary and percussion hammers equipped with various LEV systems and various drill bit sizes. Id. The Hallin report found that the median exposure level of workers drilling 50-millimeter deep holes in concrete was 60 µg/m³ with a LEV system and the median exposure level of workers drilling 80-millimeter deep holes in concrete was 45 µg/m³ with a LEV system. Id.

Unfortunately, OSHA's analysis of the effectiveness of controls, is simply inadequate. The Shepard et al. study consisted only of 1-hour drilling samples on one particular hammer drill in controlled conditions in a laboratory setting. Moreover, using the LEV systems did not reduce the inhalable airborne silica concentrations to anywhere close to the proposed PEL of 50 µg/m³ and the study recognized that the vacuums would require frequent filter changes to maintain effectiveness. The study also recognized that hood designs for portable hand-held hammer drills need to be examined and that technical

[8] The CISC questions whether OSHA would permit use of heavy equipment that incorporates some sort of compressed air in the drilling action, as described in this study, given the Agency's prohibition on the use of compressed air during housekeeping activities. OSHA should clarify this in any final rule that retains the prohibition on the use of compressed air.

improvement needs to be made to capture particles more efficiently. Similarly, the Hallin study only evaluated the use of rotary and percussion hammers indoors under test room conditions involving short sample durations where intense drilling was performed and the silica levels were estimated from a composite of several respirable dust samples collected and individual respirable dust samples were not taken from the workers' breathing zones.

Relying on one study (Shepherd 2003), OSHA asserts that simply decreasing the practice of dry sweeping or brushing debris from the hole can reduce exposures by 50 percent. However, the Shepard study did not measure the exposure level of dry sweeping or otherwise make a conclusion that reducing dry sweeping would reduce exposures by 50 percent – so it is not clear how OSHA made this assumption. Moreover, this one study is not sufficient to support OSHA's conclusion that simply decreasing workers' reliance on blowing or dry sweeping drilling debris can reduce hole driller exposure to below the proposed PEL.

OSHA estimates that reducing reliance on drills that blow air down a hole will offer drillers the same degree of exposure control as reducing use of other forms of compressed air. Id. at IV-407. OSHA does not cite a study to support this proposition so it is unclear where OSHA is getting its support.

OSHA also estimates that construction employers will need to ensure that work sites are kept clean (free of dust piles) and that fresh air exchange is provided to enclosed areas but it does not provide any studies analyzing these methods for respirable crystalline silica exposure.

OSHA's analysis of the technological feasibility of hole drillers in many ways crystallizes the overall problems with its findings. This activity category presumably covers all types of hand-held tools (hand-held electrical drills, pneumatic drills, rotary hammers, or percussion hammers) of all different sizes performed in all different environments (indoors and outdoors) and on all different types of silica containing materials. The range of different exposure scenarios is almost limitless. And yet, OSHA has gone about simply examining a handful of samples, some taken in controlled "laboratory" conditions, and concluded its feasibility burden has been met.

OSHA must go further than what it has done here. OSHA must conclude that employers can actually get to the proposed PEL most of the time in the variety of circumstances employers face. Employers are being asked to make significant changes to the way they operate and the construction industry is prepared to assist them in those efforts. But, employers will be held responsible in the context of an OSHA enforcement action to being below the PEL. OSHA cannot shift the burden of feasibility onto the employer in the face of an OSHA inspection action based upon the scope of its analysis here.

5. Jackhammer and Impact Drillers.

OSHA identified "Jackhammer and Impact Drills" as a job category potentially affected by the proposed silica standard. Of all the job categories, this job category is one of the most robust in terms of the number of samples that OSHA examined. OSHA examined over 100 different samples in this job category. Notwithstanding this, the variability and inconsistencies in the sampling results do not support the Agency's feasibility determination.

In making its conclusion regarding technological feasibility, OSHA looked at samples from NIOSH reports, OSHA SEP reports, and elsewhere. Id. at IV-410-411. ERG noted in its report that based on a review of "selected" OSHA inspection reports, workers typically perform impact drilling for five to seven hours per shift. ERG Report, 3-44. Yet, 13 of ERG's analyzed samples were for "significantly less than 8 hours per shift," including some that were 90 minutes.[9]

OSHA relies on the data above to support its conclusion that "exposure levels for most workers using jackhammers and chipping equipment outdoors will be reduced to less than 100 µg/m^3 . . . by using either wet methods (i.e. appropriate water sprays) or LEV systems . . . ." PEA Chapter IV, p IV-419. With respect to the use of wet methods, however, only five samples were conducted with wet methods and, of those five, four "wet" operations resulted in higher exposures than some "dry" operations with similar parameters. Id. at IV-413. Without any further explanation, OSHA summarily concludes that "OSHA has reason to believe that the water dust suppression control was not applied optimally." Id. Of the almost 100 samples that ERG accumulated in analyzing feasibility, the sample with the highest exposure was from the use of a pneumatic-powered gun with a water-spray system that eliminated visible dust.

[9] ERG also states that "positioning employees upwind of dust generation point may also effectively reduce exposure . . . ." However, neither ERG nor OSHA actually integrates this finding into the analysis, making the baseline control results and also the sampling with engineering controls unreliable because where the employee was positioned during the task in relation to the wind, if any, is unknown and can impact the exposure level of the employee.

In concluding the effectiveness of wet methods in controlling silica exposures, OSHA also relies heavily on the information from a manufacturer of a water-fed jackhammer. Based on this information, "ERG estimates that 80 percent of impact drilling operations can be controlled using properly designed and applied wet methods." ERG Report, 3-49. Yet, the precise "information" that ERG relies upon to make such an assertion is absent from its analysis.

ERG compares one sample of a worker inside a parking garage with no engineering controls to four workers from an OSHA SEP inspection using water prior to jackhammering to suggest that the use of the water resulted in lower readings for the four workers. However, there are too many other unknown variables (weather, wind, ventilation, type of equipment used) to conclude that the use of water alone contributed to lower readings.

In its technological feasibility analysis, OSHA acknowledges that chipping operations often take place in "complex conditions," which can involve such situations as performing operations in close proximity to other workers operating jackhammers or other impact drillers. In these situations, the best that OSHA can conclude is that using "carefully adjusted wet methods combined with low-dust cleaning methods can control the respirable quartz exposures of most impact drillers to a level equal to or less than 100 $\mu g/m^3$." PEA Chapter IV, IV-417. This is not close to concluding that most impact drillers can get to a PEL of 50 in most operations most of the time, particularly since in OSHA's own words a "large" portion of construction workers perform chipping in complex conditions.

OSHA also analyzes the extent to which LEV systems present an additional control option. OSHA states that "LEV systems present an additional control option for reducing the respirable quartz exposures of impact drillers." Id. It makes this conclusion on what appears to be three controlled studies of LEV with certain types of impact drillers. Interestingly, in *none* of the studies did OSHA actually find that an LEV could reduce exposures to below 50 $\mu g/m^3$ in most of the operations most of the time.

OSHA then proceeds to speculate that a combination of wet methods and LEV could be an effective control measure. This is important for the Agency because it is this combination of controls that, when implemented effectively, can meet the proposed PEL of 50 $\mu g/m^3$ in most operations most of the time, in the Agency's view. Id. at IV-419. The problem with OSHA's position, however, is that it is truly based on speculation.

OSHA has no actual samples concluding that these controls effectively reduce exposures to below the proposed PEL. OSHA can only extrapolate such reductions from combining different data sources – including data utilizing grinders and not impact drillers – to make a finding that in one example of an impact driller, the driller with these controls could maybe reach a level of 48 μg/m^3. Id. This level is not even within the margin of error of the proposed PEL.

Unfortunately, OSHA is forced to concede that it has no real data on the effectiveness of combined control methods: "A combination of LEV and water is another control option, although OSHA has not been able *to quantify its effectiveness*." Id. at IV-418 (emphasis added). This does not deter OSHA from concluding, though, that "[u]nder the above circumstances, when workers use jackhammers for less than 4 hours of their shifts, which is typical of most work performed, OSHA preliminarily concludes that levels of 50 μg/m^3 or less can be achieved for most workers most of the time." Id. at IV-420. OSHA is wrong on this; the data simply does not support the Agency's feasibility conclusion.

6. Masonry Cutters Using Portable Saws.

For this job category, OSHA encompasses three distinct saws: hand-held saws; walk-behind saws; and drivable saws. The majority of sampling for masonry cutters using portable saws comes from sampling of hand-held saw operators, which make up 68 out of the 91 samples relied upon. Virtually all of the samples are not full-shift; thus, OSHA assumed in almost all instances that workers were not exposed to any silica for the remaining portion of their shifts. A close examination of all three types of saws shows the deficiencies in OSHA's analysis.

a. Hand-held Saws.

The primary means of controlling exposures to hand-held masonry saws, in OSHA's view, is the implementation of wet methods. OSHA principally relies on one study to conclude that it is feasible to reach the proposed PEL in most operations most of the time. Id. at IV-431. This one study evaluated the effectiveness of two different wet methods measured by 15-minute personal breathing zone samples. Id. The study concluded that these methods could result in an over 90 percent reduction in silica exposure, which was then liberally applied to OSHA's baseline exposures, concluding that the proposed PEL could feasibly be reached.

As with other operations, OSHA has limited data regarding the effectiveness of wet methods in real world conditions. In fact, in one study of hand-held saws performed indoors with wet methods, respirable quartz levels were recorded at 240 and 260 µg/m^3. Id. This is not even close to the proposed PEL. OSHA's review of a NIOSH examination of wet methods with hand-held saws during concrete block cutting showed a 90 percent reduction in silica content using wet methods. Id. at IV-432. Notwithstanding this, the respirable silica level still recorded during a short period of sampling was 1,620 µg/m^3, significantly higher than the proposed PEL of 50. Id.

OSHA's review of LEV systems provides no further help to construction employers. OSHA cites a variety of studies and data, none of which reliably show employers can utilize LEV to reduce exposures to below 50. Instead, the analysis is littered with statements such as the following:

- "OSHA was not able to obtain extended-period exposure monitoring data indicating the effectiveness of LEV-equipped saws under workplace conditions."

- "The results from this study show that saw-based LEV extraction equipment can reduce respirable silica exposures to levels near 100 µg/m^3 during short term periods of active cutting."

- "OSHA has not been able to confirm that these saw ventilation methods offer the same degree of exposure reduction to workers currently experiencing more modest, but still elevated exposure (for example, in the range of 250 µg/m^3 with no controls)."

- "LEV-equipped saws do not appear to offer a reliable level of dust reduction under all circumstances."

- "The results of the evaluation do not indicate a significant benefit of using the LEV-equipped saw compared with the non-LEV equipped saw."

See id. at IV-432-434.

This data does not support a finding that contractors using hand-held masonry saws can reach the proposed PEL in most operations most of the time, indoors or outdoors, in different weather conditions, in different parts of the country, and working on different substrates. And yet, that is precisely what OSHA has concluded.

b. Walk-behind Saws.

OSHA only examined 20 samples for walk-behind saw operators. Twelve (12) of these samples were workers cutting concrete outdoors and using wet methods. Id. at IV-428. According to OSHA, these 12 samples were taken from "at least six construction sites." Id. No other information was provided about these six construction sites, such as geographic location, environmental conditions, weather, size of the construction site and whether there were other silica-related tasks being conducted that could have impacted the results. Despite this information gap, OSHA asserts that the wet methods used were effective in maintaining worker exposure because eight of the 12 samples were below 25 ug/m. Id. Given that these eight samples came from three different worksites, it is difficult to know precisely what other variables impacted and potentially skewed the sampling results.

The remaining eight samples analyzed by OSHA for walk-behind saw operators were "collected under various other conditions," which OSHA describes merely as wet cutting outdoors. Id. at IV-429. OSHA asserts that the median value of 236 ug/m is "almost 20 times higher than the median of 12 ug/m . . . for workers using wet methods outdoors." Id. However, in describing four of these eight samples, OSHA uses phrases such as "working conditions are less clearly documented," "for these four workers, who appear to have used dry or ineffective wet sawing methods," and "probably under dry working conditions." Id.

OSHA then makes the leap to say that "the difference between these groups of results points to a strong link between lower worker silica exposure levels, effective wet dust suppression, and site conditions that minimize the extent to which airborne particles linger near workers' breathing zones. Id. This conclusion is simply not supported by the evidence given the lack of detailed information for the eight samples used as a comparison group.

c. Drivable Saws.

Remarkably, OSHA relies solely on three silica results for workers using drivable saws for relatively short durations of 70, 80 and 125 minutes. Id. at IV-430. All three samples involved the use of wet methods, however, OSHA concludes that only two of the three samples used "sufficient wet-cutting methods," a conclusion reached presumably because these two samples were both below the proposed PEL. In comparison, the third sample, where an operator was also using a wet method, found an 8-hour TWA reading of 88 μg/m^3 for an 80-minute sample. For this reading, OSHA claims that the nozzle was clogged and this one sample alone "demonstrates the benefit of using sufficient amounts of water to reduce silica exposures" and claims that "unclogging the water nozzle would almost certainly have resulted in a lower exposure level." Id. at IV-437. Yet, no follow-up sampling was performed to support this assertion.

Based on only these three short-duration samples, OSHA claims that most workers using drivable saws can use wet-methods most of the time and that such methods "can control worker silica exposure below 50 μg/m^3." Id. Given that the three samples were for short durations, presuming zero exposure for the remaining unsampled time would have a particularly profound effect on OSHA's conclusions. The presumption also is particularly unsupportable in the context of drivable saws, as ERG presumes that drivable saws "typically operate for 1 to 2 hours per location and then are transported to other sites" where the same operator will likely continue to operate it. ERG Report, 3-64.

In addition, there is no data to suggest that workers will be able to use LEV systems to control silica exposures when using drivable saws. In fact, in its preliminary economic analysis OSHA states, "OSHA could not obtain exposure monitoring data indicating the effectiveness of LEV under either actual working conditions or experimental conditions." PEA Chapter IV, IV-436.

Again, as with the other categories discussed, OSHA must do better than three samples. Even giving OSHA the benefit of the doubt as to its interpretations of the samples taken, making broad conclusions of technological feasibility based on such scant data is indefensible.

7. Masonry Cutters Using Stationary Saws.

This job category includes workers who use stationary saws to cut masonry materials, such as bricks, concrete blocks, stone and tile. OSHA states that:

> Many saw operators alternate cutting with laying masonry and/or mixing mortar, and thus might cut for only a short portion of the shift. Some saw operators, however, cut masonry nearly continuously throughout the shift.

Id. at IV-443.

In describing the exposure profile it relied upon, ERG noted that the "data indicate that the respirable quartz concentrations and the durations of actual exposure vary widely for workers in this job category." Yet despite these inconsistences, OSHA is able to conclude, from only 28 sampling results, that most construction workers using stationary masonry saws will experience exposure levels of 50 μg/m^3 most of the time. Id. at IV-443.

OSHA relies on 28 samples to represent actual workers, facilities and comparable conditions across the country in the construction industry. These samples include results from monitoring of stationary saw operators both indoors and outdoors. While OSHA makes clear that 12 samples are from cutting operations outdoors, it is unclear if the remaining 16 samples are all indoors or a combination of indoors and outdoors.

Similar to other construction sampling results, some of the sampling results relied upon were for short duration, such as 16, 47, 56 and 75 minutes. Interestingly, ERG chose to exclude a 2-minute sample due to its "extremely short duration," but chose to rely on a 16 minute sample in its analysis. Such a short duration is also unreliable given OSHA's assertion that it will presume zero exposure for the remainder of the day.

OSHA's feasibility conclusion is primarily reliant upon the use of wet methods. Id. at IV-448. OSHA concludes, based upon seven results for workers using water-fed masonry saws to cut brick and block that the median exposure is below the proposed PEL and at a level of 33 μg/m^3. Id. Aside from the fact that this conclusion is based essentially upon only a handful of samples, there are several additional issues with it.

First, the conclusion is based on sawing on material with a median silica content of nine percent. As OSHA knows, the silica content of brick and block can vary significantly, with the amount of silica in material approaching 20 percent in some instances. The differences in the amount of silica in the material being cut can have a significant impact on worker exposures. OSHA's assessment of the technological feasibility of wet methods does not make any adjustment for materials with higher silica content.

Second, OSHA's heavy reliance on wet methods for its feasibility finding does not adequately consider those situations where OSHA has determined that wet methods cannot be used to perform the work. In its analysis with respect to masonry saws, OSHA and ERG identify the following situations as not suitable for the use of wet methods: (1) cold temperatures; and (2) extremely hot/dry atmospheric conditions. ERG Report, p 3-57-3-59. There are other instances where the use of wet methods would not be feasible when using stationary masonry saws, such as when the use of wet methods could stain or discolor the material being sawed.

OSHA and ERG continually assert that rarely will cold temperatures prevent use of wet methods and, thus, it does not serve as a significant obstacle to feasibility. But with respect to stationary masonry saws, there are several instances where wet methods cannot be used and OSHA does not quantify this in the analysis. As with drywall finishing, OSHA also does not discuss any adverse quality impacts that could result from the use of wet methods in cutting operations.

For those situations where wet methods cannot be used, OSHA's feasibility analysis hinges on the use of LEV, enclosures, or administrative controls. Unfortunately, the Agency does not have data supporting the effectiveness of these measures. With respect to LEV, OSHA principally relies on one test study conducted by NIOSH utilizing a commercially available masonry saw factory-equipped with two exhaust take-offs. Id. at IV-447. The test examined the dust concentration in the air drawn from the cell and not "worker exposure levels." Id. Notwithstanding this, the dust that was collected was still just barely at the proposed PEL, not below the PEL. Id.

The effectiveness of enclosures in reaching the PEL is also not supported by OSHA's analysis. OSHA concludes that the use of ventilated enclosures is helpful in reducing worker exposure to silica, but not at levels below the PEL. In fact, the exposure levels provided for silica when ventilated enclosures are used are as follows, only one of which is below the proposed PEL: 15; 70; 86; and 93 ug/m³. Id. at IV-447 n.220. The median of the values is 78 µg/m^3.

Finally, with respect to administrative controls, OSHA again concludes that they are helpful, but only when used in combination with other measures:

> A review of the literature also finds that worker exposures to airborne silica could be reduced by employing specific administrative controls. For example, locating the worker downwind of a stationary saw caused a four-to five-fold higher respirable dust exposure compared with locating the worker upwind of the saw (NIOSH HETA 2000-0226-2890). OSHA recognizes that administrative controls such as this are beneficial, but not always practical (particularly because workers cannot always adjust their orientation to

> stationary equipment to step out of a dust plume). These methods are helpful, but should be used in conjunction with other exposure controls.

Id. at IV-448.[10]

The CISC respectfully believes that OSHA has not made its case that employers can reach the proposed PEL for stationary masonry saws in most operations most of the time. The data points are too scarce and do not fully address the circumstances where wet methods are unable to be used.

8. Millers Using Portable or Mobile Machines.

Millers operate hand-held or walk-behind milling equipment or larger driven milling equipment. OSHA explains milling as follows:

> Milling machinery often uses a rapidly rotating drum or a bit covered with nibs to abrade surfaces, although other mechanisms are also common (e.g., systems based on impact, shot-blast, or rotating abrasive cups). The operator can drive larger models from above (e.g., road milling equipment used in recycling/resurfacing operations) or guide smaller milling equipment by hand (e.g., walk-behind equipment used for small pavement areas and floor work). Laborers or construction workers operate smaller machines during specialty tasks such as resurfacing floors, repairing pavement, or installing electrical systems (i.e., creating grooves for conduit).

Id. at IV-451.

Despite this wide variety of types of equipment used in milling operations, OSHA relies on only a handful of studies and exposure samples in concluding that the proposed PEL is technologically feasible. In its analysis, OSHA looks separately at large driven milling machines (both operators and tenders) and walk-behind milling machines.

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[10] The CISC notes the significant exposure difference that NIOSH found in this study based on the positioning of worker "upwind," as opposed to downwind. The difference was upwards of five-fold. This kind of disparity underscores the CISC's comments with respect to the difficulty in controlling for silica in multi-employer worksite environments with unpredictable weather conditions. In addition, it demonstrates how construction employers will have an extremely difficult time in accurately characterizing exposures pursuant to OSHA's exposure monitoring provisions.

a. Large Driven Milling Machine Operators and Tenders.

OSHA examined studies and other information related to certain types of large driven milling machines and, in particular, the effectiveness of wet methods in controlling exposures. When examined in detail, OSHA's analysis demonstrates the variety of exposures that can occur and – in essence – prevents OSHA from making a feasibility conclusion for most milling machine operators and tenders most of the time.

OSHA cites to a NIOSH study that evaluated asphalt milling machines with a water spray dust suppression system in place. On the first day of sampling, NIOSH obtained an exposure result of 14 $\mu g/m^3$ for the milling machine operator. Id. at IV-456. However, on another day, using the same equipment, the investigators found exposure results of 100 $\mu g/m^3$. Id. Same equipment, different days, widely varying results. The explanation was that "wind speed" and "direction" were uncertain and that the second day analysis was performed during an "unusual" operation. Id.

Additional reviews by NIOSH were performed on a variety of milling equipment, with more inconsistent results. Some exposure results were quite low (essentially below the limit of detection), but some were several times above the proposed PEL. Apparently, certain work performed in high summer temperatures can cause asphalt to become sticky, which reduces respirable dust emissions. Id. But, milling conducted at nighttime in cool temperatures – something that is not uncommon in the construction industry – resulted in at least one exposure of 181 $\mu g/m^3$. Id.

Using milling machines on concrete roads, as opposed to asphalt, can also lead to significant differences in exposures results. The New Jersey Department of Health and Senior Services found that road millers performing operations dry on asphalt were in compliance with the PEL, but performance of the same operation dry on concrete resulted in exposures over 12 times the PEL. Id. at IV-457.

Despite all of the information above, OSHA concludes that a PEL of 50 $\mu g/m^3$ can be met by both operators and tenders in most operations most of the time. OSHA cites a study conducted in the Netherlands of a "novel wet dust emission suppression system" that apparently combines a water spray with a dust suppression additive. Id. at IV-460. OSHA also states that some manufacturers of milling equipment are installing a second water spray into the equipment to help control dust, instead of simply relying on the water designed to cool the blade(s) of the machine. Finally, OSHA relies on two controlled studies of LEV on milling machines to support its finding.

Notwithstanding the above, OSHA is highly reliant on the "novel wet dust emission suppression system" and the LEV in terms of justifying feasibility:

> However, information is insufficient to confirm that this [water spray] method alone will reliably control most workers' exposures. Until water spray can be adjusted in a manner that consistently maintains exposures to levels of 50 $\mu g/m^3$ or less, this control method will need to be paired with either additional spray on the conveyor and a dust suppressant . . . .

Id. at IV-466.

Wet methods alone will not work consistently, according to the Agency. However, nowhere does OSHA indicate that the combined methods above will reliably and consistently meet the proposed PEL in the wide variety of operations affected. Nor does OSHA indicate the extent to which the type of equipment described by the Agency is readily available or if it is readily available, how quickly it can be implemented on the large number of millers currently in use. At bottom, OSHA is just speculating that these methods will consistently reduce exposures and be readily available and easily introduced into the marketplace. OSHA admits that "these control measures, even in combination, might not be sufficient to maintain exposure levels below the proposed PEL of 50 $\mu g/m^3$ during road demolition activities, such as full-depth removals or removals greater than 4 inches deep." Id. at IV-468. The CISC respectfully suggests that this is insufficient to make a feasibility conclusion at the proposed PEL.

b. Walk-Behind Machine Operators.

Walk-behind milling machines are different from the large drivable machines in several ways, including that the operator of the machines are in different locations *vis-à-vis* the point of operation. Walk-behind milling machines can also be utilized indoors, which complicates exposures for contractors using them.

As with the large drivable milling machines, OSHA relies on very little data to support its technological feasibility conclusions. In fact, several data points are taken from grinders and other different pieces of equipment. Yet, OSHA concludes that "construction sites can achieve an exposure level of 50 ug/m or below for most workers operating small, walk-behind milling machines most of the time by providing dust collection or wet methods with added dust suppressant." Id. at IV-468.

OSHA's *analysis*, however, is based on *analogy*:

> OSHA draws this conclusion from success with dust controls for larger milling machines and for tuckpointing and grinding equipment. As discussed previously, similar control measures (wet methods and LEV) can be adapted to walk-behind milling machines and should provide similar results during grating activities in comparable work environments. OSHA finds compelling evidence that controls effective for vehicular milling machines are adaptable to the smaller (and thus potentially easier to control) walk-behind milling machines.

Id. at IV-468.

Speculating that "similar control measures" "should provide" similar results in "comparable" work environments as large milling machines and for tuckpointing and grinding equipment is simply not adequate. This is particularly true when OSHA's assessment of the feasibility of large milling machines is questionable in the variety of environments where the equipment is utilized and OSHA concluded that it was infeasible for tuckpointing and grinding to meet the proposed PEL.

Both large drivable milling machines and smaller walk-behind milling machines are commonly used in the construction industry. They are used indoors and outdoors, in hot and in cold, and in different areas of the country. OSHA should be required to go out on site and actually conduct real-world sampling for various ranges of conditions and make a finding as to what is technologically feasible for contractors to reach. That has not been done here.

In a sense, OSHA treats this as an extrapolation exercise, similar to its risk assessments where it needs to model certain health effects based upon data and assumptions about exposure. OSHA does not need to "model" with respect to technological feasibility. It simply needs to go out and sample in a wide range of conditions and make a judgment as to whether a proposed PEL can be met. Unfortunately, it has not done that here.

9. Rock and Concrete Drillers.

This job category includes workers who use vehicle-mounted drilling rigs to produce holes in the ground or in concrete as well as roof bolters who drill holes overhead or in walls made of either concrete or earth. Id. at IV-473. Despite the fact that these job categories use different equipment to perform these different tasks, OSHA concludes that workers using drilling rigs for all types of rock, earth, and concrete should be addressed together because the workers' activities have much in common. However, what OSHA fails to recognize is that while the workers' activities may be similar, the extent to which they will be exposed to respirable silica dust will not. Even OSHA recognized that the working conditions for workers using drilling rigs will vary from job-to-job and will depend upon the type of hole drilled, the substrate being drilled, and the location of the drilled hole. Id. Despite recognizing the various working conditions, OSHA does not attempt to analyze the different variables in assessing the baseline exposures of employees.

Rather, OSHA concludes that employers can reach the proposed PEL of 50 µg/m³ in all instances where drilling operations are performed and that the proposed PEL is technologically feasible for this job task. Id. at IV-480. In support of this position, OSHA relies upon 39 samples – 17 where no controls were used and 22 where controls (in many cases more than one) were used. Id. at IV-474. Employee exposures ranged from 10 µg/m³ to 1,190 µg/m³. Id. at IV-474-475. The 39 samples come from four NIOSH reports, four OSHA Special Emphasis Program (SEP) inspection reports, one journal article from NIOSH, and unpublished data from the State of New Jersey regarding exposure sampling that it had done on construction sites. Id. at IV-474. The CISC respectfully disagrees that the underlying data shows that heavy equipment operators can meet the proposed PEL in most operations most of the time.

First, the majority of all samples came from the Lynch (2002) study which was gathered from just two construction worksites where concrete drilling was performed. Dust control measures and enclosed cabs were not used to reduce exposure to respirable silica dust. Of the eight laborers and nine operators sampled, all of them were significantly over the proposed PEL of 50 µg/m³ despite the fact that the majority of samples were less than eight hours.

The NIOSH (Breckenridge, 1992) study consisted of only one personal air sample of 5.5 hours for a rig drilling operator where the dust control was not operational during a school building construction project. In that study, NIOSH concluded that "if the exposure had continued for an 8-hour day, the worker would be exposed to a level that is 8 times above the current PEL of 100 µg/m³ and 16 times above the proposed PEL of 50 µg/m³." In the NIOSH (Shelly, 1995) study, two pneumatic drill operators had staggering exposure levels ranging from 160 µg/m³ to 1,190 µg/m³ over two days of sampling despite the fact that the backhoe drill was broken down for up to two hours on each day. This study clearly noted that if the drill had not been broken down, more dust would have collected during the sampling time period. Under the NJDHSS, 2000 data collected, EZ drill operators also had exposures well over the proposed PEL at 800 µg/m³ and 2,930 µg/m³, respectively, for samples times under five hours.

The NIOSH (ECTB-233-120c, 1999) study consisted of only one sample taken on one day of the exposure level of a drilling rig operator on a road demolition project. The operator's exposure level was less than 10 µg/m³ but, in this study, the operator spent only 20 percent of his time engaged in drilling activities out of the seven hour sample that was taken and continuous supply of water was used at the silica generating point of operation. Such a small amount of time spent in drilling operations can hardly be said to be an accurate representation of the exposure level of workers performing drilling operations.

Similar concerns can be found with the reliance on the NIOSH (ETCB-233-122c, 1999) study. For this matter, there was only one personal sample taken from a drilling rig operator on one day where rain was an issue and where copious amounts of water, an LEV with an air cleaner, and an enclosed cab were used during drilling operations. Despite all of these controls, the operator's 8-hour TWA was still as high as 31 µg/m³. The study also noted that too much water in a drill hole can create conditions that bind the drill in place, resulting in downtime, lost productivity, and equipment loss. Moreover, the study noted the significant cost – $370,000 (in 1999) – in using the particular drill rig at issue that had a water and dust collection system.

Despite the problems with the studies addressed above, OSHA concludes that the majority of employers have already achieved the proposed PEL for operating and rock drilling operations and wet-methods, LEV systems, and enclosed cabs are effective measures at reducing exposures. Id. at IV-480. The data do not, in fact, support OSHA's assertions or numbers regarding the use of wet-methods, LEV systems, and enclosed cabs.

For its assessment, OSHA primarily relies upon the NIOSH (EPHB-334-11a, 2008) study. The study, which focused on the use of LEVs, was performed at the equipment manufacturer's plant and thus is not based on real world conditions. The study only consisted of data for one day – because the exhaust tubing clogged with settled particulate on the first day and went unnoticed and data from the first day was discarded. Each machine trial consisted of using a five-gang dowel drilling machine (ModelA-5SC, Minnich Mfg. Co., Mansfield, OH) to drill four holes in blocks of concrete laid on their long side in the outdoor testing area behind the Minnich Manufacturing facility located in Mansfield, OH. Thus, the study only analyzed one piece of equipment with a short drilling time. The study noted that it was conducted in a controlled environment and was free from wind and it did not collect personal sample results but rather conducted area samples. It specifically stated that "[t]hese results should not be interpreted to represent potential exposures to drill operators" – the utility of this study is limited.

In this study, NIOSH recommended some additional practices that could be implemented, which OSHA "anticipates" could help ensure that optimal dust collection efficiency is maintained over time. Id. at IV-478. These additional practices include: using smooth ducts and maintaining a duct transport velocity of 4,000 feet per minute to prevent duct clogging; providing pipe clean-out points; installing pressure gauges across dust collection filters so the operator can clean or change the filter at an appropriate time; and installing static pressure taps in hoods and vacuum gauges on the operator's panel, enabling the operator to confirm that the hoods are operating as designed. Id. Neither OSHA nor NIOSH, however, have studied the effects or feasibility of these measures in reducing respirable silica exposure.

To reliably achieve exposure levels of 50 μg/m³ or less, OSHA asserts that employers must ensure that both water and local exhaust air flow are used and optimized each time the drill is operated. Id. at IV-480. For concrete drills that are heavily used, optimization "might" include adding improvements recommended by NIOSH to help ensure that effective dust collection is maintained over time. Id. OSHA, however, does not present any studies to prove that these optimization measures are effective at reducing exposure levels below the PEL.

OSHA also asserts that if these measures are insufficient, then an employer can modify the dust extractor to better capture the particles released as the drill starts and stops. Id. OSHA indicates that by activating the dust extractor before the drill starts and by turning the dust extractor off only after the drilling stops, the dust extractor will be able to capture silica particles that would otherwise escape into the work zone air. Id. Once again, OSHA does not present any data or analysis showing that this would be effective at reducing respirable silica dust exposure. Finally, OSHA concludes that employers could also modify equipment by enclosing or moistening the dust collector discharge area to minimize re-suspension of dust at dust collection areas. Id. OSHA does not indicate how this could be accomplished or provide any studies where it has been shown to reduce silica exposures.

10. Rock-Crushing Machine Operators and Tenders.

OSHA has broadly concluded that it is technologically feasible for "Rock-Crushing Machine Operators and Tenders" to achieve the proposed PEL of 50 $\mu g/m^3$ with a combination of a climate-controlled protective enclosure, an effectively designed and maintained water spray system, and when "the operator" is able to spend at least 85 percent of his/her shift in the enclosure. Id. at IV-495. OSHA further states that respiratory protection in the form of a half-mask respirator may also be needed at times. Id. In OSHA's view, this meets its burden to show that "Rock-Crushing Machine Operators and Tenders" can meet the proposed PEL in most of the operations most of the time. A detailed examination of the analysis, however, shows that OSHA has not met its burden here for several reasons.

OSHA admits that it has little data quantifying exposures and control methods for these job activities. Id. at IV-485. In fact, the exposure profile only includes five samples, based on sample duration of between 2-8 hours. Id. at IV-486. For those samples under eight hours, OSHA has assumed no additional silica exposure in calculating the TWA. The samples came from just three OSHA Special Emphasis Program Inspection Reports, only two of which are actually from the construction industry. Id. at IV-485. As an initial matter, this is a very sparse data set upon which to make a conclusion that this job activity can meet the proposed PEL in most of the operations most of the time.

OSHA's baseline conditions are for rock crushing operations using "some form of dust suppression additive (e.g., water, asphalt)" but using it inconsistently. Id. at IV-487. The median exposure under baseline conditions was found to be 300 $\mu g/m^3$. Id.

Aside from the sparse quantity of data available, the first fundamental flaw in OSHA's conclusion relates to tenders of rock crushing machines, individuals broadly included in the identified job task. These individuals may not actually operate the machine, but will be working alongside it to ensure the process is running smoothly. "The worker might also pick up debris that has fallen off the conveyor belts, or clear material that becomes impacted in the crusher, hopper, or belts." Id. at IV-484.

Apparently, OSHA concludes that for this subset of workers it is feasible to reach a PEL of 50 μg/m^3 based on – literally – *no* data. OSHA states: "The exposure information available to OSHA for rock crushers is limited to workers either controlling the machine, or alternately controlling and tending the equipment to clear foreign or impacted material; no construction industry data are available for workers strictly tending crushing machines without also spending time operating them." Id. at IV-485. OSHA cannot make a technological feasibility finding based on no information, particularly considering that a key prerequisite in its determination that operators can meet the PEL is that they stay in an enclosure for over 85 percent of the work shift. Tenders do not routinely stay in an enclosure throughout the workshift.

The lack of data for this job category extends to exposure results after the installation of control methods. OSHA has little to no data on the effectiveness of controls on rock crushing machines fitting the exposure profile. Instead, OSHA extrapolates much of its data from stationary rock crushing machines (not covered in the exposure profile), some of which were not operated in a manner similar to machine operation in the United States.

Even data from these dissimilar sources, however, shows that OSHA has not proven its case on the feasibility of the proposed PEL. First, OSHA relies on an ERG site visit report showing a full-shift sample of a rock crusher of 54 μg/m^3. Id. at IV-487. This result, which is still over the PEL, was achieved on a stationary crusher – not a mobile crusher – using fine mist water spray, with multiple water spray nozzles. Id. at IV-487-488. It was noted that the various spray nozzles were checked frequently and replaced if they became clogged. Id. The operator spent "much of the shift" in a booth, with exposures measured at below the Limit of Detection. Id. Furthermore, OSHA and ERG emphasize that the sampling was performed on a wet, "muddy" day which leads to lower levels. Id. Despite all of this, OSHA relies heavily on this study in concluding that rock crushers can meet the PEL in most of the operations most of the time. Of course, this site visit shows the opposite: despite numerous controls and a wet environment, reaching a PEL of 50 was still not possible.

Second, OSHA relies on an international report on wet dust control methods from India. Id. at IV-488-489. OSHA cites this study as support in general for the effectiveness of wet methods. The CISC does not dispute that wet methods can reduce silica exposure in certain circumstances, the question though is whether the use of wet methods can reduce silica exposure to below the proposed PEL in most operations most of the time. The India study does not support that proposition. The study shows that even after wet methods were introduced in India's dry season, 30 percent of the samples taken were over the PEL. Id. And this was for machines that were different from the standard United States rock crushing machines. Even OSHA had to concede the study is meaningless for technological feasibility purposes: "[W]ithout further detail on the rock crushing activities in India, OSHA is unable to determine if similar water spray systems would be equally effective if installed on the rock crushing equipment typically used in the United States." Id. at IV-489.

Third, OSHA examines the use of LEV, rather than wet methods, presumably hoping to show some effective method of controlling silica exposure for rock crushing machines. After a review of two studies, including one from Iran, OSHA concluded that LEV "has yet to be proven practical for mobile construction rock crushing equipment." Id. at IV-492. In one study, after LEV systems had been implemented, "rock crushing site workers' personal exposure levels continued to exceed 100 μg/m^3." Id.

Fourth, OSHA examined operator control booths as a control measure. As noted above, this measure would only apply to operators and not to tenders or others on the site. In looking at control booths, OSHA relied principally on one study – Ellis Drewitt, 1997 – which measured workers in the South Australian extractive industry. Id. at IV-492. The workers spent most of the time inside an air conditioned cabin, but at least two of the operators "occasionally" exited the cabins to free machinery blockages. Id. Despite these control measures, the median exposure for the workers was above the proposed PEL, at a level of 60 μg/m^3. Id.

Based on all this information, as well as some examination of other control measures (e.g., foam, fog, etc.) outside of the actual rock crushing industry, OSHA comes to the feasibility conclusion above that the proposed PEL can be met for operators only if they stay in fully enclosed cabs for most of their shifts and also utilize a water spray system. No data is presented justifying the effectiveness of this exact combination of controls. This is troubling here since there is absolutely no data available to suggest median exposures can get below a proposed PEL of 50 *and* the one study that essentially replicates OSHA's control combination – ERG-concr-crush-A, 2001 – was *over* the proposed PEL. And this study was conducted on a "muddy" day.

OSHA's conclusion is more alarming given its concession that, despite this combination of controls, half-mask respirators may be needed. It is also very alarming as ERG – OSHA's contractor whose work the PEA relies heavily upon – nowhere concludes that meeting a PEL of 50 is feasible:

ERG finds that by using enclosed, properly ventilated operator's booths, most rock-crusher operators can achieve 8-hour TWA respirable crystalline silica exposure levels of 75 µg/m^3 or less. This is the median exposure level obtained for rock-crushing operators using operator booths in the south Australian extractive industry (described above). This conclusion is based in part on the assumption that the activities of rock-crushing operators in the U.S. are similar to those performed by the Australian fixed plant operators, who achieved levels of 60 µg/m^3 (lower levels are possible for those operators whose work allows them to spend the whole shift in the cab). ERG believes that rock-crushing operators in the U.S. construction industry can achieve similar exposure levels.

Alternatively, reductions of 70 to 90 percent – as reported for concrete breakers using jackhammers – might be achieved through the use of improved water applications and/or other dust suppressant materials at the crusher and along the belts and transfer points. ERG estimates that 20 percent of belt tenders and operators who work outside control booths can achieve exposure levels less than or equal to 75 µg/m^3 using these methods. Twenty percent represents the proportion of rock crusher operators who are currently exposed to levels of 250 µg/m^3 or less. A 70-percent reduction in silica levels would produce levels less than or equal to 75 µg/m^3 for these workers.

A combination of controls will be required for the remaining workers who perform tasks outside enclosed booths. For example, a combination of dust suppression methods (assuming an average 80-percent reduction) and use of an enclosed booth (60 µg/m^3) for most of the shift could reduce the exposure level of an operator from 1,380 (one of the highest results associated with rock crushing) to less than 100 µg/m^3. This estimate is for an operator spending no more than 90 minutes total time outside the booth (in brief excursions to clear foreign matter from belts). This example might overestimate the worker's cumulative exposure, as the silica concentration in the booth would likely decrease when dust suppression methods are used. A result of 54 µg/m^3 was associated with a crusher operator using a combination of a booth and wet methods on a muddy day (ERG, 2001).

An alternative combination of controls includes dust suppression methods and respiratory protection. By consistently using properly directed water mist

> spray at the points indicated above, even the most highly exposed operators and belt pickers can achieve respirable silica levels in a range that is compatible with use of a half-face piece respirator.

ERG Report, 3-95-3-96.

11. Tuckpointers and Grinders.

"Tuckpointers and grinders" are one of the two job categories for which OSHA has preliminarily concluded that it is infeasible to meet the proposed PEL. OSHA describes tuckpointers and grinders as follows:

> Tuckpointers and other grinders work with masonry or concrete using hand-held tools fitted with rotating grinding blades, discs, or small drums. Tuckpointers are a subset of grinders who specialize in removing deteriorating mortar from between bricks and replacing it with fresh mortar. Other grinders use various grinding tools to smooth, roughen, or reshape concrete surfaces (including forming recesses or slots). This second group also includes workers who use hand-held power tools to remove thin layers of concrete and surface coatings, if present (e.g., performing small-scale spot milling, scarifying, scabbling and needle gunning).

PEA Chapter IV, IV-498.

Tuckpointing and grinding are common activities on construction sites and – as OSHA acknowledges – create significant challenges for construction employers in terms of controlling exposures to crystalline silica. OSHA's exposure profile demonstrates the difficulty of controlling exposures, with over 50 percent of tuckpointing and grinding samples registering at over 250 $\mu g/m^3$. Id. at IV-503.

While CISC believes that there are some potential issues with OSHA's analysis of tuckpointing and grinding, the CISC agrees with OSHA's conclusion that it is technologically infeasible to reach a level of 50 $\mu g/m^3$ for these job activities. In fact, when analyzing these activities, OSHA actually looks at non-ideal conditions, something that the CISC believes OSHA needs to do for all activities assessed.

After reviewing the various engineering and work practice control methods available to control silica exposures in tuckpointing and grinding, OSHA concludes that in certain instances, the proposed PEL can be met. Except, unlike with the other activities discussed in the analysis, OSHA goes on to state that this is only reliably found in ideal conditions, not what is faced by construction employers on a daily basis. Instead, "construction sites vary and generally include less-than-ideal conditions (e.g., overhead, curved surfaces, inner corners, substantial high or low spots, and outer edges where the shroud cannot be kept in full contact with the surface)." Id. at IV-515.

This is precisely the point that the CISC has been making in these comments. Whether an activity is capable of being done in construction must be analyzed in non-ideal conditions, which OSHA recognizes in this section is the case for construction. It is inexplicable why OSHA performs such an analysis here, and not elsewhere in the assessment.

The CISC is also concerned about introducing additional or greater hazards into the work environment with the controls suggested by OSHA in the technological feasibility analysis. Particularly with respect to tuckpointing, OSHA recognizes that it "is performed by multiple workers standing a few feet apart, often working from platforms and scaffolding." Id. at IV-498. In this type of environment, which "often" occurs, introducing wet methods, extensive dust control equipment, and electrical wiring may create potentially significant fall and other hazards that are real and should be assessed by the Agency in determining whether a particular control measure is technologically feasible in most operations most of the time.

Finally, as OSHA reworks its technological feasibility analysis, as with drywall finishing, the CISC asserts that OSHA must assess quality of work in determining whether an activity is capable of meeting the proposed PEL of 50 $\mu g/m^3$. With tuckpointing and grinding, the distance between the surface and the equipment is a major factor in determining the quality of the work performed. Use of shrouds and other LEV can impact this and reduce the quality of the job being performed.

12. Underground Construction Workers.

OSHA has also concluded that "Underground Construction Workers" can meet the proposed PEL in most of the operations most of the time. OSHA states that tunneling "accounts for most of the construction work performed underground and includes the construction and renovation of underground tunnels, shafts, chambers, and passageways." Id. at IV-520. OSHA's analysis does not demonstrate that OSHA's proposed PEL is feasible in all of the various operations involved in underground construction.

OSHA's analysis focuses on three different types of operations performed underground: (1) activities related to explosive blasting, (2) activities related to tunneling with rapid excavation machines, and (3) activities performed underground (such as grinding, drilling, etc., that are also performed above-ground). Id. at IV-520-521. After broadly separating the groups into these three areas for purposes of its analysis, OSHA later explains that it does not address the first and third groups identified. "For safety reasons, explosive blasting is performed when the tunnel is vacant, and reentry is allowed only after the exhaust systems clear the air." Id. at IV-520. Thus, OSHA determined there is no meaningful exposure to the first group of workers such that technological feasibility would be an issue. The CISC does not dispute this finding.

With respect to the third group, OSHA concludes that the feasibility of performing these tasks is addressed in the other sections of the technological feasibility analysis. OSHA states that the exposures when performing these tasks underground would generally be below that performed above-ground, but inside. Id. at IV-521. This is a result of the underground ventilation requirements otherwise mandated by OSHA pursuant to 29 CFR 1926.800. Id. In OSHA's view, if a worker is able to meet the proposed PEL in an inside construction working environment above-ground, the worker will be able to meet the proposed PEL in a worksite underground. Id. Because the CISC disagrees with OSHA that it has met its burden of showing technological feasibility with respect to those other tasks above-ground, the CISC disputes that OSHA has met its burden here.

Thus, OSHA does not separately analyze all aspects of underground construction. In fact, OSHA only analyzes activities related to tunneling with rapid excavation machines. And, even that portion of the analysis is extremely limited. ERG describes three different types of rapid excavation machines: road headers; construction miners; and tunnel boring machines TBMs). All three are configured differently and may serve different purposes.

- Road headers are configured for mobility and are used for short distances to cut around tunnel corners or refine hard rock tunnel shapes using cutting heads on a boom manipulated by the operator. The equipment configuration is similar to a tractor, with the single operator located in a cab or equipment-mounted platform. The road headers' pine-cone shaped cutting heads are notably smaller and remove rock at a substantially lower rate than a continuous mining machine or tunnel boring machine ("TBM"), but the crushing action of the road header cutting heads can generate fine rock dust more readily than the chipping action of TBMs.

- Continuous miners are also track-mounted, with a cab or platform for the single operator, and manually positioned exhaust ventilation. Continuous miners, however, are configured to remove large quantities of material rapidly (e.g., 12 tons of material in 45 seconds) using a rotating drum with teeth that is driven into a soft rock face.

- Tunnel boring machines come in a wide range of sizes and are designed to cut the entire tunnel face in one pass (a 20-foot diameter TBM is "not considered particularly large.") This extensively-used equipment is only minimally maneuverable and usually cuts a straight line or a slightly curved tunnel.

ERG Report, 3-99-3-100. A tunnel boring operation involves an operator of the machine – usually in an enclosed cab – and several "helpers" stationed around the machine to assist in the operation.

OSHA has decided in its technological feasibility analysis to focus only on tunnel boring machines. It does so without quantifying the extent to which tunnel boring machines are used in the industry, to the exclusion of the other machines discussed above. It also does so without explaining how tunnel boring machines can be used for all underground work and particularly the work of the road headers, which ERG states create a significant amount of very fine silica dust particles. Id. at 3-100.

In effect, OSHA does not analyze the technological feasibility of "underground construction workers." Instead, OSHA only analyzes the technological feasibility of using TBMs underground. That is a much different analysis. OSHA cannot rely on such a limited scope of activities in concluding that the proposed PEL of 50 $\mu g/m^3$ is capable of being done in most underground construction operations most of the time.

OSHA's technological feasibility analysis related to TBMs is also more limited, given the unique design of this equipment. TBMs are equipped, according to OSHA and ERG, with water sprays at the cutting source. Id. at 3-104. There is no discussion as to whether the other types of excavation machines are equipped with this technology.

The CISC appreciates that OSHA has had some difficulty getting data related to underground construction operations. Notwithstanding this, OSHA cannot summarily ignore aspects of the activities it is addressing in the technological feasibility analysis and then just conclude that it is feasible to reach the proposed PEL in most operations most of the time.

VI. OSHA Has Not Established That The Proposed PEL And AL Are Economically Feasible In Construction.

In addition to demonstrating technological feasibility, OSHA must also demonstrate that a new standard is economically feasible. A standard is economically feasible if the costs it imposes do not "threaten massive dislocation to, or imperil the existence of, [an] industry." United Steelworkers v. Marshal 647 F.2d at 1265 (internal quotation marks and citations omitted). To prove economic feasibility, "OSHA must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry, even if it does portend disaster for some marginal firms." As with technological feasibility, OSHA is not required to prove economic feasibility with certainty, but is required to use the best available evidence and to support its conclusions with substantial evidence in the rulemaking record. See id. at 1267; American Iron & Steel Inst. v. OSHA, 939 F.2d 975, 981 (D.C. Cir. 1991). A standard must also be cost-effective. OSHA is required to analyze a variety of options to effectuate the purposes of the rule and adopt the least costly option that will achieve the same level of protection. UAW v. OSHA, 37 F.3d 665, 668 (D.C. Cir. 1994).

As it did with technological feasibility, the CISC also carefully reviewed OSHA's estimated costs of the rule, the impact of those costs on construction employers, and OSHA's overall preliminary finding that the rule is economically feasible for the construction industry. The CISC retained Environomics, Inc. to examine the Agency's economic feasibility analysis. The key findings to date are summarized below. Further analysis and additional findings are provided in an appendix to these comments (Exhibit C). These findings will continue to be updated and submitted for the record at some date prior to the scheduled public hearings on the proposed rule. The CISC disagrees with OSHA's preliminary findings regarding economic feasibility.

A. Analytical approach.

In examining the Agency's economic analysis, Environomics performed (or is performing) the following work:

- Re-estimating the costs of the proposed rule, both for engineering controls (wet methods, LEV, etc.) and for the ancillary requirements based upon more accurate information and cost inputs and use of better analytical methodologies that more appropriately reflect the manner in which construction work is conducted and how the proposed regulation would affect the construction industry.

- Analyzing the economic impacts on construction industries if they were to face the compliance costs that are re-estimated, which are much higher than the costs OSHA has estimated. The Environomics economic impact assessment includes four components.

  - Comparison of annualized compliance costs for the large, aggregated construction industries that OSHA has identified (e.g., residential building construction) against estimated annual revenues and profits for these industries. In this work, Environomics is considering much more realistic estimates of construction industry revenues and profits, in contrast to OSHA's estimates that reflect the years 2000 through 2006 and thus completely miss the impacts of the recession and severe decline in construction activity;

  - Comparison of annualized compliance costs against revenues and profits for industries defined in a narrower manner than OSHA has considered (e.g., masonry contractors, concrete sawing and drilling contractors). These more narrowly-defined construction industries will be more directly and significantly affected by the proposed rule. There is no reason why the affected construction industries must be defined in only the grossly aggregated manner that OSHA has chosen;

  - Assessment of economic impacts for small and very small construction businesses; and

  - Evaluation of economic impacts on the construction industry from a fuller range of costs attributable to the proposed rule than OSHA has considered, including likely costs to the construction industry from the proposed General Industry standards (e.g., increased cost for construction materials produced by the to-be-regulated General

Industries, including concrete, brick, block, tile, stone, etc.); costs to the construction industry when the task specifications of Table 1 come to be adopted by the roughly 2.5 million self-employed individuals who perform construction work; and costs if the Mine Safety and Health Administration were to promulgate a PEL for the mining industry that matches that which OSHA is proposing (e.g., cost increases for construction raw materials such as cement, sand, gravel, clay, stone, etc.).

Based upon this analysis, there are several major problems with OSHA's cost analysis.

B. Failure to count and include in the cost analysis additional construction occupations.

OSHA has inexplicably omitted from the Agency's analysis of the economic costs and impacts of the proposed rule some 1.5 million workers in the construction industry who routinely perform dusty tasks on silica-containing materials. These workers – members of large construction trades such as plumbers and plumber helpers, roofers, electricians and electrician helpers, and including specialty trades such as plasterers and stucco masons and helpers and tile and marble setters – perform tasks identical or similar to those performed by occupations included by OSHA in the Agency's cost analysis such as bricklayers, concrete finishers and construction laborers. Together the additional occupations increase OSHA's base estimate of the affected construction workforce by nearly 50 percent.

Not only do workers in these additional occupations engage in some of the single tasks used by OSHA to identify other at-risk occupations (e.g., drilling holes in concrete or masonry to affix anchors as performed by carpenters), they are known to perform multiple silica-generating tasks during the course of their work day. For example, an electrician may both drill pass-through holes in masonry or other silica-containing construction materials using a hand-held drill and also open silica-containing wall, ceiling, and floor surfaces to install, repair or replace wiring, equipment, or fixtures.

On a first review of OSHA's cost analysis, it may appear that the Agency's selected tasks and occupations are intended only to be representative of the kinds of dusty work performed in construction. But no, OSHA intends its selective list to be exhaustive. OSHA has adopted a conceptual formulation that fails to capture the full extent of dusty tasks performed by construction workers and is deeply flawed for purposes of estimating at-risk employment, control equipment needs and their associated costs, as discussed below. The at-risk tasks performed by the additional occupations suggest a moderate increase of OSHA's overall estimate of at-risk FTE. However, when workers in the additional occupations are considered under more realistic assumptions than OSHA's about deploying tools, equipment and controls across the construction work force, the increase in the number of the construction workers resulting from the addition of these occupations greatly affects the estimated control costs and "productivity penalties" when these additional workers perform silica-generating tasks. Moreover, the numbers also result in proportional increases in the costs associated with the proposed program's ancillary requirements, which are driven largely by the size of the affected construction workforce.

C. OSHA's analysis focusing on FTE instead of workers results in drastically underestimating control costs involving equipment (LEV, wet methods, etc.).

By relying on highly unrealistic assumptions about control equipment deployment and use in the construction industry, OSHA grossly underestimates the costs of complying with the engineering requirements of its proposed rule. The Agency appears to believe that control equipment can be deployed in a precisely limited fashion exactly when, and only when, a workers actually engages in a dusty task, instead of making the appropriately controlled equipment available at all times when there is some possibility that a dusty task may need to be performed, as is routinely the case for workers in many construction occupations. According to the Agency, engineering control costs are incurred only while workers are actively engaged in dusty tasks, estimated by OSHA to average less than 20 percent of the time construction workers spend on the job.

This assumption would hold true only under two highly unrealistic conditions: i.e., employers know exactly when and where workers will engage in OSHA's at-risk tasks and employers have the ability to deploy and then instantly remove engineering controls to match the episodic nature of the silica-generating activities. Thus, perhaps without conscious intent, but in practical effect OSHA introduces us to the theoretical employer of a construction worker who can exactly predict when and where this employee will drill a hole in one or another type of silica-containing material. When the worker initiates the dusty task the appropriate control equipment immediately becomes available, and as soon as the task is completed, the employer instantly transfers the protective shroud and LEV used by the worker for his drill, and the HEPA vacuum used to clean up, to another worker in similar need, or back to the equipment rental service, which accepts the returned equipment for a rental charge reflecting only the precise amount of time that the worker used the control equipment to complete the drilling task.

In fact, construction crews who routinely engage in dusty tasks will need to have appropriately controlled equipment on hand and available virtually all the time, whenever there is a possibility that the job at hand requires them to perform the dusty task.

OSHA offers no evidence to suggest that the Agency, or more importantly, construction industry employers know when and where OSHA's estimated 636,000 work years of silica-generating construction activities will occur. Absent better information, the prudent employer will ensure that appropriate engineering controls must always accompany and be available for all construction crews who routinely engage in dusty tasks. The effect of this alternate, more realistic, assumption is reflected in the revised Environomics cost estimate.

D. Productivity penalties.

OSHA's estimates of the percentage losses in time, or productivity penalties, involved in conducting a task with controls (e.g., LEV or wet methods) relative to conducting the task without controls are based largely on the best professional judgment by OSHA's contractor. In contrast, the CISC has surveyed and received responses from more than 75 construction industry employers and specialty trade contractors regarding, among other topics, the productivity penalties that might be associated with performing silica-generating activities consistent with Table 1 specifications. The responses suggest some areas in which OSHA's estimated productivity penalties should be increased.

Additionally, though, the CISC survey results convey the clear message that OSHA's productivity penalty percentages, while perhaps analytically convenient for the Agency in estimating costs, do not accurately capture actual productivity losses in most work settings. In contrast to OSHA's simplistic overall percentages, productivity penalties have both a fixed and variable component. The fixed component, typically involving activities such as initial set-up and final clean-up of the control equipment, often occur at the beginning and end of a job or work shift. The variable component applies to losses that occur while the control equipment is in use. OSHA's method of estimating productivity penalties, i.e., multiplying the time spent on the silica-generating task by its productivity penalty percentage, strongly suggests that the Agency has focused mainly (if not exclusively) on the variable component. The actual percentage of time represented by the fixed component will depend on the duration of the job, or the number of set-up/clean-up cycles required over the duration of the job.

When required on a daily or other intermittent basis, set-up/clean-up becomes a variable cost. The CISC survey respondents reported that such activities typically require a significant time commitment – on the order of 30 to 60 minutes. When incurred daily, a thirty-minute activity represents a productivity penalty of six percent, and that figure does not include the additional variable penalty incurred while the control equipment is in use.

Using the example of a worker such as a carpenter drilling into silica-containing materials (e.g., concrete) for anchors demonstrates what OSHA's assumptions look like in the real world. According to OSHA, a carpenter spends an average of 4.8 minutes of his day (one percent of his time) performing this task. OSHA’s estimated labor productivity penalty when performing this task using appropriate controls (LEV for the drill and a HEPA vacuum to clean up the dust) is 2 percent of the task duration, or 4.8 minutes multiplied by 2 percent, which is a little less than six seconds per day. If the carpenter is on a ten-day job, the total productivity penalty that OSHA estimates totals less than 60 seconds, hardly enough time to even get the control equipment out of the truck and onto the job site, let alone set it up, use it, take it down, return it, and maintain it from job to job. The 60 seconds clearly accounts for at most perhaps some variable component of productivity loss when operating the LEV while drilling holes.

More significantly, the worker drilling the holes may be working on a one-day job. While his variable productivity loss may be only six seconds, the fixed cost, if even conservatively estimated at 15 minutes, would increase the total (fixed plus variable) daily loss from six seconds to over 15 minutes, or 150 times OSHA's productivity loss estimate.

Moreover, OSHA estimates such productivity losses only for labor, and not also for equipment. OSHA overlooks the fundamental production relationship between workers and the equipment they use in their work. That is, labor and equipment contribute together to the creation of what OSHA calls “project value”. OSHA acknowledges this bedrock understanding by defining Total Daily Project Value as the sum of Daily Labor Value and Daily Equipment Value. OSHA defines Daily Labor Value as the worker’s hourly wage multiplied by a standard eight-hour job shift. Similarly, Daily Equipment Value is defined by OSHA as a daily rental rate or daily fraction of an annual cost of ownership for the appropriately controlled equipment. Both labor and equipment are fully productive only when used together in a manner consistent with standard industry practice over the course of a standard job shift. If for any reason either labor or equipment is diverted from its usual productive use, neither contributes to project value and both experience productivity losses.

Stated differently, if due to a labor productivity loss, the labor time required to complete a job increases from eight hours to eight hours and 15 minutes, the equipment time required for job completion will also increase to eight hours and fifteen minutes. Additional equipment rental costs will be incurred for the additional fifteen minutes, or equipment owned by the employer will be delayed for use on another job by fifteen minutes. In either case the employer will have experienced a productivity loss equal to the productivity penalty multiplied by the Total Daily Project Value, not just the Daily Labor Value.

While labor intensity, or the fraction of total project cost representing labor costs, varies considerably across OSHA's at-risk tasks, its average is about 58 percent. This suggests that OSHA is underestimating productivity losses associated with performing tasks using the prescribed controls by an amount roughly equal to the average equipment intensity of about 42 percent.

In the draft estimates that Environomics has prepared for the costs of the proposed rule, the consultants have included the impact of some of these issues regarding productivity penalties, but have not included the impacts of others of these issues. At some point before the scheduled public hearings on the proposed regulation, Environomics will provide for the record an updated re-estimate of costs.

E. <u>OSHA's cost estimates for engineering controls do not reflect construction employers' inability to forecast accurately exactly which at-risk workers will be overexposed relative to a new PEL and when.</u>

OSHA estimates the costs for construction industry engineering controls by: 1) identifying appropriate control measures that can arguably reduce exposures to below the proposed PEL; 2) estimating the cost for a single worker at-risk of silica exposure to employ these control measures; and then 3) multiplying the cost per worker for the controls by the number of workers who would likely be overexposed relative to the new PEL in the absence of such controls.

While there is some logic to this approach, there is a question as to whether employers will be able accurately to distinguish the particular at-risk workers who will be overexposed when they perform a silica-generating task from the remaining at-risk workers who will not be overexposed when they perform the task. Whether a particular construction worker performing the at-risk task on a given day will or will not be overexposed is effectively unpredictable. The exposure information that OSHA has assembled shows that workers performing at-risk tasks (e.g., jack hammering, tuck pointing, sawing bricks or concrete blocks, drilling into masonry, etc.) are sometimes exposed above the PEL and sometimes below the PEL depending on numerous aspects of the task and environment that are exceedingly difficult to identify, understand and predict.

For example, the silica exposure that a jackhammer operator will incur over his work shift depends importantly on such factors as how much of the shift he spends jack hammering; whether the work is performed indoors or in other confined spaces or outdoors; the silica content of the material he is breaking up; whether the wind is blowing or not; whether he stands upwind or downwind of the dust he generates; whether it is raining or not; and so on. Many of these factors are not knowable in advance, and the exact impact of these factors on the worker's exposure cannot reliably be predicted in advance. As a result, the employer cannot be certain in advance of a jackhammer operator's work shift whether the employee is likely to be overexposed or not. The prudent employer and the prudent employee will want to use the exposure-reducing controls in all instances when the at-risk task is performed and overexposures could perhaps result if controls were not to be used. Indeed, this is the presumption inherent in Table 1 – whenever a construction worker performs a listed silica-generating task, he is expected to perform it in a manner consistent with the protective controls specified in Table 1.

Environomics recalculated OSHA's costs for engineering controls for the construction industry based upon the assumption that employers will need to adopt controls for <u>all</u> workers when they perform any of the construction tasks that OSHA identifies in Table 1. This is in contrast to OSHA's costing approach – seemingly contrary to Table 1 – in which the costs the Agency estimates to do all Table 1 tasks as the Table requires is then discounted to reflect the fraction of time that performance of the task, when assessed after the fact with perfect hindsight, would not have resulted in overexposure relative to the proposed PEL. Extending engineering controls to all workers performing at-risk tasks instead of only to the half or so, on average, that end up being overexposed relative to OSHA's exposure profile results in roughly doubling OSHA's cost estimate for engineering controls for the industry.

F. <u>OSHA underestimates the costs of the ancillary provisions.</u>

Environomics also believes that OSHA has underestimated the costs of the ancillary provisions for several reasons. First, the number of construction workers to whom the provisions will apply will be much higher than OSHA estimates. Second, OSHA has underestimated the unit costs for activities associated with many of the ancillary provisions in comparison to the cost experience that construction and other businesses have reported in the various industry surveys that have been conducted relating to this proposed rule. Third, OSHA's cost estimating methodologies do not, in some important respects, appear to match the specific requirements of the proposed regulation. For example, the requirement for reassessing workers' exposure whenever a "change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level", when read in the context of frequently varying construction work sites and durations for performing dusty tasks, would appear to require far more exposure assessments than those for which OSHA estimates costs. There are several additional reasons why OSHA's cost estimates for the ancillary provisions are too low.

G. <u>Environomics provisionally estimates the costs for the construction industry to comply with the proposed rule at between four and five times OSHA's estimate.</u>

The tables below show Environomics' cost estimates for the proposed rule (as of the date of filing of the CISC's pre-hearing written comments) and contrast these estimates with OSHA's.

Estimated Compliance Costs for Proposed Silica Regulation for Construction Industry
(in Millions of Dollars Annually)

	OSHA Estimate	Our Estimate (draft)
Engineering Controls	242.6	1,124.0
Program Costs	268.6	1,045.4
Total	511.2	2,169.4

Table 17
Total Estimated Costs by Industry
($ per year)

	OSHA Estimate			Our Estimate		
	Controls	Program Req'ts	Total	Controls	Program Req'ts	Total
Residential Building Construction	14,610,121	8,678,760	23,288,881	88,220,682	125,027,349	213,248,031
Nonresidential Building Construction	16,597,147	23,067,767	39,664,914	92,312,438	103,872,685	196,185,123
Utility System Construction	30,877,799	15,840,363	46,718,162	88,774,923	35,408,081	124,183,004
Land Subdivision	676,046	434,743	1,110,789	3,599,844	2,413,265	6,013,109
Highway, Street, and Bridge Construction	16,771,688	14,036,174	30,807,862	76,737,678	40,609,749	117,347,427
Other Heavy and Civil Engineering Construction	4,247,372	2,916,838	7,164,210	17,810,031	6,616,403	24,426,435
Foundation, Structure, and Building Exterior Contractors	66,484,670	149,422,541	215,907,211	228,638,370	350,635,214	579,273,585
Building Equipment Contractors	3,165,237	1,736,902	4,902,139	148,555,486	113,329,439	261,884,925
Building Finishing Contractors	34,628,392	15,630,847	50,259,239	156,254,322	123,804,421	280,058,743
Other Specialty Trade Contractors	43,159,424	24,844,554	68,003,978	136,602,039	73,978,568	210,580,607
State and Local Governments	11,361,299	11,976,934	23,338,233	86,510,382	69,707,663	156,218,045
Total	242,579,194	268,586,424	511,165,618	1,124,016,195	1,045,402,837	2,169,419,032

Finally, Environomics has noted that there are a variety of other costs that are missing from OSHA's cost estimates and these should be included when assessing the economic impacts of the proposed rule on the construction industry: 1) the likely cost increases for construction materials (concrete, bricks, block, tile, stone, etc.) that manufacturers of these materials will incur as a result of the General Industry portion of the proposed rule, of which some significant part will likely be passed on to the construction industry; 2) the likely cost increases that will result when the 2.5 million self-employed construction workers – not covered by the OSH Act and not considered by OSHA in the Agency's cost analysis – nevertheless begin to conduct dusty construction tasks consistent with the Table 1 specifications; and 3) the costs that will likely be passed on to the construction industry if MSHA adopts the proposed OSHA PEL for mining industries, and prices increase for construction raw materials such as cement, stone, sand, gravel, clay, etc.

VII. The Proposed Ancillary Provisions Are Not Reasonably Necessary And Appropriate To Effectuate The Purposes Of The Standard.

Once OSHA has established that a significant risk of harm exists and that the standard will substantially reduce that risk, OSHA has some leeway to include provisions in a rule that it believes are reasonably necessary and appropriate to effectuate the purposes of the standard. This leeway is not unbounded, however, and OSHA is not permitted to simply make-up provisions that it believes will help reduce risk.

As alluded to above, OSHA has proposed a standard that looks strikingly similar to previous health standards issued by the Agency both for construction and general industry.

Over the last several decades, OSHA has included certain provisions in virtually every health standard, such as exposure monitoring/assessment, housekeeping, medical surveillance, regulated areas, and so forth. OSHA has followed the script for the most part here, except for the inclusion of Table 1 for the construction industry.

The CISC has thoroughly reviewed the provisions of the proposal and discussed them in detail with participating coalition members. As explained fully below, many of the proposed ancillary provisions are not reasonably necessary and appropriate as applied to crystalline silica. These provisions may have been appropriate in past health standards, but the CISC respectfully believes that they are not appropriate here. The ancillary provisions are also unworkable in the construction industry for numerous and varied reasons discussed below. Each major ancillary provision included in the proposed rule is discussed below.

A. Exposure assessment (Proposed 29 CFR 1926.1053(d)).

One of the lynchpins of the proposed rule relates to exposure assessment. Under proposed paragraph (d)(1), each employer is required to assess the exposure of employees who are or may reasonably be expected to be exposed to respirable crystalline silica at or above the AL. The employer is required to determine the 8-hour TWA exposures on the basis of one or more air samples that reflect the exposures of employees on each shift, for each job classification, in each work area. In order to initially determine the 8-hour TWA exposures of employees, employers will be required to either: (1) perform initial monitoring of employees who are, or may reasonably be expected to be, exposed to respirable crystalline silica at or above the action level; or (2) fully implement the engineering controls, work practices, and respiratory protection specified in Table 1. Proposed 1926.1053(d)(2).

The requirement for assessing exposure to respirable crystalline silica in the proposed standard is nearly identical to requirements contained in other OSHA substance-specific health standards, such as asbestos or lead. See, e.g., 29 CFR 1926.1101(f) (Asbestos); 29 CFR 1926.1127(d) (Cadmium). While it may have made sense to include these exposure assessment provisions in those earlier health standards, the requirement that employers must conduct exposure monitoring that reflects the exposures of employees on each shift, for each job classification, in each work area, makes little sense with respect to respirable crystalline silica.

Unlike silica, occupational exposures to lead and asbestos are limited in two respects. First, there are specialty trades that remediate and remove asbestos and lead from a construction worksite in most instances, limiting the number of employees exposed to these materials, which in turn limits the number of employees requiring exposure monitoring. See 78 FR 56357 fn. 13 ("There are numerous instances of job reassignments and job specialties arising in response to OSHA regulation. For example, asbestos removal and confined space work in construction have become activities performed by well-trained specialized employees, not general laborers (whose only responsibility is to identify the presence of asbestos or a confined space situation and then to notify the appropriate specialist)".) Second, the use of lead and asbestos in construction materials has significantly declined over the last 20 years, again, limiting the number of employees exposed to these materials and requiring exposure monitoring.

As the CISC has repeatedly emphasized, silica is everywhere and found in nearly all construction materials and products. It is the second most abundant mineral in the Earth's crust and is the most common construction material in the world. Silica can be found in concrete, brick, gravel, stone, and tile, etc. and construction cannot occur in today's world without using materials that contain silica. In most instances, it cannot be substituted or engineered out of the products and materials that the majority of construction employees work with or near. Because of the ubiquitous nature of silica, nearly every employee who performs work on a construction worksite will work with or near a product that contains it, and nearly every employee could be exposed to respirable crystalline silica above the AL.

Moreover, respirable crystalline silica is in the ambient air naturally and thus, even when workers are not cutting, drilling, sawing, or otherwise manipulating the material, they potentially will be exposed to it above both the AL and even the PEL when they are on a construction worksite. Because of the abundant nature of silica in most construction products and the number of employees who are exposed to it, employers in the construction industry will be required to monitor significantly more employees than those required under other OSHA health standards. In fact, based on the current proposal, employers will be required to monitor nearly every employee who works on a construction site.[11]

Determining the exposures of employees on each shift, for each job classification, in each work area is simply not feasible in construction. Employees in the construction

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[11]As discussed above, OSHA's analysis of technological feasibility makes no finding that employers can reliably get below the AL on worksites, with the exception of drywall work with silica-free joint compound. There is no evidence that construction employers will somehow be exempt from the exposure assessment provisions based on their ability to get below an AL of 25 μg/m^3.

industry perform work on multiple locations and jobsites every couple of days or weeks and some even perform work on multiple jobsites per day. The materials used and the silica content of said materials are different on every project – for example, a granite countertop may be used in one home versus a quartz countertop in another, resulting in different silica levels and different levels of exposure for performing essentially the same work.

Even the same type of material may contain a different level of silica content depending upon where in the country the work is performed and the material is made. For example, in road construction, road materials in Texas are made of different materials and thus are likely to have different silica content than road materials in Washington, D.C. In addition, employees routinely perform different tasks depending on the project requirements and the materials and tools involved. It is rare for an employee to perform the exact same task from job to job or for multiple employees to perform the same tasks on a particular project.

Employees also have different levels of exposure depending on the location of the project, the materials used and the silica content of said materials used, whether the activities are performed indoors or outdoors, whether the activities are performed during summer, winter, or a rainy day, whether the wind is blowing and in what direction, and whether the employees are working on a multi-employer worksite. The list goes on and on. Thus, the exposure level of employees on each shift, for each job classification, in each work area could vary immensely on a given day or location or project. And, perhaps most fundamentally, a worker's exposure on any given work shift depends critically on the amount of time during that work shift that he spends performing the task or tasks that generate the respirable silica to which he is exposed. Consider the plumber who OSHA reports had the highest 8-hour TWA monitoring result among the Agency's exposure data samples for hand-held saw operators (PEA Chapter IV, IV-427). This plumber, monitored at an astoundingly high 14,150 $\mu g/m^3$ silica concentration, "used a hand-held saw to dry-cut slabs out of concrete bathroom floors indoors on each level of a 16-story building." The next day, we imagine, this plumber might have spent his entire shift installing replacement appliances at a site, working all day with copper and PVC piping and generating no silica dust at all. The day after that, he might have been on a remodeling job that required him to spend an hour in a basement sawing and cutting holes into concrete block walls to install new piping for a clothes washer, water heater, and drain line. This hypothetical, but not implausible, plumber, over three successive days, has spent 100 percent, zero percent and 12 percent of his shift performing a silica-generating task, and incurred corresponding silica exposures ranging from zero to one of the highest values in OSHA's entire database. What is this plumber's typical level of silica exposure? This examples demonstrates that the exposure level of employees on each shift, for each job classification, in each work area will often vary immensely and in a manner that cannot be predicted in advance on a given day or location or project.

At one point in OSHA's technological feasibility analysis, the Agency appears to recognize this dilemma. In its discussion of tuckpointing/grinding, OSHA describes a study conducted by Collingwood and Heitbrink (2007), which examined the effectiveness of shrouds and vacuums in controlling silica exposures during certain field trials. PEA Chapter IV, IV-513. The authors of the study concluded that while the proposed PEL of 50 $\mu g/m^3$ could not reliably be met with the control measures studied, the results suggested that with the controls fully implemented, a worker could perform the task with a respirator with an assigned protection factor of 10. Id.

In a footnote to this discussion, however, OSHA acknowledges the point the CISC is making here with respect to exposure assessment. Notwithstanding implementation of controls and respiratory protection, according to OSHA, employers will still need to continually perform exposure monitoring:

> Further exposure assessment will always be needed at the site to determine the correct level of respiratory protection, "as exposures will probably vary with worksite conditions such as wind and the extent to which the job is enclosed" (Collingwood and Heitbrink, 2007).

Id. Even OSHA admits that exposure monitoring in construction will need to be an ongoing exercise given the constantly changing conditions, environments, and work activities performed by construction workers.

The ASTM Standard recognizes the issues with performing exposure monitoring in the construction industry. Section X1.6.2 states:

> Given the dynamic nature of a construction site, it is generally recognized that obtaining timely and representative site-specific exposure monitoring for the tasks being performed is often impractical if not infeasible. Generally, the results of exposure monitoring would not be available until after operations involving the monitored exposure have been completed. Therefore, the employer would not be in a position to make use of the monitoring results to determine appropriate control measures for that task. In other cases, the workplace conditions in construction worksites vary to such a great extent that

> it would be difficult to accurately characterize employee exposure from one day to the next. For example, an employee may work: outdoors on a dry, windy day on day one; outdoors on a calm, humid day on day two; and in an enclosed environment on day three. Personal monitoring for crystalline exposure on a given day is not likely to accurately reflect these changing conditions.

Under the ASTM Standard (Section 4.2.7), an employer needs to perform exposure monitoring that is representative of the worker's customary activity instead of evaluating each workers' exposure level on each shift, for each job classification, in each work area. The ASTM language is more reasonable because it inherently recognizes that an employee's exposure would vary on any given day due to a multitude of factors and that an employer should attempt to understand the exposure levels when performing his/her customary activity.

Where several employees perform the same job tasks on the same shift and in the same work area, OSHA – in the proposed rule – will allow the employer to sample a "representative fraction of these employees." Proposed 1926.1053(d)(1)(iii). However, where employees are not performing the same job under the same conditions, OSHA notes that representative sampling will not adequately characterize actual exposures and individual monitoring will be required. Because employees rarely perform the same job under the same conditions on the same construction worksite much less perform the same job under the same conditions on different construction worksite, employers will typically not be able to sample a representative fraction of employees to determine the exposure level. As currently written, employers in the construction industry will be required to perform exposure monitoring for every employee on each and every worksite because of the variable nature of the construction industry and the exposure level of employees. OSHA simply has not considered or addressed this issue in the proposal.

Under proposed paragraph (d)(2)(ii), OSHA states that the employer may rely on historical data gathered within 12 months that meets the requirements in the proposed rule or objective data that demonstrates that respirable crystalline silica is not capable of being released in airborne concentrations at or above the AL under any expected conditions of processing, use, or handling.

Under other circumstances and – potentially for other health hazards – the CISC would not object to OSHA allowing employers to utilize historical and objective data in lieu of exposure monitoring. In fact, the CISC believes that – again under other circumstances – employers should be able to use historical data that is more than 12 months old if it accurately represents the exposure level of employees.

Of course, the emphasis above is on “other” circumstances. As these comments reflect, the variety of circumstances, environments, substrates, etc. that construction employers face every day make it almost impossible to rely on historical or objective data for compliance purposes.

Take the drywall finishing situation as an example. From the CISC’s perspective, a perfect instance to rely on objective data would be with silica-free joint compound. If a manufacturer asserts that joint compound has no silica, that should be something that an employer can reasonably rely on for compliance purposes. Except that OSHA’s own data suggests that an employer really cannot rely on that. As described above, OSHA found exposures of upwards of 100 μg/m^3 for a worker performing overhead sanding with silica-free joint compound. This is not only above the proposed AL, it is two-times above the proposed PEL. The CISC fears that an allowance to rely on historical and objective data will be meaningless in the industry.

Under proposed paragraph (d)(3), each employer will be required to perform periodic exposure monitoring if initial monitoring indicates that employee exposures are at or above the AL under either the fixed-scheduled or performance-based options. Under the fixed-schedule option, employers will be required to perform periodic monitoring either every three or six months depending upon the exposure level of their employees. Under the performance-based option, employers will be required to assess the exposure level of the employees on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures.

First, it should be noted that requiring periodic exposure monitoring if an employee’s exposure level is at or above the AL makes little sense given OSHA’s recognition that the OSHA Method ID-142 method only has a precision of ±23 percent at a working range of 50 to 160 μg/m^3 and that a study by SLTC found only a precision rate of ±19 and ±16 percent for quartz and cristobalite at 20 μg/m^3. The error increases by four to five percent for a full-shift sample taken at 25 μg/m^3 compared to one taken at 50 μg/m^3, and the error rate further increases as the sample reaches the limit of detection. This lack of precision at the proposed

AL makes the sampling results unreliable in determining whether an employee has been exposed at or below the AL.

Even OSHA found that current sampling methods do not allow for accurate measurements at the proposed AL of 25 µg/m^3 and below. In fact, OSHA acknowledges that the lack of precision of the analytical method precludes the Agency from proposing a PEL of 25 µg/m^3. If such measures cannot be accurately measured even by OSHA's own standard, it is unfair to require employers to continue to perform exposure sampling at this level.[12]

Second, the fixed-schedule option is not practical or feasible in the construction industry and it will increase costs exponentially. Requiring employers to perform periodic monitoring every three or six months is excessive and would require a significant amount of testing, especially when one considers the number of employees who would need to be monitored due to the variable nature of the construction industry. For example, one company in the CISC would be required to monitor at least 31 times per year under the fixed-scheduled option due to the number of employees engaged in silica-generating tasks and the expectation that exposures would be above the PEL even with engineering controls. Many employers, if not most, will need to hire an Industrial Hygienist to perform the sampling. The cost of a consultant can run as high as $1,500-$2,500, plus the cost of analyzing and testing each sample at approximately $100 per sample. As a result, this employer could have costs as high as $50,000.

Third, the construction industry needs additional clarity on the performance-based option to determine whether it would be effective and viable. OSHA does not indicate how often exposure monitoring should be performed or provide any guidance to the regulated community on when periodic monitoring should be conducted under the performance-based option. Rather, it merely states that the employer should assess the exposure to accurately characterize employee exposures to respirable crystalline silica. As stated above, the CISC believes this is essentially impossible.

Under proposed paragraph (d)(6), employers are required to notify each affected employee within five working days after completing an exposure assessment of the results of said assessment and, if the exposure is above the PEL, employers are also required to

[12] The CISC admits that this is probably an academic argument as it relates to construction, since – with just one exception – OSHA has not even preliminarily found that the AL can be met in construction for any of the analyzed activities. The CISC simply assumes that all construction employers will need to either perform exposure monitoring all the time or follow Table 1.

describe in the written notification the corrective action that will be taken to reduce employee exposure to or below the PEL.

For all of the reasons already discussed, this provision makes no sense. As an initial matter, it will be very difficult to comply with the five-day notification requirement due to the transient nature of the typical construction project and the transient nature of the workforce. Some employees are only hired for one project. Thus, by the time the employer gets the results of any exposure sampling, the employee may no longer work for the employer and the employer may not be able to locate or contact the individual affected employee. Moreover, it makes little sense to discuss the exposure results if the employees have moved onto an entirely new project with its own set of conditions and circumstances, where the exposures may be entirely different, even potentially below the PEL. Finally, many laboratories charge a premium for less than a five-day turnaround on sample analysis, making this provision an unnecessary economic burden on contractors.

It will also be exceedingly difficult in many circumstances to determine the corrective action that should be taken to reduce exposure within five days. Employers may be at a loss for how to improve their system and they may need to perform research, engage manufacturers, or experts in order to determine how employee exposures can be further reduced, particularly if they have now moved to a different jobsite with different exposures. The current five-day timeframe does not account for the time necessary to do these things or to engage in a thoughtful and careful analysis of the options, nor does it account for the time necessary to test the proposed corrective actions to determine their effectiveness before implementation.

In addition, any corrective actions may not apply to different jobsites and different projects, making the effort and time spent in coming up with corrective measures for a jobsite that no longer exists meaningless. The current time frame is unreasonable and many employers will simply not be able to meet this deadline despite their best efforts. This illustrates OSHA's misunderstanding of how the construction industry operates.

Proposed paragraph (d)(7) concerns observation of monitoring by employees or their designated representatives. Some of the requirements in this paragraph are misplaced with respect to crystalline silica. For example, under proposed paragraph (d)(7)(ii), the employer is required to provide the observer with protective clothing and equipment when observation of monitoring requires entry into an area where the use of protective clothing or equipment is required. Respirators will be required in all circumstances if an employer uses regulated areas, even if the employee or the designated representative is not at risk for exposures to respirable crystalline silica above the PEL.

This provision seems unnecessary given that the observer will not necessarily be close enough to the silica-generated tasks to pose a risk merely because he or she enters a regulated area. The size of the regulated area may be based on many factors outside of the breathable zone of respirable crystalline silica. Moreover, in order for an individual to wear a respirator, that person must receive a medical evaluation and be fitted for the appropriate respirator.

The CISC questions the benefit of requiring respirators and other PPE to an observer for a one-time exposure or even for a handful of exposures. OSHA's own risk assessment is based upon a 45-year working life and there is no literature or studies to suggest that merely observing exposure monitoring once or a handful of times would be harmful to the individual's health and require the use of a respirator or protective clothing. In addition, it is highly unlikely that the designated individual will need to be right next to the silica-generating tasks in order to observe the exposure monitoring even if the said individual is in the regulated area. Thus, as a result, there is little value in requiring said individuals to wear respirators in such circumstances. OSHA needs to better explain why such provisions are necessary.

Under paragraph (d)(8), OSHA asserts that employers may follow the requirements in Table 1 in lieu of performing employee exposure monitoring. Table 1 will need to be reworked significantly before the construction industry could support such a provision. (The CISC discusses Table 1 in greater detail below.)

B. <u>Regulated areas (Proposed 1926.1053(e)).</u>

OSHA requires the use of regulated areas or a written access control plan wherever an employee's exposure to respirable crystalline silica is, or can reasonably be expected to be, in excess of the PEL. Proposed 1926.1053(e)(1). First, it is not clear how the two options are different. Both provisions require work areas be demarcated and access to said areas be limited to essential personnel or designated employee representatives. Both provisions also require that employers provide protective clothing when there is a potential for employees' work clothing to become grossly contaminated. The only difference between the two appears to be that only one needs to be in writing and respirators are not absolutely required under a written access control plan but need only be provided and used where respirable crystalline silica exposures may exceed the PEL. OSHA needs to explain better the differences between the two options.

Second, OSHA has not defined what "reasonably expected" means or otherwise provided any clarity on when an employer should reasonably expect for an employee to be exposed over the PEL. Such subjective language is not enforceable and it will be fraught with compliance problems and, as a result, an employer will feel compelled to set up a regulated area or written access control plan in nearly all instances. What if the employer did not reasonably expect that an employee would be exposed in excess of the PEL, but monitoring showed that the employee was in fact exposed over the PEL? Can and will OSHA cite the employer under this provision?

OSHA has also not addressed the ASTM standard (Section 4.2.5) that limits the need for a written access control plan for areas where overexposures are persistent. This language is significantly more concrete than OSHA's proposed language requiring employers to create a written access control plan when an employer "reasonably expects" exposures to be above the proposed PEL. The ASTM standard also takes into account that a written access control plan should only be required when overexposures are persistent, and not for any given day when it may be possible for the employee to be exposed above the PEL due to the weather, silica content of the materials, or other conditions on one particular worksite.

Under paragraph (e)(2)(ii)-(iii), the employer shall demarcate regulated areas from the rest of the workplace in any manner that adequately establishes and alerts employees to the boundaries of the area and minimizes the number of employees exposed to respirable crystalline silica. Enforcing regulated areas is incredibly difficult on a multi-employer construction worksite, because not every individual or employee is under the control of the contractor putting up the regulated area and there is not a general contractor or controlling contractor present at all times on a construction worksite. The ASTM standard does not require the use of regulated areas.

Moreover, weather and wind can change silica exposure in many instances, requiring the employer to continuously evaluate the conditions in order to determine if the regulated area is properly designated or adjust the area to account for the changed conditions. An employer may need to change the regulated area every time the wind blows in a different direction because the boundaries of the area have changed. Employers simply will not be able to do this. The variables are compounded on a residential worksite because there is a higher variance of materials used and less zoning restrictions.

Under paragraph (e)(2)(iv), the employer is required to provide each employee and the employee's designated representative entering a regulated area with an appropriate respirator and require that they use the respirator while in the regulated area. Under this provision, OSHA is requiring the use of respirators even if an employee or a designated representative will not have exposures above the PEL simply because a regulated area has been designated. Not everyone who enters a regulated area will be exposed to respirable crystalline silica much less have exposures above the PEL. OSHA should seriously reconsider requiring the use of respirators in regulated areas unless it can be shown that the employee or designated representative will be exposed above the PEL. Moreover, as discussed above, OSHA needs to explain why respirators are required simply because an individual is observing the exposure monitoring once or a handful of times when the risk assessment is based upon a 45-year working life and not intermittent exposures.

Under paragraph (e)(2)(v), the employer is required to provide protective work clothing, at no cost to the employee, where there is the potential for employees' work clothing to become grossly contaminated with finely divided material containing crystalline silica. The employer is also required to ensure that such clothing is removed or cleaned upon exiting the regulated area and before respiratory protection is removed. OSHA does not provide any clarity on when there is a "potential" for the employee's work clothing to become grossly contaminated with crystalline silica. The potential that employees' work clothes will become grossly contaminated exists for nearly every job and every worksite. So, in practicality, employers will be required to provide protective clothing in nearly all circumstances.

OSHA asserts that "'[g]ross contamination' refers to a substantial accumulation of dust on clothing worn by an employee working in a regulated area such that movement by the individual results in the release of dust from the clothing." 78 FR 54651. On a construction worksite, clothes will naturally become dirty and covered in dust. Not all dust will be silica dust and visible dust on clothing is very unlikely to be respirable and would not be "finely divided materials." OSHA has made virtually no connection between visible dust on clothing and respirable silica exposures and there is no literature or studies to show that visible dust on clothing will significantly increase an employee's respirable silica exposure to a harmful level. OSHA has simply not explained why such a provision is necessary or likely to protect workers. Moreover, there are also circumstances where an employer may not be able to provide protective clothing – something that OSHA does not recognize or address in the proposed rule. For example, employees are not able to wear anything over fire retardant clothing. Additionally, the concern over the potential heat stress for construction workers wearing protective apparel in environments with elevated temperatures, such as working indoors, outside during the summer and fall months, or when employees are exerting a lot of energy. In the OSHA Fact Sheet on Protecting Workers from the Effects of Heat, OSHA has recognized that workers are at an increased risk of heat stress from protective clothing, especially from wearing semi-permeable or impermeable clothing, when the outside temperature exceeds 70° F or while working at high energy levels. Finally, OSHA recognizes that silica is neither a take-home hazard nor a dermal hazard, making this provision even more questionable.

OSHA asserts that the purpose of regulated areas is to ensure that the employer makes employees aware of the presence of respirable crystalline silica at levels above the PEL. In the CISC's view, providing required training of all employees potentially exposed to silica would be equally effective in making employees aware of the presence of respirable crystalline silica without all of the issues associated with regulated areas. The training would cover tasks where employees are likely to be exposed to silica as well as good housekeeping instruction to reduce risk, such as staying away from silica-generating tasks unless absolutely necessary and positioning one's body away from clouds of dust.

Under paragraph (e)(3), the employer can establish a written access control plan in lieu of a designated area. The written access control plan must contain a provision for a competent person to identify the presence and location of any area where respirable crystalline silica exposures are, or can reasonably be expected to be, in excess of the PEL and procedures for notifying employees of the presence and location of silica exposures and for demarcating such areas from the rest of the workplace. The written access control plan must also contain the methods the employer will use to inform other employer(s) of the presence and location of areas where respirable crystalline silica exposures may exceed the PEL and any precautionary measures that need to be taken to protect employees and provisions for limiting access to said areas. The written access control plan must further contain procedures for providing each employee and their designated representative entering an area where respirable crystalline silica exposures may exceed the PEL with an appropriate respirator and requiring them to use it.

Based on the nature of the construction industry, it is highly impractical for employers to create a written access control plan. A different access control plan would need to be created for each worksite and project because of the variable nature of the construction industry. A one-size-fits-all approach to the written access control plan would simply not work because each project is different, the materials and locations of the work are different, and the silica-generating tasks may be different. Simply put, the competent person will need to visit each worksite and come up with a different plan for each project and, then, he or she would need to put the plan in writing. This will take a significant amount of time and create additional costs for each job. These requirements and the costs would be especially difficult for small businesses.

The concept behind the use of regulated areas or a written access control plan is fundamentally flawed. These provisions restrict access to what OSHA believes are hazardous areas and not to hazardous exposures. These provisions should focus on reducing personal exposures to respirable crystalline silica. OSHA has not made the connection that restricting access to an entire regulated area is necessary to protect employees from personal exposures to respirable crystalline silica above the PEL. In lieu of regulated areas and a written access control plan, employers can instruct employees to stay out of work areas where dust is generated unless their presence is necessary and, if employees are required to work in areas where respirable silica dust may be generated, then employers could instruct employees to stay away from the clouds of dusts to the extent possible.

Because of the numerous problems with this provision, the CISC cannot support the use of regulated areas or a written access control plan.

C. Methods of compliance (Proposed 1926.1053(f)).

1. Hierarchy of Controls.

Under paragraph (f)(1), OSHA requires the use of engineering and work practice controls to reduce and maintain employee exposure to respirable crystalline to or below the PEL unless the employer can demonstrate that such controls are not feasible. OSHA asserts that the proposed rules establish a hierarchy of controls and employers must implement engineering and work practice controls as the primary means to reduce exposure to or below the PEL. If engineering and work practice controls are not sufficient to reduce employee exposure to at or below the PEL, the employer must supplement such controls with the use of respirators.

OSHA generally asserts that employers can substitute their use of silica containing materials with non-silica containing materials, use wet-cutting methods or dust collection systems, such as local exhaust ventilation, or enclose a work area to reduce silica exposure. There are, however, instances when one or more of these methods will not be available for a particular operation. For example, employees performing tile work on a rooftop cannot use wet-methods to cut tile because of the hazards associated with introducing water on a roof where the cutting is performed. If employees were to use wet-methods, then they could easily slip and fall or drop a tool, resulting in the employee or others getting hurt. Because of the danger associated with wet-cutting, California carved out an exception to its silica rule for roof tile operations[13]. In addition, attempts to use a dust collection system while cutting roof tile have been unsuccessful because such systems affect the precision of the cut and can make the tool cumbersome to use. In addition, an enclosure is similarly infeasible and impractical in this operation because it would be impossible to safely mount it on top of a roof. Moreover, a non-silica containing material is generally not available as a substitute for typical roof tiling.

OSHA indicates that employers can use substitution as a viable engineering control. However, it presents virtually no data or analysis on the effectiveness of substitutes in the construction industry – outside of some limited data for drywall finishers and abrasive blasting operations. Substitution makes little sense in the construction industry where nearly all construction materials and products contain silica. There is virtually no substitute for concrete, asphalt, brick, gravel, stone, granite, and/or tile – each of which contains silica. In most instances, silica containing materials cannot be substituted or engineered out of the products and materials that the majority of construction employees work with. An employer, for example, cannot tell a future home owner that they need to substitute the granite countertops that they requested for some non-silica containing material. Simply put, the construction industry is a service industry that works with the materials and products picked out by the clients – whether they are the owners of a commercial, high-rise office complex or a single-family home. In addition, OSHA recognizes that there may be additional health risk to workers associated with substituting a non-silica containing material for a silica containing material, which would bring about its own challenges and enforcement issues. For these

[13] T8CCR Section 1530.1. OSHA has failed to consider the Cal-OSHA rules and the exceptions provided in crafting this rule.

reasons, substitution is not a viable engineering control for nearly all construction activities and OSHA has not presented any data or analysis otherwise.

OSHA also indicates that process enclosures may be an effective engineering control. However, much like with substitution, OSHA presents virtually no data or analysis on the effectiveness of enclosures in the construction industry – outside of some limited data regarding abrasive blasting, heavy equipment operators, and rock crushing operators. Again, this engineering control is not suitable in the construction industry, where employees work on multiple locations and jobsites every couple of days or weeks and some even perform work on multiple jobsites per day. As a result, employees typically must carry from job to job all of the equipment and tools necessary to perform the work. Employees would be required to transport an enclosed cab from worksite to worksite and an employer would need to have a place to store it when it was not being used. OSHA has not considered the cost of loading and unloading and storing an enclosed cab for an employer. Moreover, the enclosed cabs are not typically effective in reducing respirable crystalline silica exposure at or below the PEL unless they contain a ventilation and air-conditioned system with a HEPA-filter or employees perform wet-cutting. Finally, equipment operators typically perform work in an open cab environment because much of the equipment (e.g., skid-steer loader) is not built with enclosures.

OSHA further indicates that ventilation through a local exhaust ventilation system and/or wet-cutting methods are effective engineering controls. However, each poses its own challenges that make them difficult to implement and such controls may not be available for all operations. For example, wet-cutting is ineffective when there is not ready access to water. On many new home construction projects, there is no running water in or around the worksite until very late in the construction process, right before occupancy when the water meter is installed. Thus, employers would be required to bring their own large tanks filled with numerous gallons of water or regularly stop work in order to find a ready water supply – both are costly and time consuming propositions. The use of wet-cutting methods for a remodeling home project is equally impractical if the cutting, for example, must be performed inside the home as such water could damage existing floors, drywall, or the home owner's possessions. In addition, using wet-cutting methods outside can create slurry that can flow into storm drains, potentially violating environmental regulations.

Moreover, using wet-cutting methods in winter has not been fully studied by OSHA for feasibility. There are many places within the United States, where the use of water, outside in the dead of winter, would not only be ineffective at reducing silica exposure because the water would immediately freeze but, also, because it could create pockets of ice that employees and others could slip on. Before OSHA asserts that wet-methods can be used for most operations, it needs to analyze the effective use of this method in winter for various types of operations across the country. If wet-cutting is not a feasible method for reducing silica exposure for three months out of the year for parts of the country, then OSHA should reconsider whether it is a feasible engineering control at all.

Finally, many tools are not equipped with a vacuum system and such systems typically require the use of a HEPA-filter in order to be effective. Such filters clog up very quickly because they filter particle dust that is significantly bigger than what is respirable and they need to be monitored and changed frequently. Moreover, when they get clogged, they are not effective at filtering the respirable dust, which in turn makes them less effective at reducing respirable silica exposure.

OSHA's endorsement of a hierarchical approach is premised on the notion that employees do not like to wear PPE or that such equipment may not be maintained or worn properly due to human error. But the same can be true about the engineering controls – one need only look to Table 1 as proof. Table 1 requires, for example, that employees change water frequently to avoid silt build-up in water, prevent wet slurry from accumulating and drying, and operate equipment such that no visible dust is emitted from the process. These controls are subject to human error too. Just like the respirators, all engineering controls will require some maintenance and upkeep. OSHA's concerns about PPE can be eliminated with proper training on the use and maintenance of respirators and enforcement of the respiratory protection standard.

OSHA's reliance on a hierarchy of controls approach also fails to take into account that the proposed rule will affect a highly diverse regulated population where a one-size-fits-all approach may not be the most productive and certainly will not be the most cost effective. In addition, the hierarchy of controls does not make sense if the employee is performing short, intermittent tasks that could result in high levels of silica exposure, but nevertheless are not done for more than a few minutes per day or a few times per year. In such circumstances, an employer will be required to implement engineering controls or be subject to a potential violation of the proposed rule, even if their employees are protected with the use of PPE. OSHA should reevaluate its approach to the hierarchy of controls as it relates to crystalline silica.

2. Housekeeping Requirements.

Under paragraph (f)(4), OSHA requires the employer to ensure that accumulations of crystalline silica are cleaned by HEPA-filter vacuuming or wet methods where such accumulation could, if disturbed, contribute to employee exposure to respirable crystalline silica above the PEL. Employees would also be prohibited from using compressed air, dry sweeping, and dry brushing to clean clothing or surfaces contaminated with crystalline silica, where such activities could contribute to employee exposure to respirable crystalline silica above the PEL. Proposed 1926.1053(f)(4)(ii).

OSHA does not explain or provide any clarity on when dry sweeping or dry brushing could contribute to employee exposures to respirable crystalline silica that exceed the PEL. The ASTM Standard (Section 4.4.3.2) certainly does not prevent the use of dry sweeping or dry brushing. OSHA also does not have any objective data showing that dry sweeping appreciably or significantly increases exposure of employees to respirable crystalline silica and it only has limited data in a few operations that prohibiting dry sweeping and dry brushing reduces an employee's exposure level to silica. Dry sweeping and dry brushing are intermittent, incidental tasks that only take a few minutes during the workday. Thus, it is not expected in most circumstances that such activities will significantly or appreciably contribute to employee exposures to respirable crystalline silica above the PEL. Despite this, OSHA prohibits their use.

Using wet methods is not an effective substitute for dry sweeping as introducing water during the construction process could damage many surfaces, such as door frames and drywall, and could lead to other problems, such as structural issues, indoor air quality degradation, and water intrusion leading to mold. OSHA's alternative to dry sweeping appears to be using vacuums equipped with a HEPA filter. A HEPA-filter vacuum will not be able to pick up anything beyond small dirt or dust particles and thus would be completely ineffective at picking up electrical wires, pieces of drywall, and other debris often found throughout a construction worksite.

Some projects also may not have access to an electrical source in order to run the vacuum and the HEPA-filters would need to be changed frequently in order for the vacuum to remain effective. Depending upon the size of the project and the location of silica-generating tasks, an employer may need to provide more than one vacuum. But more importantly, OSHA has not shown that these prohibitions will in fact reduce exposure to *respirable* silica.[14]

D. Table 1.

At the outset, the CISC wants to emphasize that it appreciates OSHA's attempt in Table 1 to craft a performance-based tool for use in the construction industry. The associations participating in the CISC have for some time urged OSHA to consider the unique aspects of construction work *vis-à-vis* silica exposures and, certainly, applauds OSHA for including Table 1 in the proposal.

Having said this, the CISC believes that Table 1 as proposed misses the mark for several reasons. First and foremost, as currently drafted, Table 1 is unworkable for most construction employers. Primarily, this is due to the "Notes" included in the "Engineering and work practice control methods" section of the Table. These Notes were not included in the SBREFA draft published over a decade ago, were not included in the draft given to ACCSH a few years ago, and are such that compliance with Table 1 becomes impossible. As a result, OSHA should reconvene a new SBREFA panel to provide feedback on this proposal and address the new concerns raised by a substantially revised Table 1.

The primary obstacle to compliance in the Notes relates to the requirement that there be "no visible dust" emitted from a process after the introduction of the engineering control methods. The CISC will testify that rarely – if ever – will there be absolutely no visible dust emitted from a silica generating activity with the use of wet methods or other engineering controls. To CISC's knowledge, OSHA has not examined the extent to which the control methods required under Table 1 will prevent visible dust from being emitted from the process. Our review of the PEA found virtually no discussion of this.

CISC member companies note that for certain types of tools, such as grinders and other hand-held pieces of equipment, it is impossible to perform the work with the tool flush against the surface being impacted. At times, there must be a gap and this will mean some visible dust is emitted, even if local exhaust ventilation or wet methods are utilized.

[14]The prohibition on dry sweeping and dry brushing may not be necessary in situations where an employer has applied a dust suppressant material on the floor to reduce silica exposures.

For employers using wet methods, even attempting to meet this standard will require a tremendous amount of water. Such large amounts of water runs counter to ERG's assessment that "minimal" water should be used to avoid issues of environmental contamination:

> Most of the other concerns associated with wet dust suppression methods relate to the need to transport water or collect water runoff. Both of these challenges are less significant when water usage rates are low. It is important to note that current research suggests that most wet dust control methods function optimally with minimal water. The optimal water delivery method typically involves a directional water mist sprayed at a modest rate. Specifically, Flynn and Susi (2003) reviewed several studies and suggest that half a gallon per minute (0.5 gallon/min) appears to be an appropriate water application rate for a hand-held masonry saw. In another report, NIOSH (2003EPHB 282-11a) finds that 350 milliliters (about 12 ounces) per minute is adequate to control dust from an impact drill. NIOSH notes that this amount of water dries rapidly without adding a substantial amount of water to the worksite. Some equipment, such as stationary masonry saws, may be purchased or retrofit with the manufacturer's basin and recirculating water systems, which requires a few gallons of water for a complete shift. In cases of drought where water usage restrictions could be in effect, local jurisdictions are likely to take a favorable view of the modest volumes needed for wet dust suppression methods.

ERG Report, 1-8. The Agency contends that construction employers can mitigate any environmental concerns by utilizing as little water as possible to prevent accumulations from occurring or potentially damaging residential or commercial buildings. Even if utilizing only a little water will effectively reduce exposures to below the proposed PEL, the CISC has significant concerns that it will prevent *any* visible dust from being emitted.

The requirement of "no visible dust" is so stringent that the CISC does not believe any construction employer will run the risk of relying on Table 1 for compliance. There are so many variables involved in controlling silica-generating activity that, on any given day, an employer could not guarantee that an activity will not generate at least a little visible dust.

Compliance with this specification is also made very difficult on a multi-employer worksite, where other employers are performing silica-generating activities. If one employer is conducting operations where visible dust is being emitted, perhaps because the employer has opted not to follow Table 1, it will be a significant challenge for an employer conducting operations alongside to demonstrate that its dust control measures did not emit any visible dust. In addition, subcontractor No. 1 will not necessarily know what subcontractor No. 2 is doing or how it chooses to mitigate its silica exposure.

The CISC is also confused with this specification as it relates to another requirement found in some operations in the Table. OSHA has proposed for the conduct of certain operations indoors, that employers following Table 1 "provide sufficient ventilation to prevent build-up of visible airborne dust." This requirement seems superfluous since in all situations visible dust must not be emitted from the process.

There are other ambiguities and vague terms used throughout the Table that the CISC respectfully asserts will eliminate Table 1 as a realistic compliance option:

- "Change water frequently to avoid silt build-up in water." This specification provides no guidance on how frequently water should be changed or what level of "silt build-up" is acceptable.

- "Ensure saw blade is not excessively worn." This specification provides no guidance on what "excessively" means.

- "Cab is maintained as free as practicable from settled dust." This specification provides no guidance regarding the terms "as free as practicable."

With the specifications included in Table 1 and the ambiguity that goes along with it, OSHA has unfortunately created a compliance option that no construction employer will follow. Even if an employer, for example, developed a protocol for replacing blades with excessive wear, it could still be subject to citation from a compliance officer if the compliance officer happened to hold a different view of the definition of the word "excessive." And this reality applies to all of the ambiguous terms included in the specifications in Table 1 of the proposal.

Much of Table 1 requires employers to implement either wet methods or local exhaust ventilation in order to be in compliance with its provisions. There are times, however, where the nature of the work or the environmental conditions make use of these control measures impossible. The CISC has already discussed difficulties associated with cold temperatures and introducing water into a construction environment. OSHA recognizes that water may not be able to be used in certain interior work. Introducing water can also create other hazards, such as cutting tile on roofs. CISC participating association members have identified other situations where the use of wet methods or LEV will not work:

- Selective demolition around or near operating electrical or other sensitive equipment such as “clean rooms” for computer operations.

- Specifications for cleaning/sealing concrete joints often require that no water be introduced to control the dust.

- Work when compacting pavers prevents the use of wet methods or vacuum systems.

- Grinding existing striping to be repainted on roadways.

- Drilling anchor bolts into a vertical face of a concrete surface.

- Removal of fire proofing on columns in refineries.

When a problem with complying with Table 1 arises, the CISC questions precisely how the standard applies. The proposed standard seems designed to have employers “pick” their compliance option up front and then presumably stick with that option. So, an employer would not conduct exposure monitoring if the employer made the decision to choose Table 1. But if a few months down the road, the employer encounters a worksite where Table 1 is not capable of being used, what is that employer’s responsibility with respect to exposure monitoring?

CISC participating association members have also raised a concern regarding the practical implementation of the “4-hour” specification in the Table. While the CISC appreciates what OSHA is trying to do by bifurcating the table by time spent on an activity, the reality is that contractors will be unable to keep precise track of the amount of time each worker has spent performing a particular task or tasks, such that compliance with Table 1 becomes a realistic option. Contractors currently do not – and the CISC believes will not – embark on complicated time-tracking of tasks to devise when a respirator is needed or when a respirator is not needed, particularly for workers who perform multiple different tasks included in Table 1 throughout the day. The problem occurs on both a prospective and retrospective basis. In many instances the employer will not know how much of his upcoming shift the employee will spend performing the task in question. Maybe the particular job will turn out to require more time spent performing the dusty task than expected, or maybe the job will require less. Or maybe the employer and employee will not have any idea at all in advance, which is common for construction workers who work at multiple new sites in a day, each posing work issues that are not knowable in advance. And, on a retrospective basis, how is the employer supposed to demonstrate and keep records for each day to the effect that one employee who did not wear a respirator only worked three and a half hours on the Table 1 task, while another employee who worked four and a half hours on the task did in fact use a respirator?

Table 1 also does not address short, intermittent tasks and, instead, lumps all tasks of 4 or less hours together.

In addition to the above, OSHA has decided to propose an extremely narrow "use" for Table 1. Table 1 is not a safe harbor for construction employers by any stretch. It is only utilized in lieu of exposure monitoring requirements. A construction employer who opts to utilize Table 1 is still on the hook to ensure that all exposures are below the proposed PEL. See Proposed Paragraph (f)(2) ("For the operations listed in Table 1, if the employer fully implements the engineering controls, work practices, and respiratory protection described in Table 1, the employer shall be considered to be in compliance with paragraph (f)(1) of this section. (NOTE: The employer must comply with all other obligations of this section, including the PEL specified in paragraph (c) of this section.).").

Perhaps the unworkability of OSHA's exposure assessment provisions in the construction environment will end up ultimately forcing construction employers to utilize Table 1. For this to happen, though, OSHA has to go back to the drawing board and create a new Table 1 with the following concepts in mind:

- Expand Table 1 to include additional tasks. In many ways, OSHA has mirrored Table 1 to its technological feasibility analysis. Broad tasks are set out, along with the engineering and work practice controls and respiratory protection. In the CISC's view, it is acceptable to put forth some broad tasks, but it also would be helpful to include more specifically-defined tasks in a revised Table. For example, the following would be specific tasks in specific circumstances that, if included in a table, could increase compliance: "concrete slab sawing (indoors)"; "concrete dowel drilling (outdoors)"; "sawing joints in concrete (outdoors)"; "overhead drilling"; and so forth. The table should also be expanded to include additional broad tasks not currently listed in Table 1, which can result in exposures exceeding the PEL when appropriate controls are not employed, such as mixing cement.

- Eliminate the heavy use of respiratory protection. As described above, OSHA's reliance on respiratory protection is analytically inconsistent with its position that it is technologically feasible to reach the proposed PEL in most construction operations most of the time, and particularly when the control measures specified in Table 1 are used. Requiring such heavy use of respirators in Table 1 will serve as a significant barrier to effective use of same. As OSHA recognizes, wearing respirators, particularly for long periods of time, is uncomfortable for employees. While the CISC appreciates that OSHA is taking a conservative approach with respect to employee protection here, the CISC respectfully asserts that in this situation OSHA has created a tool that will not be used by employers.[15]

- Eliminate the "Notes" in the Table. The "Notes" that are included in the Table are ambiguous, unworkable, and ultimately unnecessary. The CISC has described its concerns with the "Notes" and, as currently drafted, believes they will cause employers *not* to select Table 1 as a compliance option.

- Eliminate specificity regarding wet methods. Throughout the Table, OSHA relies heavily on the use of wet methods. Depending upon the task described, the method of water delivery differs. Thus, if a construction employer is using Stationary Masonry Saws, the employer must use a saw with an integrated water delivery system. If a construction employer is using a hand-operated grinder, the employer must use a "water-fed" grinder that continuously feeds water.

[15] Notwithstanding this, as described more fully in the "Respiratory Protection" section of these comments, the CISC does believe that there is a place for respiratory protection with respect to protecting employees from silica exposure. Namely, use of respirators for short durations and intermittent exposures is appropriate. What is not appropriate, however, is setting a PEL based upon an analysis that requires heavy respirator use.

The CISC believes that limiting the delivery of wet methods in this way may reduce the ability of certain contractors to use Table 1. If a construction employer finds a way to effectively deliver water through another mechanism, in the CISC's view that should be encouraged. In addition, the CISC is concerned that certain tools equipped with a water delivery system are so designed to cool the saw blades and not control dust emission.

In some instances which OSHA has not recognized, LEV can substitute effectively for wet methods in reducing employee exposures when wet methods have drawbacks and are inadvisable. Several construction companies have reported good success in using fans and air scrubbers in indoor settings when wet methods would be problematic.

- <u>Exempt Tasks of Short Duration</u>. OSHA only provides two time frames for compliance under Table 1 – when those tasks are performed under four hours and when those tasks are performed over four hours. There are many tasks such as overhead drilling that are rarely performed for more than a half-hour or so during a shift. Several construction trades will be "caught" by the Proposed Standard, because they perform Table 1 tasks (e.g., hole drilling into masonry), but they do so only occasionally and for only a small portion of a shift. The ASTM Standard (Section 4.4.1.3) specifically exempts controls provided for in its Tables 1-5 when employees are engaged in those tasks for 90 minutes or less.

Many of these suggestions go to a fundamental issue for the CISC – Table 1 must be simple and user-friendly or it will not be used. In the CISC's view, the more "Notes" that are included in the Table the fewer contractors will use it. To be sure, the CISC understands why OSHA has included all of the detail in the Table. OSHA wishes to set forth parameters on how engineering controls and work practices are actually carried out, in order to ensure that their protective qualities are being realized. If an employer is not correctly using wet methods, then the employer should not be able to rely on Table 1. The CISC understands that.

OSHA's concerns in that regard, however, must be balanced against the ambiguity and complexity in OSHA's Table 1. Having a Table that no one can or will use, does little to protect the safety and health of construction workers.

In addition to the above, the CISC provides the following additional comments on the engineering and work practice controls included in Table 1:

Operations	Engineering and work practice control methods	CISC Comments
Using Stationary Masonry Saws	Use saw equipped with integrated water delivery system. **Note:** Additional specifications: • Change water frequently to avoid silt build-up in water. • Prevent wet slurry from accumulating and drying. • Operate equipment such that no visible dust is emitted from the process. • When working indoors, provide sufficient ventilation to prevent build-up of visible airborne dust. • Ensure saw blade is not excessively worn.	• Many, if not most, stationary masonry saws with integrated water delivery systems are designed to keep the blade cool, and are not designed for dust suppression. In those situations, OSHA should clarify whether there needs to be a separate integrated water delivery system in addition to the system provided by the manufacturer to keep the blade cool. • OSHA does not explain why in this situation utilizing a separate wet method at the point of operation would not be acceptable. • It is not clear what "excessively worn" means and how it will be enforced.

Operations	Engineering and work practice control methods	CISC Comments
Using Hand-Operated Grinders	Use water-fed grinder that continuously feeds water to the cutting surface. OR Use grinder equipped with commercially available shroud and dust collection system, operated and maintained to minimize dust emissions. Collector must be equipped with HEPA filter and must operate at 25 cubic feet per minute (cfm) or greater airflow per inch of blade diameter. **Note:** Additional specifications (wherever applicable): • Prevent wet slurry from accumulating and drying. • Operate equipment such that no visible dust is emitted from the process. • When working indoors, provide sufficient ventilation to prevent build-up of visible airborne dust.	• Using a water-fed grinder may not be possible in situations where there is no established water main on site. • OSHA does not explain why employers can only use "commercially available" shrouds for hand-operated grinders, which eliminates specialty manufactured products. • OSHA states that the system must be operated to "minimize" dust emissions. However, this is inconsistent with the specification that <u>no</u> visible dust be generated. • For larger blades, it may be difficult to design and operate a system that pulls air flow at 25 cubic feet per minute per inch of blade diameter.
Tuckpointing	Use grinder equipped with commercially available shroud and dust collection system. Grinder must be operated flush against the working surface and work must be performed against the natural	• OSHA does not explain why employers can only use "commercially available" shrouds for hand-operated grinders, which eliminates specialty

Operations	Engineering and work practice control methods	CISC Comments
	rotation of the blade (*i.e.,* mortar debris must be directed into the exhaust). Use vacuums that provide at least 80 cfm airflow through the shroud and include filters at least 99 percent efficient. **Note:** Additional specifications: • Operate equipment such that no visible dust is emitted from the process. • When working in enclosed spaces, provide sufficient ventilation to prevent build-up of visible airborne dust.	manufactured products. • A significant portion of tuckpointing takes place at elevated locations on scaffolds. The CISC is concerned about the control measures listed introducing significant trip and fall hazards at elevated locations. • The saw cannot be operated flush against the surface when the grinder blade is inserted and removed at the start and finish of every cut, and there will inevitably be visible dust emitted at these times. • When grinding a mortar joint, the work can be performed against the natural rotation of the blade for the initial cut, but when the employee goes back to detail the joint he must move the grinder back and forth in short, deliberate motions in order to provide the quality finish that is needed.

Operations	Engineering and work practice control methods	CISC Comments
Using Jackhammers and Other Impact Drillers	Apply a continuous stream or spray of water at the point of impact. OR Use tool-mounted shroud and HEPA-filtered dust collection system. **Note:** Additional specifications: • Operate equipment such that no visible dust is emitted from the process. • When working indoors, provide sufficient ventilation to prevent build-up of visible airborne dust.	• There are situations where utilizing wet methods may raise quality issues, for example by introducing water to the base when pouring new concrete. • Unlike other operations in Table 1, in this instance OSHA does not state that the dust collection system needs to be "commercially available" or set the parameters for the functioning of the dust collection system. OSHA does not explain its rationale for the different treatment of these operations.
Using Rotary Hammers or Drills (except overhead)	Use drills equipped with hood or cowl and HEPA-filtered dust collector. Eliminate blowing or dry sweeping drilling debris from working surface. **Note:** Additional specifications: • Operate equipment such that no visible dust is emitted from the process. • When working indoors, provide sufficient ventilation to prevent build-up of visible	• Unlike other operations in Table 1, in this instance OSHA does not state that the dust collection system needs to be "commercially available" or set the parameters for the functioning of the dust collection system. OSHA does not explain its rationale for the different treatment of these

<table>
<tr><th>Operations</th><th>Engineering and work practice control methods</th><th>CISC Comments</th></tr>
<tr><td></td><td>airborne dust.
Use dust collector in accordance with manufacturer specifications.</td><td>operations.
Many hoods or cowls are not designed for dust collection, as described in Table 1.
Prohibiting use of blowing or dry sweeping may produce quality issues as holes need to be completely clear of debris (utilizing water as an alternative may introduce other quality issues).</td></tr>
<tr><td>Operating Vehicle-Mounted Drillings Rigs for Rock</td><td>Use dust collection system around drill bit and provide a low-flow water spray to wet the dust discharged from the dust collector.
Note: Additional specifications:
Operate equipment such that no visible dust is emitted from the dust process.
Half-mask respirator is to be used when working under the shroud.
Use dust collector in accordance with manufacturer specifications.
For equipment operator working within an enclosed cab having the following characteristics:
Cab is air conditioned and</td><td>Unlike other operations in Table 1, in this instance OSHA does not state that the dust collection system needs to be “commercially available” or set the parameters for the functioning of the dust collection system. OSHA does not explain its rationale for the different treatment of these operations.
It is more common to wet the drill bit for dust suppression when operating vehicle-mounted drilling rigs for rock, as</td></tr>
</table>

Operations	Engineering and work practice control methods	CISC Comments
	positive pressure is maintained. • Incoming air is filtered through the prefilter and HEPA filter.	opposed to using dust collection systems. • Few, if any, machines are equipped with cabs with the parameters specified. This serves as a significant obstacle to use of Table 1 by contractors.
Operating Vehicle-Mounted Drilling Rigs for Concrete	Use dust collection system around drill bit and provide a low-flow water spray to wet the dust discharged from the dust collector. **Note:** Additional specifications: • Use smooth ducts and maintain duct transport velocity at 4,000 feet per minute. • Provide duct clean-out points. • Install pressure gauges across dust collection filters. • Activate LEV before drilling begins and deactivate after drill bit stops rotating. • Operate equipment such that no visible dust is emitted from the process. • Use dust collector in accordance with manufacturer specifications. For equipment operator working within an enclosed cab having the	• Unlike other operations in Table 1, in this instance OSHA does not state that the dust collection system needs to be "commercially available" or set the parameters for the functioning of the dust collection system. OSHA does not explain its rationale for the different treatment of these operations. • It is more common to wet the drill bit for dust suppression when operating vehicle-mounted drilling rigs for rock, as opposed to using dust collection systems. • There is no explanation provided for why there are additional specifications

Operations	Engineering and work practice control methods	CISC Comments
	following characteristics: • Cab is air conditioned and positive pressure is maintained. • Incoming air is filtered through a prefilter and HEPA filter. • Cab is maintained as free as practicable from settled dust. • Door seals and closing mechanisms are working properly.	when using drilling rigs on concrete, as opposed to rock. • Few, if any, machines are equipped with cabs with the parameters specified. This serves as a significant obstacle to use of Table 1 by contractors.
Milling	For drivable milling machines: Use water-fed system that delivers water continuously at the cut point to suppress dust. **Note:** Additional specifications: • Operate equipment such that no visible dust is emitted from the drum box and conveyor areas. For walk-behind milling tools: Use water-fed equipment that continuously feeds water to the cutting surface. OR Use tool equipped with commercially available shroud and dust collection system. Collector must be equipped with a HEPA filter	• Using a water-fed system may not be possible in situations where there is no established water main on site. • With respect to dust collection, in this operation, OSHA uses a performance-oriented approach to the effectiveness of the system, as opposed to setting forth specific parameters of flow rate. OSHA does not explain why it has taken a different approach to this issue.

Operations	Engineering and work practice control methods	CISC Comments
	and must operate at an adequate airflow to minimize airborne visible dust. **Note:** Additional specifications: • Use dust collector in accordance with manufacturer specifications including airflow rate.	
Using Handheld Masonry Saws	Use water-fed system that delivers water continuously at the cut point. OR Use saw equipped with local exhaust dust collection system. **Note:** Additional specifications: • Prevent wet slurry from accumulating and drying. • Operate equipment such that no visible dust is emitted from the process. • When working indoors, provide sufficient ventilation to prevent build-up of visible airborne dust. • Use dust collector in accordance with manufacturer specifications.	• Unlike other operations in Table 1, in this instance OSHA does not state that the dust collection system needs to be "commercially available" or set the parameters for the functioning of the dust collection system. OSHA does not explain its rationale for the different treatment of these operations. • OSHA does not explain why in this situation utilizing a separate wet method at the point of operation would not be acceptable. • There are situations – installing pavers – where wet methods cannot be

Operations	Engineering and work practice control methods	CISC Comments
		used for quality reasons. • Many handheld masonry saws are used at heights and, thus, introducing water or LEV systems may create greater hazards of falls, etc.
Using Portable Walk-Behind or Drivable Masonry Saws	Use water-fed system that delivers water continuously at the cut point. **Note:** Additional specifications: • Prevent wet slurry from accumulating and drying. • Operate equipment such that no visible dust is emitted from the process. • When working indoors, provide sufficient ventilation to prevent build-up of visible airborne dust.	• Using a water-fed system may not be possible in situations where there is no established water main on site. • Many, if not most, saws with water-fed systems are designed to keep the blade cool, and are not designed for dust suppression. In those situations, OSHA should clarify whether there needs to be a separate integrated water delivery system in addition to the system provided by the manufacturer to keep the blade cool.
Rock Crushing	Use wet methods or dust suppressants OR Use local exhaust ventilation	• Unlike other operations in Table 1, in this instance OSHA does not state that the dust collection system

Operations	Engineering and work practice control methods	CISC Comments
	systems at feed hoppers and along conveyor belts. **Note:** Additional specifications • Operate equipment such that no visible dust is emitted from the process. For equipment operator working within an enclosed cab having the following characteristics: • Cab is air conditioned and positive pressure is maintained. • Incoming air is filtered through a prefilter and HEPA filter; • Cab is maintained as free as practicable from settled dust; and • Door seals and closing mechanisms are working properly.	needs to be "commercially available" or set the parameters for the functioning of the dust collection system. OSHA does not explain its rationale for the different treatment of these operations. • Few, if any, machines are equipped with cabs with the parameters specified. This serves as a significant obstacle to use of Table 1 by contractors.
Drywall Finishing (with silica-containing material)	Use pole sander or hand sander equipped with a dust collection system. Use dust collector in accordance with manufacturer specifications. OR Use wet methods to smooth or sand the drywall seam.	• Even "silica-free" joint compound contains a small amount of silica, so as drafted, this would apply to all drywall finishing. • Using pole sanders or hand sanders equipped with dust collection system cannot be used in certain circumstances (in tight

Operations	**Engineering and work practice control methods**	**CISC Comments**
		spaces, etc.) or may result in quality issues. • Wet methods cannot be used in certain circumstances due to quality issues and concerns of introducing water into certain environments.
Use of Heavy Equipment During Earthmoving	Operate equipment from within an enclosed cab having the following characteristics: • Cab is air conditioned and positive pressure is maintained; • Incoming air is filtered through a prefilter and HEPA filter; • Cab is maintained as free as practicable from settled dust; and • Door seals and closing mechanisms are working properly.	• Few, if any, machines are equipped with cabs with the parameters specified. This serves as a significant obstacle to use of Table 1 by contractors. • HEPA filters will typically not last an entire shift. • "Positive Pressure" requirement would restrict safe operations because it would not allow doors and front and top windows to be opened during operation which would limit visibility of work zone and restrict oral and visual communication.

As the rulemaking progresses, the CISC will continue to analyze Table 1 and its potential use as a compliance option for contractors. Whatever the Agency does with respect to Table 1, however, it must be based on sound data, that is proven to control exposures, and will be workable in the range of activities on construction sites.

E. Respiratory Protection (Proposed 1926.1053(g)).

Paragraph (g) of the proposed rule sets forth the requirements for respiratory protection. Paragraph (g) states that respiratory protection is required (1) where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls; (2) where exposures exceed the PEL during work operations for which engineering and work practice controls are not feasible; (3) during work operations 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; (4) during periods when the employee is in a regulated area; and (5) during periods when the employee is in an area where respirator use is required under a written access control plan. 78 FR 56499-56500. In addition, the proposal states that where respirator use is required, the employer must follow all applicable requirements of 29 CFR 1910.134. Id. at 56500.

In the course of these comments, the CISC has expressed certain concerns with the Agency's approach to respiratory protection in the proposal. The heavy reliance on the use of respirators in Table 1 demonstrates in the CISC's view that reaching a PEL of 50 $\mu g/m^3$ is not technologically feasible in most operations most of the time.

On a different level, the heavy reliance on respiratory protection in Table 1 will place a significant burden on employees. The majority of tasks included in the Table require some form of respiratory protection, and several would require respiratory protection even if performing the tasks for less than an hour. The vast majority of construction employees will thus be in some form of respiratory protection for much of their workshifts.

While heavy use of respiratory protection in Table 1 is the wrong approach in the CISC's view, there is a place for respirators in a silica rule that OSHA does not recognize. For short duration tasks that are performed intermittently on a job site, OSHA may wish to consider placing respiratory protection at the same level as engineering and work practice controls with respect to the hierarchy of controls, as the CISC suggests above. Admittedly, this would constitute a deviation from OSHA's past practice, but OSHA should consider this here given the unique aspects of construction worksites *vis-à-vis* crystalline silica.

F. Medical Surveillance (Proposed 1926.1053(h)).

Under proposed paragraph (h)(1), OSHA requires that employers provide medical surveillance, at no cost to the employee, and at a reasonable time and place, for each employee who will be occupationally exposed to respirable crystalline silica above the PEL for 30 or more days per year.

Medical surveillance is impractical in the construction industry as it relates to crystalline silica, in light of the transient nature of the workforce, the turnover rate in the construction industry, and the extent to which employees are exposed to at least some level of silica in the construction environment. As OSHA acknowledges, the construction industry has a 64 percent turnover rate. Many of these individuals will continue to work in the same trade but for a different employer within the construction industry where they will likely be exposed to respirable crystalline silica above the PEL at least 30 or more days per year. As a result, many employees could be subject to medical surveillance multiple times a year. Under the proposed paragraph, the new employer will be required to pay for medical surveillance unless the employee happens to have his previous records and supplies them to his new employer or the new employer is able to get the information from the previous employer. All of this is highly unlikely.

In addition, OSHA does not address how an employer is supposed to know whether its employees will be exposed over the PEL for at least 30 days per year unless the employer is following Table 1. If exposure monitoring indicates that employees were above the PEL on one project must an employer assume that the employees would be above the PEL for 30 days or more? How will OSHA prove that employees should have received medical surveillance because they were exposed above the PEL for more than 30 days a year? OSHA needs to provide further clarity and guidance on this issue.

OSHA asserts that the purpose of medical surveillance is, among other things, to determine if an individual can be exposed to respirable crystalline silica in his or her workplace without experiencing adverse health effects. 78 FR 56468. And OSHA notes that the proposal is consistent with Section 6(b)(7) of the OSH Act. Id. Having said that, it is not clear how medical surveillance will reduce exposures to respirable crystalline silica. Many individuals within the construction industry, especially those performing silica-generating tasks, tend to be young and most have not been in the industry for 45 years – the working life assumed under the risk analysis for this proposed rule. Due to the latency period of silicosis and other lung diseases, workers do not start to show signs of the disease until they have been exposed to respirable crystalline silica for decades. Young and new workers to the industry are unlikely to develop or show any signs or symptoms of the disease for decades, if ever – as the CDC data shows. OSHA has not explained why medical surveillance is necessary for many individuals – particularly when they are first starting in the construction industry – when it is unlikely a chest X-ray or other physical examinations will show any signs of silicosis or lung disease, and may even show a false positive response. Furthermore, many employees do not typically spend 20 years or more working full-time in silica-generating jobs; rather, many employees move up the ranks, becoming a foremen, supervisor, project manager, etc. where their silica exposure is significantly reduced.

If OSHA decides to adopt this provision, it should consider whether medical surveillance should be limited to employees who have been exposed to respirable crystalline silica over the proposed PEL for a certain period of time (e.g., over 20 years), where the risk of silicosis or other silica-related diseases is potentially greater and the chance for detection may be more likely or definitive, or it should consider whether medical surveillance should begin only after a medical event such as the diagnosis or onset of disease, as a result of silica-related exposure.

It is also not clear what an employer and employee are supposed to do if an employee does show early signs of silicosis or a lung disease, especially if the employer has already implemented necessary engineering and work practice controls and respirator use. There is no medical removal requirement in the rule and, if the employer were to remove someone from the working environment, it could be exposing itself to potential liability under other employment laws and regulations.

In addition, there is the potential that employers will refuse to hire individuals who are classified as 1/0 or higher on their chest X-ray because of the potential workers' compensation or private civil ligation liability that they could be exposed to in the event they hire the individual and the disease progresses. The employer will be faced with the decision to hire a worker and face the potential liability that may come from further exposing a susceptible worker to respirable silica or not hire the individual and be subjected to a claim under other employment statutes and regulations.

Under proposed paragraph (h)(2), the employer must provide an initial (baseline) medical examination within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of this section within the last three years. And under paragraph (h)(3), the employer must also provide a periodic examination at least every three years, or more frequently if recommended by the physician or licensed health care provider ("PLHCP"). The medical examination must include a medical and work history; a physical examination; a chest X-ray interpreted and classified according to the International Labour Organization ("ILO") International Classification of Radiographs of Pneumoconioses by a NIOSH-certified "B" reader; a pulmonary function test, administered by a spirometry technician with current certification from a NOISH-approved spirometry course; and testing for latent tuberculosis.

OSHA has not provided any reasoning for why it is not following the ASTM standard (Section 4.6.1), which requires medical surveillance for workers with actual or anticipated exposures to respirable crystalline silica at concentrations that exceed the occupational exposure limit (of 250 μg/m³) for 120 days or more. The timeframe established in the ASTM standard is more reasonable as it reduces the need to provide medical surveillance to those employees who have quit and moved on to another employer after a few weeks of employment. In the CISC's view, OSHA must explain why a 120-day proposed timeframe would not be more reasonable than the approach set forth in the proposed rule. OSHA also needs to explain how the additional 90 days (the difference between the ASTM standard and OSHA's proposal) is likely to increase the health and safety of workers.

Requiring the chest X-ray to be interpreted and classified according to the ILO International Classification of Radiographs of Pneumoconioses by a NIOSH-certified "B" reader is impractical and will be difficult to implement. As OSHA recognizes, there are only 242 certified B readers in the United States, as of February 12, 2013. 78 FR 56470. Those 242 certified B readers would be required to review and interpret 454,000 exams (assuming that OSHA's numbers are accurate). That is 1,876 chest X-rays for every B reader (assuming that each B reader is still active). The B reader would be required to review more than five chest X-rays per day, every day for the entire year. To say that there is likely to be a significant backlog of chest X-rays that need to be reviewed and interpreted by a NIOSH-certified B reader is an understatement.

In addition, OSHA does not address ASTM's and others concerns that there is a lack of evidence that routine spirometry testing is useful for detecting early stages of respirable crystalline silica-related disease and that most abnormalities detected by spirometry screening are not related to respirable crystalline silica-related diseases but rather to factors such as smoking and non-occupationally related diseases. OSHA has not presented any evidence or data to address these concerns. Before requiring spirometry testing, OSHA needs to address the very legitimate concerns raised by ASTM and others that such testing is not useful in detecting silica-related disease.

Finally, OSHA has not explained why periodic medical examinations are needed every three years or more frequently if recommended by a PLHCP. OSHA has not presented any data or evidence that shows that periodic medical examinations every three years versus every five years or versus any other period significantly protects workers or detects more cases of silica-related disease. OSHA merely asserts that "[b]ased on the Agency's experience, OSHA believes that surveillance every three years would strike a balance between the need to diagnose health effects at an early stage and the limited number of cases likely to be identified through medical surveillance." 78 FR 56471. The CISC respectfully asserts that OSHA must explain why an examination every three years is reasonably necessary and appropriate, not simply state that the number seems to strike a good balance and is consistent with what other organizations have recommended.

Under proposed paragraph (h)(5), the employer must obtain a written medical opinion from the PLHCP within 30 days of each medical examination performed on each employee. The written opinion shall contain: (A) a description of the employee's health condition as it relates to exposure to respirable crystalline silica, including the health care provider's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica; (B) any recommended limitations upon the employee's exposure to respirable crystalline silica or upon the use of personal protective equipment; (C) a statement that the employee should be examined by an American Certified Specialist in Pulmonary Disease if the chest X-ray provided in accordance with this section is classified as 1/0 or higher by the "B" reader, or if referral to a pulmonary specialist is otherwise deemed appropriate by the health care provider; and (D) a statement that the health care provider has explained to the employee the results of the medical examination, including findings of any medical conditions related to respirable crystalline silica exposure that requires further evaluation or treatment, and any recommendations related to use of protective clothing of equipment.

The CISC understands the overall need for a written opinion to be provided and that OSHA has historically included this requirement in its health standards, although it questions the employer's role in providing such information to an employee or another medical provider. However, in this rule, OSHA has not provided any data or evidence to support its requirements that an employee must be examined by an American Certified Specialist in Pulmonary Disease if the chest X-ray provided is classified as 1/0 or higher by the B reader, which is how the CISC interprets the proposed rule *vis-à-vis* proposed paragraphs (h)(5) and (h)(6). What medical evidence does OSHA have to show that a pulmonary specialist is absolutely necessary at this stage? Furthermore, OSHA has not adequately explained why it is deviating from the ASTM standard (Section 4.7.1), which recommends examination by a pulmonary specialist of workers with profusion opacities greater than 1/1.

G. Hazard Communication/Training (Proposed 1926.1053(i)).

Under paragraph (i)(1), the employer must include respirable crystalline silica as part of the requirements under the Hazard Communication Standard, 29 C.F.R. § 1910.1200. Under this provision, employers would be required to provide access to labels, safety data sheets, and employee information and training, as well as discuss the following hazards with employees: cancer; lung effects; immune system effects; and kidney effects.

The CISC generally supports the requirement that employers must make labels and safety data sheets readily available to employees when they have been created for a particular product or material. The Hazard Communication standard requiring a warning label for substances that contain more than 0.1 percent crystalline silica could be problematic. There are a lot of materials being used in construction that may contain only small or trace amounts of silica, such as caulking, fires stop material, and dry wall. The CISC questions how other building materials such as concrete, bricks, blocks, sand, or dirt would be labeled.

The CISC, however, does not support the requirement that employers must discuss the alleged cancer, immune system effects, and kidney effects of exposure to respirable crystalline silica with employees as OSHA has not met its burden of showing a link between these diseases and exposure to crystalline silica in the construction industry.

Under paragraph (i)(2), the employer is required to ensure that each affected employee can demonstrate knowledge of: (A) specific operations in the workplace that could result in exposure to respirable crystalline silica; (B) specific procedures the employer has implemented to protect employees from exposure to respirable crystalline silica, including appropriate work practices and use of personal protective equipment; (C) the contents of this section; and (D) the purpose and a description of the medical surveillance program.

The CISC also supports the requirement that employees be trained on the specific operations that would result in exposure to respirable crystalline silica and the methods implemented by employers to reduce said exposure, including appropriate work practices and the use of personal protective equipment. Providing comprehensive training on these items is an effective means of protecting employees. In addition, the CISC supports the requirement that employers provide employees with an opportunity to ask questions of a qualified person during training. The CISC would also agree to document that training has been received and that employees have demonstrated knowledge of said training. Finally, the CISC supports the performance-oriented basis for this requirement and OSHA's recognition that employers are in the best position to determine how their employees will be trained.

H. Recordkeeping (Proposed 1926.1053(j)).

Under paragraph (j)(1)-(j)(2), OSHA requires that employers maintain exposure monitoring results and objective data used or relied on to characterize employee exposure to respirable crystalline silica in accordance with 29 C.F.R. § 1910.1020. Under paragraph (j)(3), OSHA requires that employers establish and maintain an accurate record for each employee's medical surveillance in accordance with 29 C.F.R. § 1910.1020. These records must be made available to an employee or designated employee representative.

The construction industry generally supports the need to keep records but believes that 30 years is excessive.[16] With the constantly changing work environment in the construction industry, basic compliance is a challenge with respect to keeping certain documentation. In the case of crystalline silica, such records will not be useful in analyzing the exposure levels of employees on a different worksite under different conditions – especially on a different worksite 30 years into the future. Such records will also not be

[16] The construction industry does not support the requirement that the employee's social security number must be included on the exposure monitoring results. Due to identity theft concerns, employers and employees are reluctant to include this information when not absolutely necessary. Why does the social security number need to be included? Requiring a social security number would increase the cost of storing this data as the information would need to be stored in a locked cabinet or under encryption software and the potential for liability if said information was stolen or accidentally disclosed. OSHA should reconsider this requirement or better address why this information is necessary.

useful in light of the advancements in tools and work practice methods likely to occur for reducing exposure to respirable crystalline silica in the future.

It is also not clear how these records will protect employees. Employers will not use old records to address overexposures because they are already required to come up with a plan for addressing overexposures within 5 days of obtaining results under the current proposal.

Furthermore, it is not clear how OSHA will enforce this provision if a 29 year old record is lost or misplaced. OSHA needs to explain when a citation will be issued for violations of this provision.

Finally, due to the transient nature of the workforce and the high turnover rate – 64 percent as shown by BLS data – the need to keep these records for 30 years would result in a voluminous amount of records that an employer would need to maintain and store. The employer would have an obligation to protect the employee's medical records under the Medical Records Privacy Act, which would increase the cost of storing and protecting such data. OSHA needs to include the cost of maintaining and storing such a large amount of records for 30 years and consider such costs in determining the economic feasibility of the rule.

VIII. OSHA's Regulatory Alternatives Do Not Solve The Issues Identified By The CISC With OSHA's Proposed Rule.

OSHA has set forth numerous potential regulatory alternatives to the proposed rule. In summary, OSHA has highlighted the following alternatives and specifically requested comment on them:

- Regulatory Alternative #1: PEL at 100 μg/m^3; AL at 50 μg/m^3
- Regulatory Alternative #2: PEL at 25 μg/m^3; AL at 25 μg/m^3
- Regulatory Alternative #3: PEL at 50 μg/m^3; AL at 50 μg/m^3
- Regulatory Alternative #4: Medical surveillance triggered by AL

- Regulatory Alternative #5: Medical surveillance annually instead of every three years

- Regulatory Alternative #6: Medical surveillance triggered by AL and annually instead of every three years

- Regulatory Alternative #7: Eliminate all ancillary provisions

- Regulatory Alternative #8: Eliminate Table 1 as a compliance option

- Regulatory Alternative #9: PEL at 50 μg/m^3 in five years with 100 μg/m^3 in the interim

The CISC appreciates OSHA seeking comment on alternative approaches to the regulation of crystalline silica. As described above, the CISC does not support OSHA's proposed approach for many reasons, but primarily because (1) it will not actual work in the construction industry, and (2) it is not feasible for the industry to reduce exposure levels to the proposed PEL.

The CISC would welcome a new dialogue with OSHA on what would work in construction. Unfortunately, doing so in the context of rulemaking is particularly challenging because of the restrictions placed upon public participation as a result of the rulemaking process. That is why various construction trade associations have for years requested that OSHA put the proposed rule on hold for construction and sit down with employers and workers to craft a rule that works.

The CISC believes that OSHA needs to rethink the way it regulates health standards in the construction industry in order to devise a workable rule for crystalline silica. Relying on approaches used in previous health standards will not work here, given how ubiquitous silica is on construction worksites. Because virtually all of the Regulatory Alternatives keep that historical "old" approach, in the CISC's view none address the concerns expressed in these comments.

Instead, OSHA should focus on simplifying and expanding Table 1 and making that a true safe harbor for compliance with an OSHA silica standard. The CISC believes that this approach would be far superior to the proposed rule and the expressed alternatives. The CISC is stopping short of expressly recommending that OSHA adopt such a rule, because significant questions remain about the data underlying the effectiveness of certain controls and what a revised Table 1 would look like. However, the CISC believes that a simplified and expanded Table 1 is the direction that the Agency should look as it continues to review its overall approach to crystalline silica.

IX. OSHA's Risk Assessment Should Specifically Examine Risk In The Construction Industry.

The CISC respectfully states that OSHA has not adequately shown the need for this rule with respect to the construction industry. While the CISC believes that others are more equipped to address the flaws in OSHA's health analysis, it wants to highlight a few points. According to the Centers for Disease Control ("CDC"), the silicosis mortality rate in the U.S. significantly declined – by 93 percent from 1968-2007 – falling from 1,157 cases in 1968 to about 123 cases in 2007. While even one silica-related death is too many, the CDC data indicates that silica mortality is vanishing under the current PELs, calculated as an 8-hour time-weighted average, of 250 µg/m³ in construction and 100 µg/m³ in general industry. NIOSH similarly reported that there has been a steep decline in silica mortality rates, noting that one of the main factors for such decline is that many deaths in the early part of its study period occurred among persons whose main exposure to crystalline silica dust probably occurred before introduction of national standards for silica dust exposure established by OSHA and the Mine Safety and Health Administration. This steep decline in deaths indicates that workers are being protected from exposure to silica and exposures are likely to continue to decrease over the years.

To support its rule, OSHA primarily relies on five studies – none them representative of the construction industry – where high concentrations of silica exposures were noted and where most, if not all, are based on 40 years of exposures for 10 hours per day. First, it is highly unlikely in the construction industry that employees will be exposed to respirable crystalline silica for 10 hours per day for 40 years, much less that such exposures will be as high as those noted in the studies used by OSHA. OSHA has not presented any evidence to show that employees within the construction industry today are exposed to the levels seen in these studies or that construction employees are likely to see high concentrations of silica exposures over the time frames provided for in these studies. In fact, OSHA does not present any scientific studies to show the likely exposure level over a working lifetime for the various different trades in the construction industry to support its risk assessment.

Similarly, OSHA's 45-year working life assumption is fundamentally flawed – especially for the construction industry. Employees in the construction industry rarely have 45 year careers in the same jobs where their respirable crystalline silica exposure is consistently high and constant. Employees typically change jobs not only within the construction industry but also outside of it and typically move into positions such as supervisor, safety leader, and project leader where their respirable crystalline silica exposure is significantly reduced. OSHA does not present any studies to show the actual working life or the average silica exposure over that working life for employees in the construction industry. OSHA should examine studies to determine the actual working life of those in the construction industry in order to accurately address whether there is a significant risk.

Moreover, many of the studies are based on exposures from the 1930s through 1960s – before the current PEL was implemented and arguably when exposure levels were much greater than those found today. For example, the British Coal Miner study concerned exposures between 1954 through 1978, when exposures would have been higher and when much of the exposure would have been before standards were put into place. Similarly, the Hessel et al., 1988; Hughes et al., 1982; Ng et al., 1987a studies reflected exposures of workers to generally higher average concentrations of respirable quartz than are permitted by OSHA's current exposure limits. In fact, the two studies that OSHA primarily relies upon – Miller et al., 1998 and Ng et al., 1987a – had average exposure ranges as high as 480 $\mu g/m^3$, which is significantly more than the current OSHA PEL for construction.

In addition, many of the studies do not conclusively show that lung cancer or kidney disease were the result of exposure to respirable crystalline silica. For example, the British Pottery Workers study was based on exposures from workers born between 1916 and 1945 and thus it does not represent exposure levels of the average worker today under the current PEL. The study stated that lung cancer was dominated by high exposure to crystalline silica, smoking, and past asbestos exposure. Similarly, the Vermont Granite Workers study concluded that there was no evidence that increased lung cancer mortality was due to respirable crystalline silica exposure for those exposed after 1940. The study further concluded that malignant and non-malignant kidney disease was not significantly increased or associated with silica exposure. In addition, the North American Industrial Sand Workers study first stated that because there was no smoking history of the subjects, they could not attribute lung cancer confidently to crystalline silica. In 2005, it stated that after allowing for cigarette smoking that there was only a causal relationship between lung cancer and exposure to silica.

Other studies have concluded that there may not be a link between exposure to silica and lung cancer. In a study of men with silicosis in New South Wales, Australia (http://www.ncbi.nlm.nih.gov/pubmed/15347775), it was determined that the excess lung cancer rate may not be entirely due to silica exposure because compensation may have been influenced by the presence of chronic obstructive respiratory disease and there is some evidence that the presence of this disease increases lung cancer risk independent of smoking. In another study in Sardinia (http://www.ncbi.nlm.nih.gov/pubmed/11706145), the findings indicate that the slightly increased mortality for lung cancer in this cohort of silicotic patients was significantly associated with other risk factors-such as cigarette smoking, airflow obstruction, and estimated exposure to radon daughters in underground mines-rather than to the severity of radiological silicosis or to the cumulative exposure to crystalline silica dust itself. Similarly, in a study regarding metal miners (http://www.ncbi.nlm.nih.gov/pubmed/8010293), a scientist concluded that crystalline silica per se does not appear to affect lung cancer mortality. It found a slight association between lung cancer mortality and exposure to radon daughters, though within relatively low levels. It also concluded that impaired pulmonary function may be an independent predictor of lung cancer and an important risk factor enhancing the residence time of inhaled carcinogens, i.e., alpha particles or PAHs, by impairing their bronchial and alveolar clearance. Moreover, the Finnish study of granite workers did not show an association between lung cancer and silica exposure. Nor did the Brown and Rushton study of British industrial sand workers.

Similarly, many of the studies do not conclusively show that there is a link between respiratory disease and silica exposure especially in cases of non-smokers. Two Hnizdo et al. studies concluded that there was no significant degree of emphysema for non-smokers with cumulative dust exposure. OSHA notes that the studies are equally divided between those that have reported a relationship between silica exposure and bronchitis and those that have not. 78 FR 53606. It seems difficult to imagine that an equal break down in the science could support a finding that silica exposure creates a significant risk of bronchitis.

Finally, OSHA presented only one study that analyzed the health risks associated with silica exposure in the construction industry. One study is not sufficient in the CISC's view to show that the exposures seen by employees in the construction industry over a *realistic* working life will result in the adverse health effects that OSHA has asserted in the proposal. At a minimum, OSHA should be required to address the real life exposure level of construction workers.

X. Responses To List Of Questions.

Through these comments the CISC has attempted to provide OSHA its perspective on the proposed rule and the feasibility analyses conducted by the Agency. The CISC has reviewed the list of questions set out by the Agency in the preamble to the proposed rule for specific comment and has included its thoughts on most of the issues in the sections above.

Notwithstanding this, there a few additional questions raised by the Agency that the CISC wishes to comment on that have not already been addressed. A discussion of these questions follows:

<u>Question 35</u>: Competent person. OSHA has proposed limited duties for a competent person relating to establishment of an access control plan. The Agency did not propose specific requirements for training of a competent person. Is this approach appropriate? Should OSHA include a competent person provision? If so, should the Agency add to, modify, or delete any of the duties of a competent person as described in the proposed standard? Provide the basis for your recommendations.

> The construction industry is very familiar with the "competent person" concept as it is frequently employed in OSHA's construction standards. The proposed rule defines "competent person" as "one who is capable of identifying existing and predictable respirable crystalline silica hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them." 78 FR 56494. There are two key components to OSHA's "competent person" definition: (1) an individual with knowledge of certain hazards, and (2) the authority to take action on a worksite.
>
> The CISC does not believe that it is necessary to include a competent person requirement in any rule related to crystalline silica. Because of how common silica is on construction worksites and integral to job site tasks and actions, there is little need to identify one person on a site "capable of identifying existing and predictable respirable crystalline silica hazards in the surroundings." As stated above, silica is <u>not</u> like asbestos or lead. It is a different hazard that requires different solutions. For the same reasons, there is no need to couple "authorization to take prompt corrective measures" with capability to identify silica hazards in one individual on a jobsite.

Having said that, if OSHA were to finalize a silica rule with a "competent person" requirement included in it, the CISC does not believe that any special training requirements should be included in the standard. An individual's experience, job training, and silica awareness training, in the CISC's view, will provide the capabilities envisioned by OSHA for a competent person with respect to crystalline silica. For silica in construction, the CISC respectfully believes that no specific training for a "competent person" is required.

Furthermore, the Agency has traditionally not included specific competent person training requirements in its construction standards, instead taking a performance-oriented approach to the requirements and definition. There is nothing unique about silica that would cause the Agency to deviate from this past approach. In fact, as stated above, the opposite is true.

Question 52: In OSHA's cadmium standard (29 CFR 1910.1027(f)(1)(ii),(iii), and (iv)), the Agency established separate engineering control air limits (SECALs) for certain processes in selected industries. SECALs were established where compliance with the PEL by means of engineering and work practice controls was infeasible. For these industries, a SECAL was established at the lowest feasible level that could be achieved by engineering and work practice controls. The PEL was set at a lower level, and could be achieved by any allowable combination of controls, including respiratory protection. In OSHA's chromium (VI) standard (29 CFR 1910.1026), an exception similar to SECALs was made for painting airplanes and airplane parts. Should OSHA follow this approach for respirable crystalline silica in any industries or processes? If so, in what industries or processes, and at what exposure levels, should the SECALs be established? Provide the basis for your position and include supporting information.

The CISC does not support at this time the concept of SECALs. As the rulemaking progresses, the CISC will continue to examine whether a SECAL is appropriate in the construction industry.

However, the concepts underlying OSHA's determination to utilize SECALs or exemptions from PELs is certainly relevant to the points the CISC has made above. OSHA has failed to establish that reaching a PEL of 50 $\mu g/m^3$ can be done in construction in most operations most of the time. OSHA has turned to SECALs or utilized exceptions in these circumstances in the past. Use of these techniques has been upheld by the courts as permissible. What is not permissible, however, is for OSHA to establish a PEL for an industry that is neither technologically nor economically feasible.

Question 80: OSHA has not included requirements for medical removal protection (MRP) in the proposed rule, because OSHA has made a preliminary determination that there are few instances where temporary worker removal and MRP will be useful. The Agency requests comment as to whether the respirable crystalline silica rule should include provisions for the temporary removal and extension of MRP benefits to employees with certain respirable crystalline silica-related health conditions. In particular, what medical conditions or findings should trigger temporary removal and for what maximum amount of time should MRP benefits be extended? OSHA also seeks information on whether or not MRP is currently being used by employers with respirable crystalline silica-exposed workers, and the costs of such programs.

For the reasons discussed above, the CISC objects to the proposed medical surveillance requirements of the proposed rule. The requirements, as proposed, will be unworkable in the construction industry. The CISC further objects to the addition of some sort of MRP in a silica rule.

The purpose behind MRP in past OSHA standards has been to encourage employees to participate in medical surveillance when those standards involved temporarily removing employees from hazardous exposures in order for their health conditions to improve after exposure. For example, in OSHA's lead standard, certain employees would need to be removed from exposure to lead for a period of months to allow their blood-lead levels to return to a healthy level. OSHA was concerned that if employees were removed from these exposures and not compensated during the removal period, they would not come forward to participate in the surveillance program. OSHA's proposed rule does not envision this type of temporary removal and, thus, OSHA's previous rationale for including MRP is inapplicable.

XI. Conclusion.

While the CISC understands that OSHA has spent significant time and resources on this rulemaking, it also believes that the Agency has failed to meet its burden to show the proposal is technologically and economically feasible in the construction industry. Furthermore, the proposed requirements simply will not work in the "real world" of construction. Silica is unlike any other health standard OSHA has regulated in the construction industry. Unfortunately, OSHA's proposed approach does not reflect this.

The CISC must respectfully request that OSHA withdraw its rulemaking until it can put forth a proposal that addresses the concerns outlined above. OSHA must first demonstrate that a lower PEL is needed. In addition, OSHA must show that its prescribed methods to achieve lower exposure limits and action levels are technologically and economically feasible. Finally, OSHA's requirements must be able to be implemented in the field.

As the participating trade associations in the CISC have stated repeatedly, the CISC would welcome the opportunity to engage in a working dialogue with OSHA on what type of approach to crystalline silica would actually work in construction. We also encourage OSHA to work with the construction industry to ensure that the positive reduction in silicosis-related disease continues.

The CISC appreciates OSHA's consideration of these comments on the proposed rule, and hopes that the Agency thoroughly reviews the entire rulemaking record.

CONSTRUCTION INDUSTRY SAFETY COALITION

February 11, 2014

The Honorable David Michaels
Assistant Secretary of Labor
Occupational Safety and Health Administration
U.S. Department of Labor
Room S-2002
200 Constitution Ave., NW
Washington, DC 20210

Re: Construction Industry Safety Coalition
Hearing Testimony for NPRM on Occupational Exposure to Crystalline Silica
(Docket No. OSHA 2010-0034)

Dear Dr. Michaels:

I write on behalf of the Construction Industry Safety Coalition ("CISC"). CISC respectfully files the enclosed written hearing testimony for the representatives of the CISC at OSHA's informal public hearing on OSHA's Proposed Rule on Occupational Exposure to Crystalline Silica, 78 FR 56274 (Sept. 12, 2013).

Sincerely,

JACKSON LEWIS P.C.

Bradford Hammock
Nickole Winnett

Enclosures

CONSTRUCTION INDUSTRY SAFETY COALITION
Testimony of Bradford T. Hammock
Shareholder, Jackson Lewis P.C.

Thank you for providing me the opportunity to testify. My name is Brad Hammock. I am a shareholder in the Washington, D.C. Region Office of Jackson Lewis P.C. I am here to testify on OSHA's Notice of Proposed Rulemaking on Occupational Exposure to Crystalline Silica on behalf of the Construction Industry Safety Coalition ("CISC").

The CISC is comprised of 25 trade associations representing virtually every aspect of the construction industry. The CISC speaks for small, medium, and large contractors; general contractors; subcontractors; union contractors; etc. The CISC has a strong commitment to worker safety and it recognizes that it is incumbent upon the construction industry to take measures to protect employees from exposure to crystalline silica.

I am representing the CISC throughout OSHA's rulemaking proceedings on this proposed rule. As lead counsel for the CISC, I have reviewed OSHA's data, assumptions, and reasoning with respect to the construction industry and I have provided feedback and analysis to assist the CISC in providing OSHA with thoughtful, data-driven comments on the proposed rule.

By pooling resources and members from the wide range of trades affected by the proposal, the participating construction industry trade associations believe that they can assist OSHA in better understanding the unique challenges found in the construction industry with respect to crystalline silica. OSHA's proposed crystalline silica rule for construction is potentially the most far-reaching regulatory initiative proposed by OSHA for the industry. Crystalline silica is everywhere on a construction site, and it is found in numerous building materials and a number of job activities result in the release of a certain amount of respirable crystalline silica. To say that this rule will have a significant impact on the construction industry is an understatement.

The CISC and its member associations recognize the hazards posed by crystalline silica at construction worksites and it applauds OSHA's attempts at creating a proposed rule for the construction industry on this matter. However, the CISC believes that the Agency has not met its burden of demonstrating that the proposal is technologically and economically feasible for the construction industry. In addition, OSHA's proposed ancillary provisions – which are very similar to the ancillary requirements included in other OSHA health standards – are unworkable in the construction environment.

The CISC does not believe that OSHA has shown that the proposed PEL can be met by the construction industry in most operations most of the time. OSHA's overall analysis falls short for several reasons:

- OSHA has not identified all of the job categories that could be affected by the proposed rule.

- OSHA's assumption that construction workers have no exposure after the period of time sampled is incorrect and unjustified.

- OSHA's analysis does not consider the broad scope of tasks and environments affected.

- OSHA's assumption about compliance on multi-employer worksites does not account for exposure affects.

Moreover, a detailed examination of each individual assessment of the identified construction activities in the CISC comments shows that – for numerous and varied reasons – OSHA has not met its burden of proving technological feasibility. Ironically, the flaws in OSHA's technological feasibility analysis can best be seen through Table 1. Of the 13 operations included in Table 1, eight of the operations provide for some form of respiratory protection under certain conditions of use. There is no way that the use of respiratory protection in two-thirds of construction operations constitutes reaching the PEL with engineering and work practice controls in most construction operations most of the time.

Furthermore, OSHA's economic feasibility analysis understates by significant margins the true cost and impacts of the proposal on the construction sector. Stuart Sessions of Environomics will discuss the significant problems with OSHA's economic analysis later today.

In addition, the CISC believes that the ancillary provisions of the proposal are unnecessary and not workable in the construction industry. For example, the exposure monitoring provisions, which are based on other health standards, are unworkable given the range of exposure conditions, environments, operations, materials, and so on. The establishment of regulated areas or written access control plans, while well-meaning, also does not work on most construction sites due to multiple operations and environmental conditions that are constantly shifting and changing. OSHA's prohibition on dry sweeping is unsupported by evidence showing that such a practice significantly contributes to silica-related disease. Kevin Turner with Hunt Construction Group will discuss in more detail the issues found with respect to these and other ancillary provisions.

CISC appreciates OSHA's attempts to make compliance simple in construction with Table 1. Having said this, the CISC believes that Table 1 as proposed misses the mark for several reasons, but primarily due to the notes included in the "Engineering and work practice control methods" section of the Table. In the view of member companies, these notes will prevent Table 1 from being utilized as a compliance option. Kellie Vasquez from Holes, Inc. will testify regarding the problems found with the current proposed Table 1.

The CISC recognizes that it is "easy to criticize" but harder to come up with alternatives and the CISC appreciates that OSHA has put forward a number of alternatives for stakeholder consideration and comment. The CISC believes that OSHA needs to rethink the way it regulates health standards in the construction industry in order to devise a workable rule for crystalline silica. Relying on approaches used in previous health standards does not work here, given how ubiquitous silica is on construction worksites. Because virtually all of the Regulatory Alternatives keep OSHA's historical approach, in the CISC's view none address the concerns raised in the construction environment.

The CISC respectfully requests that OSHA withdraw its proposed rule until it can put forth a proposal that addresses the concerns that we will discuss in more detail today. OSHA must first demonstrate that a lower PEL is needed and that whatever PEL is adopted is both technologically and economically feasible. OSHA's requirements also must be workable in the field. The CISC is prepared to – and welcomes the opportunity to – sit down with the Agency and engage in a dialogue as to what would be an appropriate approach to dealing with the hazards of crystalline silica on construction worksites.

Thank you.

CONSTRUCTION INDUSTRY SAFETY COALITION
Testimony of Kellie Vasquez
Vice President of Holes, Inc.

Thank you for providing me the opportunity to testify today. My name is Kellie Vasquez. I am the Vice President of Holes, Inc. and a member of the Concrete Sawing & Drilling Association. I am here to testify on OSHA's Notice of Proposed Rulemaking on Occupational Exposure to Crystalline Silica on behalf of the Construction Industry Safety Coalition ("CISC").

Before I discuss the proposal, I want to tell you a little bit about my company and my experience. Holes, Inc. is a family-owned business that was started by my father 42 years ago when he decided, after years of being a saw cutter, to go into business for himself. Our employees perform an array of concrete cutting, wall and slab sawing, core drilling, and removal and demolition work. The average employee has been with our company for 14 years and we have several employees who have been with us for over 30 years. We recognize that our employees are our number one asset. We simply could not do the work without them and we consider them a part of our family.

As the Vice President of Holes, Inc., I am responsible for supervising our field operators and overseeing the Safety Department. Over the last ten years, I have had the honor of being involved in various initiatives that have addressed exposure to respirable crystalline silica. I was a SBREFA Panelist in 2003 for this rule and a member of the Silica Task Force from 2003-2006. I also contributed and provided guidance for the ASTM standard on the Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica for Construction and Demolition Activities. In addition, I have been a member of the Board of Directors of the Concrete Sawing & Drilling Association since 2009 and have actively participated in several committees. As part of my membership with the Concrete Sawing & Drilling Association, I provided guidance and feedback on OSHA's proposed rule as part of the CISC.

The CISC has several concerns with respect to Table 1 that I would like to address today. While the CISC appreciates OSHA's attempt with Table 1 to craft a performance-based tool for use in the construction industry that would in theory make compliance simpler, we believe that Table 1 as proposed misses the mark for several reasons.

First and foremost, as currently drafted Table 1 is unworkable for most construction employers. Primarily, this is due to the "Notes" included in the "Engineering and work practice control methods" section of the Table. These Notes were not included in the SBREFA draft published over a decade ago, were not included in the draft given to ACCSH a few years ago, and are such that compliance with Table 1 becomes impossible.

The primary obstacle to compliance in the Notes relates to the requirement that there be "no visible dust" emitted from a process after the introduction of the engineering control methods. While "no visible dust" is a lofty goal, it has no basis in reality in the construction environment. Rarely – if ever – will there be absolutely no visible dust emitted from a silica generating activity with the use of wet methods or other engineering controls.

For certain types of tools, such as grinders and other hand-held pieces of equipment, it is impossible to perform the work with the tool flush against the surface being impacted. At times, there must be a gap and this will mean some visible dust is emitted, even when local exhaust ventilation or wet methods are utilized.

For employers using wet methods, even attempting to meet this "no visible dust" standard will require a tremendous amount of water – many studies discussed in the technological feasibility analysis certainly support this notion. Such large amounts of water run counter to OSHA's contractor's assessment that "minimal" water should be used to avoid environmental contamination issues. The Agency contends that construction employers can mitigate any environmental concerns by utilizing as little water as possible to prevent accumulations from occurring or potentially damaging residential or commercial buildings. Even if utilizing only a little water will effectively reduce exposures to below the proposed PEL, the CISC has significant concerns that it will prevent *all* visible dust from being emitted.

Even if there were times where a process could be controlled such that no visible dust could be emitted, the requirement is so stringent that the CISC does not believe any construction employer will run the risk of relying on Table 1 for compliance. There are so many variables involved in controlling silica-generating activity that, on any given day, an employer could not guarantee that an activity will not generate at least a little visible dust.

Compliance with this specification is also made very difficult on a multi-employer worksite, where other employers are performing silica-generating activities. If one employer is conducting operations where visible dust is being emitted, perhaps because the employer has opted not to follow Table 1, it will be a significant challenge for an employer conducting operations alongside to demonstrate that its dust control measures did not emit any visible dust.

The CISC is also confused with this specification as it relates to another requirement found in some operations in the Table. OSHA has proposed for the conduct of certain operations indoors, that employers following Table 1 "provide sufficient ventilation to prevent build-up of visible airborne dust." This requirement seems superfluous since in all situations visible dust must not be emitted from the process.

There are other ambiguities and vague terms used throughout the Table that the CISC respectfully asserts will eliminate Table 1 as a realistic compliance option:

- "Change water frequently to avoid silt build-up in water." This specification provides no guidance on how frequently water should be changed or what level of "silt build-up" is acceptable.
- "Ensure saw blade is not excessively worn." This specification provides no guidance on what "excessively" means.
- "Cab is maintained as free as practicable from settled dust." This specification provides no guidance regarding the terms "as free as practicable."
- "Cab is air conditioned and positive pressure is maintained." This specification does not account for the fact that few machines are equipped with cabs with these specifications and enclosed cabs could create problems with verbal communication and visual obstructions.
- "Commercially available shrouds and dust collection system." This specification eliminates specialty manufactured products that may be equally effective.

- "Prevent wet slurry from accumulating." This specification does not define what it means by accumulation.

With the specifications included in Table 1 and the ambiguity that goes along with it, OSHA has unfortunately created a compliance option that no construction employer will follow. Even if an employer, for example, developed a protocol for replacing blades with excessive wear, it could still be subject to citation from a compliance officer if the compliance officer happened to hold a different view of the definition of the word "excessive." And this reality applies to all of the ambiguous terms included in the specifications in Table 1 of the proposal.

Much of Table 1 requires employers to implement either wet methods or local exhaust ventilation to be in compliance with its provisions. There are times, however, where the nature of the work or the environmental conditions make use of these control measures impossible. There are difficulties associated with cold temperatures and introducing water into a construction environment. OSHA recognizes that water may not be able to be used in certain interior work. Introducing water can also create other hazards, such as cutting tile on roofs. CISC participating association members have identified other situations where the use of wet methods or LEV will not work:

- Selective demolition around or near operating electrical or other sensitive equipment such as “clean rooms” for computer operations.
- Specifications for cleaning/sealing concrete joints often require that no water be introduced to control the dust.
- Work when compacting pavers prevents the use of wet methods or vacuum systems.
- Grinding existing striping to be repainted on roadways.
- Drilling anchor bolts into a vertical face of a concrete surface.
- Removal of fire proofing on columns in refineries.

When a problem with complying with Table 1 arises, the CISC questions precisely how the standard applies. The proposed standard seems designed to have employers “pick” their compliance option up front and then presumably stick with that option. So, an employer would not conduct exposure monitoring if the employer made the decision to choose Table 1. But if a few months down the road, the employer encounters a worksite where Table 1 is not capable of being used, what is that employer’s responsibility with respect to exposure monitoring?

There is also concern regarding the practical implementation of the “4-hour” specification in the Table. While the CISC appreciates what OSHA is trying to do by bifurcating the table by time spent on an activity, the reality is that contractors will be unable to keep precise track of the amount of time each worker has spent performing a particular task or tasks, such that compliance with Table 1 becomes a realistic option. Contractors currently do not – and the CISC believes will not – embark on complicated time-tracking of tasks to devise when a respirator is needed or when a respirator is not needed, particularly for workers who perform multiple different tasks included in Table 1 throughout the day. This just will not happen.

In addition to the above, OSHA has decided to propose an extremely narrow "use" for Table 1. Table 1 is not a safe harbor for construction employers by any stretch. It is only utilized in lieu of exposure monitoring requirements. A construction employer who opts to utilize Table 1 still is required to ensure that all exposures are below the proposed PEL. In addition, OSHA asserts that the employers must assume that employees are exposed above the PEL if they are using Table 1, resulting in medical surveillance for all employees and regulated areas or a written access control plan on all jobs.

Perhaps the unworkability of OSHA's exposure assessment provisions in the construction environment will end up ultimately forcing construction employers to utilize Table 1. For this to happen, though, OSHA has to go back to the drawing board and create a new Table 1 with the following concepts in mind:

- <u>Expand Table 1 to include other tasks.</u> In many ways, OSHA has mirrored Table 1 to its technological feasibility analysis. Very broad tasks are set out, along with the engineering and work practice controls and respiratory protection. In the CISC's view, it is acceptable to put forth some broad tasks, but it also would be helpful to include more specifically-defined tasks in a revised Table. For example, the following would be specific tasks in specific circumstances that, if included in a table, could increase compliance: "concrete slab sawing (indoors)"; "concrete dowel drilling (outdoors)"; "sawing joints in concrete (outdoors)"; "overhead drilling"; and so forth.

- Eliminate the heavy use of respiratory protection. As described above, OSHA's reliance on respiratory protection is analytically inconsistent with its position that it is technologically feasible to reach the proposed PEL in most construction operations most of the time. Requiring such heavy use of respirators in Table 1 will serve as a significant barrier to effective use of same. As OSHA recognizes, wearing respirators, particularly for long periods of time, is uncomfortable for employees. While the CISC appreciates that OSHA is taking a conservative approach with respect to employee protection here, the CISC respectfully asserts that in this situation OSHA has created a tool that will not be used by employers.

- Eliminate the "Notes" in the Table. The "Notes" that are included in the Table are ambiguous, unworkable, and ultimately unnecessary. The CISC has described its concerns with the "Notes" and, as currently drafted, believes they will cause employers *not* to select Table 1 as a compliance option.
- Eliminate specificity regarding wet methods. Throughout the Table, OSHA relies heavily on the use of wet methods. Depending upon the task described, the method of water delivery differs. Thus, if a construction employer is using Stationary Masonry Saws, the employer must use a saw with an integrated water delivery system. If a construction employer is using a hand-operated grinder, the employer must use a "water-fed" grinder that continuously feeds water. The CISC believes that limiting the delivery of wet methods in this way may reduce the ability of certain contractors to utilize Table 1. If a construction employer finds a way to effectively deliver water through another mechanism, in the CISC's view that should be encouraged. In addition, the CISC is concerned that certain tools equipped with a water delivery system are so designed to cool the saw blades and not control dust emission.

- Exempt Tasks of Short Duration. OSHA only provides two time frames for compliance under Table 1 – when those tasks are performed under four hours and when those tasks are performed over four hours. The ASTM Standard (Section 4.4.1.3), on the other hand, specifically exempts controls provided for in its Tables 1-5 when employees are engaged in those tasks for 90 minutes or less.

Many of these suggestions go to a fundamental issue for the CISC – Table 1 must be simple and user-friendly or it will not be used. In the CISC's view, the more "Notes" that are included in the Table the fewer contractors will utilize it. Having a Table that no one can or will use, does little to protect the safety and health of construction workers. Moreover, Table 1 must be a safe harbor for employers in order for Table 1 to be a viable option for those in the construction industry.

Because of the numerous issues discussed above and in the CISC's comments to the proposed rule, CISC urges OSHA to reevaluate Table 1 as currently proposed.

Thank you.

CONSTRUCTION INDUSTRY SAFETY COALITION
Testimony of Kevin Turner, CSP, CHST, CRIS
Director of Safety - East Division at Hunt Construction Group

Thank you for allowing me the opportunity to testify. My name is Kevin Turner. I am the Director of Safety - East Division at Hunt Construction Group and a member of the Associated General Contractors. I am here to testify on OSHA's Notice of Proposed Rulemaking on Occupational Exposure to Crystalline Silica on behalf of the Construction Industry Safety Coalition ("CISC").

Before I discuss the proposal, I want to tell you a little bit about my company and my experience. Hunt Construction Group is a construction management firm based in Indianapolis, Indiana that handles many large and complex construction projects throughout the United States, including sports arenas, government and education buildings, aviation complexes, and health care facilities. As a construction management firm, we work with a number of construction trades and employers who will be affected by this rule and we know firsthand the challenges that employers face in this competitive market.

I have more than 16 years of experience in the construction industry and have been a longstanding member of the Associated General Contractors ("AGC"). As the Director of Safety, I am responsible for the environment, safety and health programs and training initiatives for the East Division. I am a Certified Safety Professional and I have numerous certifications related to safety and health, including Construction Health and Safety Technician and OSHA 500 Construction Outreach Trainer.

Based on my numerous years of experience in the construction industry, I have become aware of the issues concerning occupational exposure to respirable crystalline silica and I recently provided guidance and feedback on OSHA's proposed rule as part of the CISC.

The CISC has several concerns with respect to regulated areas and housekeeping requirements that I would like to address today. First, OSHA requires the use of regulated areas or a written access control plan wherever an employee's exposure to respirable crystalline silica is, or can reasonably be expected to be, in excess of the PEL. It is not clear how the two options are different. Both provisions require work areas be demarcated and access to said areas be limited to essential personal or designated employee representatives. Both provisions also require that employers provide protective clothing when there is a potential for employees' work clothing to become grossly contaminated. The only difference between the two appears to be that respirators are not absolutely required under a written access control plan but need only be provided and used where respirable crystalline silica exposures may exceed the PEL. OSHA needs to better explain the differences between the two options.

In addition, OSHA has not defined what “reasonably expected” means or otherwise provided any clarity on when an employer should reasonably expect for an employee to be exposed over the PEL. Such subjective language is not enforceable and it will be fraught with compliance problems and, as a result, an employer will feel compelled to set up a regulated area or written access control plan in nearly all instances.

Enforcing regulated areas is incredibly difficult on a multi-employer construction worksite, because not every individual or employee is under the control of the contractor putting up the regulated area and a general contractor may not be onsite at all times during the project.

Moreover, weather and wind can change silica exposure in many instances, requiring the employer to continuously evaluate the conditions in order to determine if the regulated area is properly designated or adjust the area to account for the changed conditions. An employer may need to change the regulated area every time the wind blows in a different direction because the boundaries of the area have changed. Employers simply will not be able to do this.

OSHA’s requirement that the employer must provide each employee and the employee’s designated representative entering a regulated area with an appropriate respirator and require that they use the respirator while in the regulated area is unworkable. Under this requirement, OSHA is requiring the use of respirators even if an employee or a designated representative will not have exposures above the PEL simply because a regulated area has been designated. Not everyone who enters a regulated area will be exposed to respirable crystalline silica much less have exposures above the PEL. Persons who occasionally come in that work area should not be required to wear a respirator unless their own exposure may exceed the PEL. Moreover, OSHA needs to explain why respirators are required simply because an individual is observing the exposure monitoring once or a handful of times when the risk assessment is based upon a 45-year working life and not intermittent exposures.

Requiring protective work clothing when there is the potential for employees' work clothing to become grossly contaminated with finely divided material containing crystalline silica is confusing and OSHA has not adequately described how it will protect workers. OSHA does not provide any clarity on when there is a "potential" for the employee's work clothing to become grossly contaminated with crystalline silica. The potential that employees' work clothes will become grossly contaminated exists for nearly every job and every worksite. So, in practicality, employers will be required to provide protective clothing in nearly all circumstances.

OSHA asserts that "'[g]ross contamination' refers to a substantial accumulation of dust on clothing worn by an employee working in a regulated area such that movement by the individual results in the release of dust from the clothing." On a construction worksite, clothes will naturally become dirty and covered in dust. Not all dust will be silica dust and visible dust on clothing is very unlikely to be respirable and would not be "finely divided materials." OSHA has made virtually no connection between visible dust on clothing and respirable silica exposures and there is no literature or studies to show that visible dust on clothing will significantly increase an employee's respirable silica exposure to a harmful level. OSHA has simply not explained why such a provision is necessary or likely to protect workers. Moreover, there are also circumstances where an employer may not be able to provide protective clothing – something that OSHA does not recognize or address in the proposed rule. For example, employees are not able to wear anything over fire retardant clothing.

OSHA asserts that the purpose of regulated areas is to ensure that the employer makes employees aware of the presence of respirable crystalline silica at levels above the PEL. In the CISC's view, providing required training of all employees potentially exposed to silica would be equally effective in making employees aware of the presence of respirable crystalline silica without all of the issues associated with regulated areas. The training would cover tasks where employees are likely to be exposed to silica as well as good housekeeping instruction to reduce risk, such as staying away from silica-generating tasks unless absolutely necessary and positioning one's body away from clouds of dust.

Construction employers are unlikely to create a written access control plan. A different access control plan would need to be created for each worksite and project because of the variable nature of the construction industry. A one-size-fits-all approach to the written access control plan would simply not work because each project is different, the materials and locations or the work are different, and the silica-generating tasks may be different. Simply put, the competent person will need to visit each worksite and come up with a different plan for each project and, then, he or she would need to put the plan in writing. This will take a significant amount of time and create additional costs for each job.

The concept behind the use of regulated areas or a written access control plan is fundamentally flawed. These provisions restrict access to what OSHA believes are hazardous areas and not to hazardous exposures. These provisions should focus on reducing personal exposures to respirable crystalline silica. OSHA has not made the connection that restricting access to an entire regulated area is necessary to protect employees from personal exposures to respirable crystalline silica above the PEL. In lieu of regulated areas and a written access control plan, employers can instruct employees to stay out of work areas where dust is generated unless their presence is necessary and, if employees are required to work in areas where respirable silica dust may be generated, then employers could instruct employees to stay away from the clouds of dusts to the extent possible.

Because of the numerous problems with this provision, the CISC cannot support the use of regulated areas or a written access control plan as currently proposed.

The CISC also does not support several of the housekeeping requirements provided in the proposed rule. OSHA is prohibiting employers from using compressed air, dry sweeping, and dry brushing to clean clothing or surfaces contaminated with crystalline silica, where such activities could contribute to employee exposure to respirable crystalline silica above the PEL.

OSHA does not explain or provide any clarity on when dry sweeping or dry brushing could contribute to employee exposures to respirable crystalline silica that exceeds the PEL. The ASTM Standard (Section 4.4.3.2) certainly does not prevent the use of dry sweeping or dry brushing.

OSHA's alternative to dry sweeping appears to be using vacuums equipped with a HEPA filter. A HEPA-filter vacuum will not be able to pick up anything beyond small dirt or dust particles and thus would be completely ineffective at picking up electrical wires, pieces of drywall, and other debris often found throughout a construction worksite.

Some projects also may not have access to an electrical source in order to run the vacuum and the HEPA-filters would need to be changed frequently in order for the vacuum to remain effective. Depending upon the size of the project and the location of silica-generating tasks, an employer may need to provide more than one vacuum. But more importantly, OSHA has not shown that these prohibitions will in fact reduce exposure to respirable silica.

Thank you.

CONSTRUCTION INDUSTRY SAFETY COALITION
Testimony of Stuart Sessions
Environomics, Inc.

Thank you for providing me the opportunity to testify. My name is Stuart Sessions. I am the President of Environomics, Inc. I am here to testify on OSHA's Notice of Proposed Rulemaking on Occupational Exposure to Crystalline Silica on behalf of the Construction Industry Safety Coalition ("CISC").

I was asked to review OSHA's economic data and assumptions with respect to the construction industry and provide feedback and analysis to the CISC. I am an economist with more than 30 years of experience in analysis of environmental, safety, and health regulatory issues. Prior to my time at Environomics, I was an analyst with the Office of Management and Budget, a staff member of the Carter White House, and a manager in several policy analysis positions at the Environmental Protection Agency ("EPA"), including the Director of the Regulatory Policy Division.

As more fully developed in the CISC's comments and attached appendices, OSHA's economic feasibility analysis understates by significant margins the true cost and impacts of the proposal on the construction sector.

First, OSHA has omitted 1.5 million workers in the construction industry who routinely perform dusty tasks on silica-containing materials from its analysis of the economic costs and impacts of the proposed rule. These workers – members of large construction trades such as plumbers and plumber helpers, roofers, electricians, and electrician helpers and including specialty trades such as plasterers and stucco masons and helpers and tile and marble setters – perform tasks nearly identical to those performed by occupations included by OSHA such as cement masons, plasterers and ceiling tilers. Together, the additional occupations increase OSHA's base estimate of the affected construction workforce by approximately 50 percent.

The substantial increase in the number of the construction workers resulting from the addition of these occupations profoundly affects the estimated control costs and “productivity penalties” when these additional workers perform silica-generating tasks. Moreover, the numbers also result in proportional increases in the costs associated with the proposed program's ancillary requirements, which are driven largely by the size of the affected construction workforce.

In addition, by relying on highly unrealistic assumptions about control equipment deployment and use in the construction industry, OSHA grossly underestimates the costs of complying with the engineering requirements of its proposed rule. According to the Agency, engineering control costs are incurred only while workers are actively engaged in dusty tasks, estimated by OSHA to average less than 20 percent of the time construction workers spend on the job. The reality is construction crews who routinely engage in dusty tasks will need to have appropriately controlled equipment on hand and available virtually all the time, whenever there is a possibility that they might perform the dusty task. Thus, the cost of engineering controls will average much closer to 100 percent of the time construction workers spend on the job than OSHA has accounted for. The effect of this alternate, more realistic, assumption is a significant increase in the costs of deploying engineering controls.

Third, OSHA's estimates of the percentage losses in time, or productivity penalties, involved in conducting a task with controls (e.g., LEV or wet methods) relative to conducting the task without controls are understated and only relate to productivity losses for labor, but not for equipment. OSHA's method of estimating productivity penalties, i.e., multiplying the time spent on the silica-generating task by its productivity penalty percentage strongly suggests that OSHA did not consider fixed component costs, which include the cost of activities such as initial set-up and final clean-up of the control equipment. The actual percentage of time spent engaged in fixed component activities will depend on the duration of the job, or the number of set-up/clean-up/break down cycles required over the duration of the job. Set-up/clean-up/break down activities may take upwards of 30 to 60 minutes per day. When incurred daily, a 30 minute activity represents a productivity penalty of six percent, and that figure does not include the additional penalty incurred while the control equipment is in use.

Moreover, OSHA estimates such productivity losses only for labor, and not also for equipment. OSHA overlooks the fundamental production relationship between workers and the equipment they use in their work. Simply put, a productivity penalty for labor will translate to a productivity penalty for equipment. For example, if due to a labor productivity loss, the labor time required to complete a job increases from eight hours to eight hours and 15 minutes, the equipment time required for job completion will also increase to eight hours and 15 minutes. Additional equipment rental costs will be incurred for the additional 15 minutes, or equipment owned by the employer will be delayed for use on another job by 15 minutes. In this case the employer will have experienced a productivity loss equal to the productivity penalty multiplied by the Total Daily Project Value, not just Daily Labor Value. As a result of these fundamental flaws in the analysis, OSHA is underestimating productivity losses associated with performing tasks using the prescribed controls by an amount roughly equal to the average equipment intensity of about 42 percent.

And OSHA has incorrectly estimated costs for engineering controls assuming a more limited number of at-risk workers, then will be truly affected by any final rule. Essentially, because an employer cannot be certain in advance of an employee's work shift whether the employee is likely to be overexposed or not, the prudent employer and the prudent employee will want to use the exposure-reducing controls in all instances when the at-risk task is performed and overexposures could perhaps result if controls were not to be used. Indeed, this is the presumption inherent in Table 1.

As such, OSHA should recalculate the costs for engineering controls for the construction industry based upon a more realistic assumption that employers will need to adopt controls for all workers when they perform any of the construction tasks that OSHA identifies in Table 1. Extending engineering controls to all workers performing at-risk tasks instead of only to the half that end up being overexposed relative to OSHA's exposure profile results in a roughly doubling of OSHA's cost estimates for engineering controls for the industry.

Finally, OSHA has underestimated the costs of the ancillary provisions for several reasons. First, the number of construction workers to whom the provisions will apply will be much higher than OSHA estimates. Second, OSHA has underestimated the unit costs for activities associated with many of the ancillary provisions in comparison to the cost experience that construction and other businesses have reported in the various industry surveys that have been conducted relating to this proposed rule. Third, OSHA's cost estimating methodologies do not, in some important respects, appear to match the specific requirements of the proposed regulation. One such example is the requirement for reassessing workers' exposure whenever a "change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level", when read in the context of frequently varying construction work sites and durations for performing dusty tasks, would appear to require far more exposure assessments than those for which OSHA estimates costs.

All told, the CISC estimates that the costs of the proposed rule are understated by a factor of at least four.

Thank you.

Associated Builders and Contractors, Inc. (ABC) is a national construction industry trade association with 22,000 chapter members. ABC and its 70 chapters help members develop people, win work and deliver that work safely, ethically and profitably for the betterment of the communities in which they work. ABC member contractors employ workers, whose training and experience span all of the 20-plus skilled trades that comprise the construction industry. Moreover, the vast majority of our contractor members are classified as small businesses. Our diverse membership is bound by a shared commitment to the merit shop philosophy in the construction industry. The philosophy is based on the principles of nondiscrimination due to labor affiliation and the awarding of construction contracts through open, competitive bidding based on safety, quality and value. This process assures that taxpayers and consumers will receive the most for their construction dollar.

The Associated General Contractors of America (AGC) is the leading association for the construction industry, and places safety in the construction industry as a priority. Founded in 1918 at the express request of President Woodrow Wilson, AGC is a full service trade association representing nearly 30,000 firms in partnership with a network of 94 exceptional chapters throughout the United States. Among the association's members are approximately 7,500 of the nation's leading general contractors, more than 12,500 specialty contractors, and more than 13,000 material suppliers and service providers to the construction industry. AGC members play a powerful role in sustaining economic growth, in addition to producing structures that add to productivity and the nation's quality of life.

AGC member firms engage in the construction of buildings, shopping centers, factories, industrial facilities, warehouses, highways, bridges, tunnels, airports, waterworks facilities, waste treatment facilities, dams, hospitals, water conservation projects, defense facilities, multi-family housing projects, municipal utilities and other improvements to real property. And unlike many associations in the industry, we proudly represent both union and open-shop construction contractors. AGC is truly the "voice and choice" of the construction industry.

American Subcontractors Association, Inc.

The American Subcontractors Association, Inc. (ASA) is a national trade association representing subcontractors, specialty trade contractors, and suppliers in the construction industry. ASA's 5,000 members work in virtually all of the construction trades and on virtually every type of horizontal and vertical construction. ASA members frequently contract directly a construction owner. More often, they serve as subcontractors dealing with the ultimate construction owner through a prime contractor. More than 60 percent of ASA members are small businesses.

ASA Vision: The American Subcontractors Association is recognized as the united voice dedicated to improving the business environment in the construction industry.

ASA Mission: The American Subcontractors Association amplifies the voice of and leads trade contractors to improve the business environment for the construction industry and to serve as a steward for the community.

ASA Values: The ideals and beliefs of ASA are ethical and equitable business practices, quality construction, a safe and healthy work environment, integrity and membership diversity.

AMERICAN SOCIETY OF
CONCRETE CONTRACTORS
Enhancing the Capabilities of Those Who Build with Concrete

The Only Association By And For All Concrete Contractors

The American Society of Concrete Contractors was formed by and for concrete contractors and others who provide services and goods to the concrete construction industry. It is a powerful organization of contractors who share the same goals – to improve their businesses and their roles as contractors. Members include contracting firms, manufacturers, suppliers, designers and other professionals. There are approximately 500 member companies in the U.S. and abroad in the American Society of Concrete Contractors.

ASCC seeks to be the voice of the concrete contractor, serving as a collective instrument to give members of the concrete construction industry a stronger presence in the construction industry as a whole.

ASCC is committed to helping members enhance the quality of their construction and their businesses. Members of this concrete contractor association become better equipped to improve all aspects of their performance with the help of valuable information and member interaction.

Association of the Wall and Ceiling Industry

AWCI is a trade association providing members with industry information, contacts and leadership for the wall and ceiling industries. Member companies are among the most successful in the industry. They are union and non-union wall and ceiling contractors of all sizes, manufacturers, suppliers and distributors throughout the world.

AWCI represents 2,200 companies and organizations in the acoustics systems, ceiling systems, drywall systems, exterior insulation and finishing systems, fireproofing, flooring systems, insulation, and stucco contractors, suppliers and manufacturers and those in allied trades. Our mission is to provide services and undertake activities that enhance the members' ability to operate a successful business.

AWCI is highly regarded by members of our industry as providing valuable technical and product information, education and training, industry contacts and the collaborations essential to operating a successful business, and is the principal organization advocating the interests of contractors, suppliers and manufacturers in the wall and ceiling industries.

AWCI is a national leader in trade-specific education programs covering the wall and ceiling industry. AWCI continues to expand its list of programs to cover every facet for the wall and ceiling contractor. All AWCI Doing It Right programs (except EIFS—Doing It Right®) are designed specifically for owners, project managers, estimators, superintendents, foremen, architects and code officials. EIFS—Doing It Right® is a certificate program targeting EIFS mechanics, inspectors and industry professionals. All AWCI Doing It Right program content is based on industry accepted standards and best practices.

AWCI is the prime source of information published for the wall and ceiling industries. AWCI members receive technical and news periodicals throughout the year. Experienced staff will assist members with the latest technical documentation and keep them informed of changes in codes, specifications and standards. The largest technical information and resource library for the wall and ceiling industry, which is owned by the Foundation of the Wall and Ceiling Industry, is located at AWCI headquarters.

Established in 1902, the Washington, D.C.-based American Road & Transportation Builders Association (ARTBA) is the "consensus voice" of the U.S. transportation design and construction industry before Congress, federal agencies, the White House, news media and general public. The association's mission is simple: We are a federation whose primary goal is to aggressively grow and protect transportation infrastructure investment to meet the public and business demand for safe and efficient travel. From the beginning, ARTBA has been a major leadership force in the development of federal transportation policy. The association's 5,000+ private and public sector members are involved in the planning, designing, construction and maintenance of the nation's roadways, bridges, ports, airports and transit systems. Our industry generates more than $380 billion annually in U.S. economic activity and sustains more than 3.3 million American jobs.

Since 1919, the Building Stone Institute (BSI) has worked on behalf of the quarries, fabricators, retailers, importers, exporters, carvers, sculptors, restorers, designers, and installers that comprise our diverse membership. BSI provides programs and services that empower our member companies to offer the highest level of quality products and services. BSI resources are necessary tools that enable our members to educate the architectural and design communities on the benefits and uses of natural stone. BSI is a not-for-profit trade association dedicated to serving its member firms, and providing educational materials and continuing education on the uses and benefits of natural stone. We support efforts to continually increase the quality of service, quality of products, and demand for stone. Our website is informative about the organization, abundant in stone awareness and technical guidance plus a convenient resource to locate experts for all aspects of natural stone.

BSI is a proud continuing education provider with the American Institute of Architects & the American Society of Landscape Architects, a founding member of the Natural Stone Council and a member of the U.S. Green Building Council.

The Concrete Sawing & Drilling Association (CSDA) is a nonprofit trade association of contractors, manufacturers and affiliated members from the construction and renovation industry. The CSDA mission is to promote the selection of professional industry contractors and their methods. Diamond tools for projects requiring sawing, drilling, selective demolition, cutting and polishing offers the construction industry many benefits including lower total project costs, precision cutting, maintenance of structural integrity, reduced downtime, reduced noise, dust and debris, limited access cutting and the ability to cut heavily-reinforced concrete. CSDA offers its members access to multiple training programs and safety documents, as well as educational opportunities at its annual convention and online. Founded in 1972, CSDA has 500 member companies worldwide.

CDRA

Construction & Demolition

Recycling Association

The Construction & Demolition Recycling Association promotes the recycling of materials generated from construction and demolition (C&D) projects. These materials can be generated from road, bridge, or building projects. While no official government estimates exist for the total material stream, conservative estimates put the amount of C&D material generated annually in the United States at 350 million tons, with some experts saying as much as 650 million tons is generated. For point of comparison, EPA estimates municipal solid waste generation to be around 240 million tons annually.

Components of the material stream include concrete, asphalt, wood, asphalt shingles, plastics, metals, carpet, and drywall, among other items. By weight, probably the most recycled material in the United States is concrete, at about 140 million tons. Asphalt is close behind. In addition, asphalt shingle generation is about 11 million tons annually, with the amount recycled at about 2 million tons.

The CDRA has 275 members throughout North America. Almost all these companies are privately held small businesses. Obviously the benefits of recycling all these companies bring to the environment is tremendous. For example, that 140 million tons of concrete recycled would otherwise go to landfills, quickly filling them up, while also requiring an equal amount of mining activity to take place. In addition, the industry provides thousands of green jobs to the economy.

DCA represents contractors, suppliers and manufacturers who provide construction services including installation, replacement and rehabilitation of natural gas pipelines, water and wastewater infrastructure, as well as fiber optic, cable and duct systems in communities across the country.

ICE

INTERNATIONAL COUNCIL OF EMPLOYERS
of Bricklayers and Allied Craftworkers

ICE is the only wholly union international masonry contractors' association, representing approximately 10,000 signatory contractors who perform, brick, block, stone, tile, marble, terrazzo, cement masonry, plastering and restoration work. Its members employ the highest skilled, safest and best trained workers in the masonry industry. The primary purpose of ICE and its affiliate entities is to engage in labor relations matters with the International Union of Bricklayers and Allied Craftworkers (BAC) and its constituent local unions. The contractor members and officers of ICE are committed to working in harmony with the BAC to further the collective bargaining process, to enhance work opportunities for members of the union and to increase business opportunities for union contractors. ICE works with the BAC to provide union masonry craftworkers with the best training available, safe jobsites, pensions and healthcare. It works with its affiliates and other signatory contractors' associations to provide signatory masonry contractors with labor relations, education, staffing services and political advocacy specifically needed by the signatory contractor.

ICPI
INTERLOCKING CONCRETE PAVEMENT INSTITUTE ®
Celebrating 20 Years

Pavers in Every Project!

As the leading technical organization on segmental concrete pavement systems, the Interlocking Concrete Pavement Institute (ICPI) provides substantial resources to concrete paver producers, contractors, suppliers, design professionals and distributors. Members representing this growing industry support the association's mission while utilizing its wealth of resources to gain a competitive business edge.

Our Mission:
To increase awareness, acceptance and use of segmental concrete pavement systems in North America.

What We Do:

- **Education:** ICPI and its members hold education and certification programs across the US and Canada, providing top quality education for contractors, sales and design professionals, university professors and municipal officials.
- **Communications and Marketing:** ICPI provides continuous communication and marketing efforts to members, users and specifiers regarding the benefits of segmental concrete pavement systems. This is done through various mediums including www.icpi.org, *Interlock Design* magazine, publications and e-newsletters aimed at specific audiences.
- **Government Affairs and Advocacy:** Advocating for our members and promoting the value of our industry is a top priority. ICPI identifies opportunities to educate policymakers and addresses legislative and regulatory issues affecting the segmental concrete pavement industry.
- **Industry Standards and Research and Development:** ICPI staff participates on ASTM and CSA committees governing paving product standards and liaisons with various other associations, to represent industry best interests. ICPI's participation with ASTM and CSA has led to improvements in existing paver standards and test methods.
- **ICPI Foundation:** The ICPI Foundation for Education and Research supports, develops and conducts educational programs, seminars, courses and research, and disseminates information relating to interlocking concrete pavement.

Our Members:
ICPI began in 1993 with 66 charter members, since then membership has grown to over 900 companies. The diverse and unique membership represents manufacturers, contractors, industry suppliers and distributors. Our members are made up of strong, passionate leaders committed to the future growth and success of our industry.

Leading Builders of America (LBA) is a Washington, DC based trade association representing twenty one of the nation's largest homebuilding companies. Our members construct about one third of the new homes sold annually in the United States, generating over $33 billion in revenue and accounting for over 350,000 jobs through direct employment and the engagement of subcontractors. LBA's primary goal is ensuring that new homes remain affordable for American families.

Celebrating 70 Years • 1944-2014

MARBLE INSTITUTE of America

Setting the Standards for Natural Stone

About the Marble Institute of America

Headquartered in Cleveland, Ohio, the Marble Institute of America (MIA) has served as the authoritative source of information on standards of natural stone workmanship and practice and the application of natural stone products for 70 years.

Membership in the association is worldwide and includes over 1,600 natural stone producers, exporters/importers, distributors/wholesalers, fabricators, finishers, installers, and industry suppliers committed to the highest standards of workmanship and ethics.

MIA offers an industry accreditation program for fabricators and installers, markets a range of technical publications and consumer pamphlets on natural stone, sponsors business and technical meetings and seminars on industry-related topics, provides educational programming for architects and construction specification professionals, and conducts the annual Pinnacle Awards competitions recognizing outstanding natural stone projects worldwide.

MIA is also a leading promoter of stone usage in the commercial and residential marketplaces, producing consumer education materials on the use of natural stone and its proper care and maintenance. More information can be found on the association's website: http://www.marble-institute.com.

MIA Position Statement:

The Marble Institute of America (MIA) is urging OSHA to maintain the current silica exposure levels as they are appropriate if adhered to. Data from the U.S. Centers for Disease Control (CDC) show a greater than 90 percent reduction in the silicosis mortality rate from 1968 to 2010. It is doubtful that a further reduction of the allowable exposure limits will impact those numbers.

Advances in wet cutting and stone industry education have positively aided OSHA in the effort to curb silica exposure during the past few years. The MIA believes that OSHA will continue to have a positive impact if attention is focused on compliance at the current exposure levels.

The natural stone industry advocates the use of proper equipment, training, vigilance and continual monitoring to minimize the risk of silicosis. The MIA has produced videos, handouts, and training guidelines on awareness and prevention of silicosis, and is providing many of those resources free-of-charge to stone companies online.

Again, the MIA is 100% committed to workplace safety. The well-being of our member companies, and the stone industry as a whole, is at the core of what we do every day. This new rule will require our members, and all companies in the stone industry, to endure additional burdens, despite the fact that consensus on the safety impact has yet to be reached. Learn more at www.marble-institute.com/silica.

The Mason Contractors Association of America (MCAA) is the national trade association representing all mason contractors both union and open shop. MCAA was incorporated in 1950. Its purpose is to help educate, train, and represent the mason contractor through its various programs aiding members to maintain their competitive edge against other construction methods.

In addition, the MCAA promotes the use of masonry, actively recruits and assists in training of the industries workforce, advocates for federal legislative issues and standards affecting contractors and provide educational programs for the employees of member firms. One such program includes weekly webinars throughout the year through the MCAA webinar series. The MCAA contracts with a lobbying firm in DC to advocate for our positions consistent with our purpose. The MCAA is a 501 C 6 not for profit entity.

In 2008 the MCAA created a new entity called the Masonry Foundation which is controlled by a spate Board, has separate by-laws and operates as an independent foundation. The foundation's purpose is to support education, training and research priorities of the industry. The Masonry Foundation is a 501 C 3 organization and is currently in the process of a five year endowment building campaign.

The MCAA has been operating for nearly 65 years and is proud of it's rich history in advocating for all mason contractors throughout the US.

The Association

The Mechanical Contractors Association of America (MCAA) is a non-profit construction trade association representing more than 2,400 members nationwide and overseas. More than 2,000 of MCAA's members are mechanical construction and/or service firms.

- Most MCAA contractor members perform both mechanical construction and mechanical service work;
- All of MCAA's contractor members are union contractors;
- Their companies employ more than 270,000 union workers; and
- The association has 85 local affiliates (chapters) throughout the United States and overseas.

Mechanical Construction

Mechanical construction firms are primarily involved in the installation of:

- Piping systems:
- Plumbing systems:
- Heating systems;
- Ventilation systems;
- Air Conditioning systems;
- Fire Sprinkler systems; and
- Refrigeration systems.

Mechanical Service

Mechanical service firms are primarily involved in the maintenance and repair of:

- Heating Systems;
- Ventilation Systems;
- Air Conditioning Systems; and
- Refrigeration Systems.

National Association of Home Builders

Founded in 1942, the National Association of Home Builders (NAHB) is a Washington, D.C.-based trade association representing more than 140,000 members involved in home building, remodeling, multifamily construction, property management, specialty trade contractor, design, housing finance, building products manufacturing, and all other aspects of the residential and light commercial construction industries. NAHB is affiliated with more than 800 state and local home builders associations (HBAs) located in all 50 states and Puerto Rico. NAHB's members touch on all aspects of the residential construction industry. About one-third of NAHB's members are home builders and/or remodelers. The others are associates working in closely related specialties such as sales and marketing, housing finance, and manufacturing and supplying building materials. Currently, the residential construction sector employs over 2 million people and NAHB's builder members will construct approximately 80 percent of the new housing units projected in the next 12 months, making housing one of the largest engines of economic growth in the country. The more than 14,000 members that belong to NAHB Remodelers Council comprise about one fifth of all firms that specify remodeling as a primary or secondary business activity. The NAHB Multifamily Council is comprised of more than 1,000 builders, developers, owners, and property managers of all sizes and types of multifamily housing comprising condominiums and rental apartments.

For over two decades, NAHB and its members have been at the forefront of enhancing safety and health in residential construction. NAHB has taken part in numerous Occupational Safety and Health Administration (OSHA) rulemakings and our members have experience in complying with the myriad of OSHA regulations that affect the residential construction industry. NAHB has been an active partner with OSHA through its Alliance Program and participation on OSHA's Advisory Committee on Construction Safety and Health (ACCSH). Together, NAHB and OSHA have worked to improve worker safety and prevent workplace fatalities, injuries, and illnesses in the home building industry. Because of this experience and expertise, NAHB is well positioned to provide useful information, advice, and input to federal regulators, such as OSHA.

NARI®

NATIONAL ASSOCIATION OF THE REMODELING INDUSTRY

NARI is a non-profit trade association with national headquarters based in Des Plaines, IL with 57 local chapters located in most major metro areas. NARI members are engaged in repair/remodel of residential and commercial construction. NARI members voluntarily subscribe to a strict Code of Ethics and Standards of Practice.

NARI is the only national organization dedicated exclusively to the remodeling industry. NARI members are entrusted to work on the most valued asset of their clients and customers—their home.

NARI delivers rigorous education and certification programs including Certified Remodeler, Certified Lead Carpenter, Certified Kitchen and Bath Remodeler, Green Certified Professional and Universal Design Certified Professional and Certified Remodeler Project Manager. These programs are a NARI hallmark.

NARI annually awards Contractor of the Year (CotY) awards which recognize remodeling project excellence and expertise.

NARI'S CORE PURPOSE
To advance and promote the remodeling industry's professionalism, product and vital public purpose

NARI'S CORE VALUES
Professional: Ethical and honest; committed to high standards
Open: Diverse and respectful; inclusive of many views and dedicated to free expression
Progressive: Informed and knowledgeable; resourceful and flexible
Member Focused: Focused on importance of success, return on investment and profit

Legacy: Founded 1983
Strength: 6,500+ member companies
Nationwide Network: 27,730 contractors (includes specialized trade contractors). 340,195 employees of allied companies within the industry (vendors, manufacturers, lumberyards, etc.)
Educated: 1,454 hold at least one NARI certification

Our members:
Small: 79.93% employ between 1-10 people. 46% have between $1-$5 M in revenue.
Experienced: 34% of companies have been in business 6-15 years; another 34% have been in business 16-30 years.

The National Demolition Association, founded in 1973, is the trade organization for the Demolition Industry in the United States, Canada and beyond. With over 800 members the organization represents the bulk of the entrepreneurial contractors and suppliers involved with the demolition process. In addition to structural dismantlement the industry is involved with implosions, asbestos, lead, and PCB abatement, the safe handling of hazardous and toxic materials, historic preservation, land clearing, facilities decontamination, specialized rigging, landfilling, C&D recycling, industrial recovery, scrap processing, trucking and general contracting. The Demolition Industry around the world is the largest source of feedstock for the scrap recycling industry and often recycles over 90% of the demolition debris in its material stream. The Association is the repository of safe work practice for the Demolition Industry on a global basis. Its Demolition Safety Manual, which was developed under an OSHA "New Directions" grant, is the bible of safe work practice for the industry around the world. The Association, as part of an OSHA Alliance, developed a Disaster Site Worker Training & Certification Program to train demolition workers as Second Responders at any man-made or natural disaster.

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION

NECA began in 1901 when a group of electrical contractors met in Buffalo, NY to form an association that could help in the fostering of trade among electrical contractors and reform abuses in the electrical industry. Part of its mission was to settle differences between its members and promote more enlarged and friendly discourse among its members.

Today over 3500 NECA members from around the country count on NECA to deliver the resources that help them make better business decisions, provide excellent customer service, and take advantage of innovative technology. NECA's national office and local chapters advance the electrical construction industry through advocacy, education, research, and standards development.

NECA works with members, contractors, building owners, developers, manufacturers, business development staff and NECA chapters to produce training programs, tools, publications and promotional material that position NECA contractors as a customer's full service energy solutions provider.

Our member’s voices matters when it comes to the issues, regulations and legislation that affect their businesses. NECA represents members on Capitol Hill with regulatory agencies and federal officials. By monitoring OSHA and DOL rulemaking activities, NECA helps members prepare for and follow the regulations promulgated by those agencies.

By participating with NFPA in the NFPA 70 National Electrical Code making process, NECA can help to ensure better electrical installations for the public. Working with NFPA in the revisions to NFPA 70E, Standards for Electrical Safety in the Workplace, NECA helps its member provide a safe workplace for their employees.

NECA also develops installation standards that are recognized by architects, designers and engineers as the baseline for quality assurance and acceptance. NECA also recognizes emerging technologies such as solar, wind and electric motor vehicles and helps to develop standards with ANSI to ensure these are installed and used in the safest manner possible.

NECA connects our members with the products and services that support their businesses. Electrical contractors count on NECA to deliver the industry’s most up-to-date technical guides and e-tools. From PPE Selector to the Manual of Labor Units, NECA can help its members improve productivity, safety and accuracy.

NRCA

National Roofing Contractors Association

Established in 1886, NRCA is one of the nation's oldest trade associations and the voice of professional roofing contractors worldwide. NRCA is an association of roofing, roof deck, and waterproofing contractors; industry-related associate members, including manufacturers, distributors, architects, consultants, engineers, and city, state, and government agencies; and international members. NRCA has approximately 3,600 members located in all 50 states and 51 countries and is affiliated with 100 local, state, regional and international associations. NRCA contractors typically are small, privately held companies, with the average member employing 30-40 people in peak season and having sales of $3.5 million per year. NRCA members install the majority of new construction roof systems and replacement roof systems on commercial and residential structures in the U.S.

One of NRCA's core objectives is to promote worker health and safety in the roofing industry. NRCA has developed more than 50 roofing safety-related publications, programs and training materials on diverse topics including asbestos abatement, hazard communication, fall protection and crane and hoist operation. In addition, over the past 12 years, OSHA has awarded NRCA 11 individual grants to develop programs designed to improve workplace safety in the roofing industry. Many of those grants have dealt with a priority issue for both OSHA and NRCA: protecting roofing workers from falls. NRCA has been a sitting member of and represents the roofing industry in proceedings before OSHA's Advisory Committee for Construction Safety and Health, is a member of the American National Standards Institute's A10 Committee on Construction and Demolition Operations and the SIO 45001 standard's Technical Advisory Group for Occupational Health and Safety Management Systems.

NUCA is the largest and most influential national trade association working solely for the excavation and utility construction markets. NUCA represents contractors, manufacturers, suppliers, and other service providers engaged in the water, sewer, gas distribution, electric, communications, construction site development and excavation industries. Founded in 1964, NUCA is entering its 50th year of leadership providing high quality safety services, craft training, management education, and advocacy.

Under the direction of our Safety Department, NUCA offers premier confined space and excavation safety training programs, taught by over 100 instructors nationwide. We also offer a bimonthly safety newsletter, publish a monthly safety article in Utility Contractor magazine, conduct an annual 3-day Safety Directors forum, and provide individualized technical assistance from a CSP on a full range of safety issues, including how to establish and implement a successful safety program and remain in compliance with OSHA regulations. We work closely with the Common Ground Alliance for damage prevention best practices. We provide safety training products, recognize exception safety results through our William H. Feather Safety Awards program, and also invite our members to join the Safety Ambassdors Club, which provides funding for a wide variety of new safety activities, resources and initiatives.

Our Vice President of Safety, George Kennedy (CSP), brings 35 years of professional safety experience to work every day and was awarded the National Safety Council's Distinguished Service to Safety Award (DSSA), it highest individual honor, in 2013.

In 2003, the Natural Stone Council (NSC), a not-for-profit organization, was formed to unite a diverse industry of natural stone producers, fabricators and related affiliates to actively promote the attributes of natural stone in commercial, residential, government, institutional, educational and all types of applications interior and exterior, and to proactively position natural stone as the premier construction material. The NSC is comprised of twelve affiliates representing every type of dimensional stone quarried and fabricated in the United States. The NSC affiliates have a combined membership over 2,200 whose companies' employee in excess of 40,000 workers. The dimension stone industry is a major part of the nation's economy. According to recent Department of Labor figures, 4,380 stone quarries themselves directly employed 35,248 workers, and 2,125 fabrication facilities directly employed 23,666 workers. Additional indirect employment is estimated to be greater than 100,000 people with a total estimated payroll for the industry approaching $4 billion annually.

The affiliates include Allied Stone Industries, Building Stone Institute, Elberton Granite Association, Indiana Limestone Institute, Marble Institute of America, Mason Contractors Association of America, National Building Granite Quarries Association, National Slate Association, Natural Stone Alliance, New York State Bluestone Association, Northwest Granite Manufacturers Association, and Pennsylvania Bluestone Association.

By pooling resources and launching a united branding campaign including the use of a Genuine Stone® coin logo, NSC has successfully established awareness for natural stone's authenticity. Natural stone producers and retailers now have a trusted symbol by which designers and consumers can recognize natural stone and differentiate it from imitation stone products.

To further promote the sustainability of natural stone, the NSC has funded the development of an environmental ANSI based standard, NSC 373, to which stone producers and products can become certified.

The NSC Environmental Compliance Sub-Committee which also includes MSHA-OSHA focused interests is an interdisciplinary group of professionals with expertise in air, land, water and waste resources, management, and regulatory obligations. The committee is made up of professional engineers, professional geologist, and operations leaders to provide a wide understanding of the impacts of environmental compliance on operations. The mission of the sub-committee is to keep members of the Natural Stone Council up to date on the environmental trends and upcoming regulations that may have an impact on the industry and to support related NSC initiatives.

The Natural Stone Council is committed to supporting sustainable initiatives and innovations at all levels of the production of Genuine Stone products. As such, best practices of the industry have been identified and these guidance documents created to provide assistance in implementing environmentally-preferable operations.

Located across the Potomac River from Washington, D.C.'s corridors of power, The Association of Union Constructors (TAUC) – "The Voice for Union Construction" -- occupies a unique space in the nation's capital as the premier national trade association for the union construction industry.

TAUC is made up of more than 2,000 contractor companies that utilize union labor for their projects, as well as local contractor associations and vendors in the industrial maintenance and construction fields.

TAUC's mission is to act as an advocate for union contractors and enhance cooperation between the three entities involved in the successful completion of construction projects: the union, the contractor and the owner-client, the company for which the work is being completed. By encouraging this "tripartite dialogue," many potential issues and delays are eliminated before work even begins.

We strive to demonstrate that union construction is the best option because it is safer and more productive, and also provides a higher-quality and cost-competitive product. We aim to enhance labor-management cooperation, workplace safety and health and collaboration among construction users with the greater goal of making union contractors more competitive in the marketplace.

Founded in 1969 under the auspices of the National Erectors Association, the organization originally served as the voice for union steel erector companies. Over the years, however, the need became apparent for a single national organization to represent all industrial maintenance and construction companies that realize the value of the union workforce, and soon other non-steel erection contractors would join up as well. In recognition of this newfound diversity, in 2007 the association changed its name to The Association of Union Constructors.

TILE ROOFING INSTITUTE

Founded in 1971 (Incorporated in the state of California, non-profit 501C6), the Tile Roofing Institute (TRI) - originally named the National Tile Roofing Manufacturers Association (NTRMA) - has been the leading voice for the concrete and clay tile Industry. The TRI has over 95% of the capacity for roofing tiles within its ranks and has several hundred roofing contractors, distributors and suppliers of related materials. The primary focus of the TRI has been in the development of technical manuals, industry positions and research studies for code language and preferred installation practices within all the major code bodies nationwide. TRI has played a major role in establishing tile performance and recommendations for severe weather, fire and seismic conditions, as well as developing legislation of building codes.

A few instances where TRI's presence has proven to be invaluable include:

- TRI developed the first industry-based series installation guides for all climatic regions in North America.
- TRI assisted the Committee for Firesafe Dwellings in the creation of legislation to ban combustible roofing materials in California.
- TRI guided the tile roofing industry's successful efforts to revise code for high- wind applications and worked with local building officials to upgrade installation standards following Hurricanes that have hit within the USA.
- TRI along with the University of Southern California (USC) determined that tile roofs--when installed under current building codes--withstand forces two-to-three times those generated by the Northridge Earthquake.
- TRI worked with the American Society of Testing Materials (ASTM) to develop standardized testing methods for roof tile.

In addition to the technical aspects of roofing tiles, the TRI provides certified training programs for installation, Specialty and high wind certification. These programs target roofing installers, inspectors and industry professionals on proper, code approved methods to installing concrete and clay tile roofs. TRI is dedicated to growing the tile roofing market through technical expertise, training, and building awareness for the many benefits of tile.

The TRI is an active liaison for roofing tile initiatives with all of the regional roofing contractor associates allowing industry to collaborate with the roofing professionals in developing recommended and best practices that address product, installation and safety concerns.

Exhibit C: Interim Report to the Construction Industry Safety Coalition on Costs and Economic Feasibility of OSHA's Proposed Standard for Worker Exposure to Respirable Crystalline Silica in the Construction Industry

Environomics, Inc.

February 11, 2014

This report summarizes our progress to date in reviewing and assessing OSHA's economic analysis in support of the Proposed Standard for the construction industry and in developing our own assessment of the costs and economic feasibility of OSHA's proposal. In this work for the Construction Industry Safety Coalition ("CISC"), we aim to:

1. Develop a more accurate estimate of the likely costs of the Proposed Standard for the construction industry than OSHA has developed. We will review and critique OSHA's cost estimates and develop our own re-estimates, both for engineering controls (wet methods, LEV, etc.) and for the ancillary requirements. We will develop our re-estimates based upon more accurate information and cost inputs and use of better analytical methodologies that more appropriately reflect the manner in which construction work is conducted.

2. Analyze the economic impacts on construction industries if they were to face the compliance costs that we estimate. Our economic impact assessment will include four components.

    - Comparing annualized compliance costs for the large, aggregated construction industries that OSHA has identified (e.g., residential building construction) against estimated annual revenues and profits for these industries;

    - Comparing annualized compliance costs against revenues and profits for industries defined in a narrower manner than OSHA has considered (e.g., masonry contractors, concrete sawing and drilling contractors). These more narrowly defined construction industries will be more directly and significantly affected by the Proposed Standard. There is no reason why the affected construction industries must be defined in only the grossly aggregated manner that OSHA has chosen;

    - Assess the likely economic impacts for small and very small construction businesses;

    - Evaluate the economic impacts on the construction industry from a fuller range of costs attributable to the Proposed Standard than OSHA has considered, including likely costs to the construction industry from the proposed General Industry standards (e.g., increased cost for construction materials produced by the to-be-regulated General Industries, including concrete, brick, block, tile, stone, etc.); costs to the construction industry when the task specifications of Table 1 come to be adopted by the more than 2.5 million self-employed individuals who perform construction work; and costs if the Mine Safety and Health Administration were to promulgate a PEL for the mining industry that matches that which OSHA is proposing (e.g., cost increases for construction raw materials such as cement, sand, gravel, clay, stone, etc.).

3. Based on this work, we will then draw conclusions as to the economic feasibility of the Proposed Standard for the construction industry.

To date, we have accomplished only portions of this planned work. We have reviewed and assessed OSHA's compliance cost estimates for the construction industry and the Agency's analyses concluding that these costs are affordable and that the Proposed Standard is economically feasible. We have identified shortcomings in OSHA's data, assumptions and methodologies. We have worked with CISC's legal counsel to survey the CISC membership and develop additional data with which we can characterize the construction industry more accurately than OSHA has. We have accumulated exposure monitoring information for several important construction occupations that OSHA has omitted from the Agency's analysis, with this data indicating that workers in these occupations generate and can be exposed to respirable crystalline silica in meaningful concentrations while performing tasks similar or identical to those that OSHA believes will be affected by the Proposed Standard. We have developed a methodology for including these omitted workers in our re-estimate of compliance costs. We have identified several additional faults in OSHA's compliance cost analysis, have developed ways to modify OSHA's cost analysis to correct some of these faults, and have built our own modified version of OSHA's cost model that estimates compliance costs for the Proposed Standard and that we can update as we make further improvements to OSHA's data and methodologies.

At this time, we estimate that the construction industry will incur costs of approximately $2.2 billion per year to comply with the Proposed Standard, some four to five times the amount that OSHA estimates. We expect that our cost estimate will increase as we make further improvements in our modeling to address additional shortcomings that we see in OSHA's analysis. We also believe, based on the compliance costs that we anticipate estimating and our review to date of information relating to the construction industry's ability to bear these costs, that the Proposed Standard will not be economically feasible for the industry.

Due to the limited time available to understand and evaluate OSHA's record, to generate data with which to test OSHA's assumptions, to re-estimate the likely costs of the regulation, and then to compare these re-estimated costs against appropriate measures of the industry's ability to bear these costs, we have not yet completed the work we plan. We will perform further analysis and will develop additional findings, and we will provide an updated and final report at some date prior to the scheduled public hearings on the Proposed Standard.

In this interim report, we summarize the major faults we find in OSHA's compliance cost analysis for the construction industry, discuss how we have addressed these faults in our model for re-estimating compliance costs, and present our current but interim estimate of these costs. We are not at this time reporting on the shortcomings in OSHA's economic impact analysis nor on the progress that we have made in estimating the economic impacts that will result from the estimated costs for the industry to comply with the Proposed Standard.

A. Major Issues Regarding OSHA's Cost Analysis.

Table 1 summarizes the major issues we identified in OSHA's cost analysis and have been able to address in the current version of cost model. Table 1 also introduces the key differences in methodological approach that OSHA and we employ on each issue. The remainder of this section explains each of our issues with OSHA's cost analysis in more depth, expands on the problematic features of OSHA's approach, and contrasts them with the key features of our approach.

Table 1
Overview of Our Issues Concerning OSHA's Cost Estimates for the Proposed Silica Rule and Key Differences Between OSHA's and Our Approaches for Cost Estimation

Our Issue		OSHA's Approach	Our Approach
1.	OSHA wrongly fails to count and include several construction occupations in the cost analysis	OSHA considers 14 construction occupations comprising 3.25 million workers who routinely engage in the 12 dusty tasks addressed by OSHA in its analysis.	We included nine additional construction occupations representing a further 1.5 million workers who also routinely engage in dusty tasks identical or similar to those addressed by OSHA in its analysis.
2.	OSHA's analysis focuses on at-risk full time equivalents (FTE) instead of workers, resulting in drastically underestimating the need for and costs of control equipment (LEV, wet methods, etc.)	OSHA estimates costs to provide the control equipment prescribed in Table 1 to workers for only the amount of time that they are estimated to spend actually performing at-risk tasks producing respirable silica dust.	We provide control equipment to workers who engage in dusty work on an ongoing basis so that it will be available to them whenever they may need to perform an at-risk task
3.	OSHA's "productivity penalties" associated with using the controls understate actual productivity losses.	OSHA estimates productivity losses involving labor that are incurred when using control equipment prescribed in Table 1 of the Proposed Rule.	We estimate total productivity losses, representing both labor and equipment losses due to the use of control equipment prescribed in Table 1 of the Proposed Rule.
4.	OSHA's cost estimates for engineering controls do not reflect construction employers' inability to forecast accurately exactly which at-risk workers will be over-exposed relative to a new PEL and when.	OSHA uses its task-level exposure profiles to estimate fractions of at-risk workers who would be exposed at levels above and below the proposed PEL. OSHA assumes that controls need be provided only when performance of the dusty task would have resulted in exposure above the proposed PEL	We considered all 3.25 million workers in OSHA's construction occupations (as well as the 1.5 million workers in our additional occupations) to be at-risk workers who may expect to be at least occasionally exposed to significant levels of silica dust.
5.	OSHA underestimates the costs of the ancillary provisions.	OSHA uses its estimate of 1.8 million workers as the starting point for its estimates of workers who would be covered under each of the proposed ancillary program requirements.	We use our estimate of 3.25 million workers, plus the additional 1.5 million workers in our additional occupation, as the starting point for our estimates of workers who would be covered under each of OSHA's proposed ancillary program requirements.

1. Failure to count and include in the cost analysis additional construction occupations.

OSHA has inexplicably omitted from the Agency's analysis of the economic costs and impacts of the Proposed Rule some 1.5 million workers in the construction industry who routinely perform dusty tasks on silica-containing materials. These workers – members of large construction trades such as plumbers and plumber helpers, roofers, electricians and electrician helpers, and including specialty trades such as plasterers and stucco masons and helpers and tile and marble setters – perform tasks identical or similar to those performed by occupations included by OSHA in the Agency's cost analysis such as bricklayers, concrete finishers and construction laborers. Together the additional occupations increase OSHA's base estimate of the affected construction workforce by nearly 50 percent.

Not only do workers in these additional occupations engage in some of the single tasks used by OSHA to identify other at-risk occupations (e.g., drilling holes in concrete or masonry to affix anchors as performed by carpenters), they are known to perform multiple silica-generating tasks during the course of their work day. For example, an electrician may both drill pass-through holes in masonry or other silica-containing construction materials using a hand-held drill and also open silica-containing wall, ceiling, and floor surfaces to install, repair or replace wiring, equipment, or fixtures.

On a first review of OSHA's cost analysis, it may appear that the Agency's selected tasks and occupations are intended only to be representative of the kinds of dusty work performed in construction. But no, OSHA intends its selective list to be exhaustive. OSHA has adopted a conceptual formulation that fails to capture the full extent of dusty tasks performed by construction workers and is deeply flawed for purposes of estimating at-risk employment, control equipment needs and their associated costs, as discussed below. The at-risk tasks performed by the additional occupations suggest a moderate increase OSHA's overall estimate of at-risk FTE. However, when workers in the additional occupations are considered under more realistic assumptions than OSHA's about deploying tools, equipment and controls across the construction work force, the increase in the number of the construction workers resulting from the addition of these occupations greatly affects the estimated control costs and "productivity penalties" when these additional workers perform silica-generating tasks. Moreover, the numbers also result in proportional increases in the costs associated with the proposed program's ancillary requirements, which are driven largely by the size of the affected construction workforce.

The following briefly describes and contrasts OSHA's and our methodological approaches.

OSHA's Approach: OSHA's analysis focuses on 14 of over 40 construction occupations, presumably because in the agency's view those occupations account for most of worker time spent on dusty construction tasks. OSHA's 14 occupations do in fact account for most (but not all) of the drilling, cutting, breaking and abrading of masonry materials that result in potential silica exposures. OSHA's choice of occupations is consistent with its decision to use at-risk full-time equivalents (at-risk FTEs, see below), rather than actual worker counts, to characterize the at-risk work force engaging in dusty tasks.

Our Approach: An examination of OSHA's approach reveals two types of omissions.

- OSHA has failed to include occupations including large numbers of construction workers who routinely engage in drilling, cutting, breaking and abrading of masonry and other silica-laden materials, albeit typically for fractions of worker time smaller than many (but not all) of OSHA's selected occupations.

- OSHA's profile for carpenters, one of the largest construction occupations addressed in the Agency's analysis, includes only hole-drilling into masonry materials, while failing to include other tasks commonly performed by carpenters, such as cutting, breaking and abrading masonry and other silica-laden materials. These additional tasks may individually amount to small fractions of a carpenter's work day. Taken together, however, the additional dusty tasks portray a more significant potential exposure profile in which the carpenter may be spending several times the amount of time estimated by OSHA performing dusty tasks.

We integrated the additional occupations, workers and tasks into our analysis as follows:

- We added nine construction occupations: Tile and Marble Setters; Electricians and Electrician Helpers; Plumbers and Plumber Helpers; Plasterers and Plasterer Helpers; and Roofers and Roofer Helpers. Table 2 presents an overview of our additional occupations and associated employee counts, which total about 1.5 million workers across the 11 4-digit construction NAICS.

- We made work crew assumptions for each occupation, similar to OSHA's representative job and crew analysis for its 12 at-risk tasks. For each occupation we assumed a crew size of two, composed loosely of a senior and junior tradesman (e.g., electrician and electrician's helper, or junior electrician).

- We accounted for the real-world likelihood that employers would seek cost savings through sharing of equipment and controls. For example, a carpenter making only limited use of an LEV shroud required for hole drilling could comfortably share equipment with other carpenter crews under the same employer on a given job site. We assumed that control equipment sharing would be inversely related to the amount of time control equipment is required by a crew, i.e., the fraction of time spent on the at-risk task. For simplicity, we adopted the following assumptions:

   - If the fraction of time spent on the at-risk task was less than 10 percent, three crews would share control equipment.

   - If the fraction of time spent on the at-risk task was over 10 but less than 50 percent, two crews would share control equipment.

   - If the time spent on the at-risk task was 50 percent or more, there would be no control equipment sharing. i.e., the control equipment would be used exclusively by one crew.

- After examining work descriptions for each occupation available from the Bureau of Labor Statistics and other career development services to identify dusty tasks commonly performed by each occupation, we assigned each new occupation an at-risk profile. The at-risk profiles are composed of at least one of OSHA's existing 12 at-risk task profiles and supplemented to reflect fractions of time spent on additional dusty tasks that we identified. Table 3 summarizes the composition of our at-risk profiles for the additional occupations and workers.

- We applied the estimates of time spent on at-risk tasks borrowed from OSHA's task profiles to the worker counts in our additional occupation to estimate at-risk FTEs for use in calculating productivity losses for the additional 1.5 million workers due to requirements for control equipment use in the Proposed Rule. (See below.) Table 4 presents the distribution of our estimated 92 thousand additional at-risk FTEs by occupation and industry.

- We estimated productivity losses using our own estimates of at-risk FTEs for the additional occupations and OSHA's estimates of productivity penalties for the OSHA tasks we assigned to our additional occupations. OSHA's focus on FTEs properly reflects labor productivity losses incurred while control equipment is in use. As discussed in later sections, we extended OSHA's productivity penalties to equipment costs in order to estimate the corresponding equipment productivity losses due to idle or underutilized equipment.

Table 2

Our Additional Occupations and Workers by Industry

	Our Additional Occupations and Wc			
		Tile and Marble Setters	Electricians and Helpers	Plumbers and Helper:
	18,210	2,020	7,010	4,430
ɔnstruction	33,890	250	12,790	19,870
ı	29,500	0	6,160	23,340
:ion	160	0	0	70
e Construction	1,600	0	800	800
neering Construction	2,950	0	1,410	1,540
Building Exterior Contractors	139,130	0	360	1,900
ıctors	1,037,500	0	655,450	381,140
:ors	85,400	38,760	180	0
:ractors	9,880	1,580	1,630	4,410
overnment	160,800	11,052	37,248	29,610
:ional Totals	1,519,020	53,662	723,038	467,110

Table 3

Additional "At-Risk" Occupations and Tasks Involving Drilling, Sawing, Breaking or Abrading Silica-Containing Materials (Masonry, Concrete, Brick, Block, Stone, Tile, Mortar, etc.)

Based Largely on Job Descriptions Provided in Bureau of Labor Statistics, Occupational Outlook Handbook: What They Do, and CareerPlanner.com/Job Duties and Tasks

1 Percent of a Worker's Time (.01) Over a Year Equals 4.8 Minutes/Day

Carpenter and carpenter helper are two construction occupations that OSHA recognizes as generating a meaningful amount of silica dust, but where we believe OSHA has clearly underestimated the amount of time that workers in this occupation spend in silica-generating tasks. There are other construction occupations that OSHA does not believe generate silica dust, but which we believe do generate meaningful quantities of dust and should be included in the cost analysis.

At-Risk Occupation	OSHA: At-Risk Tasks Performed in this Occupation and Fraction of Time	Us: Additional Drilling Tasks and Fraction of Time	Us: Additional Sawing Tasks and Fraction of Time	Us: Additional Breaking Tasks and Fraction of Time	Us: Additional Abrading Tasks and Fraction of Time	Us: Total Fraction of Time Spent Performing At-Risk Tasks
Carpenter and Carpenter Helper	(1) Drilling holes for anchors using hand-held drill (.01)	(2) Drilling holes to pass things through (e.g., conduit) using hand-held drill (.01)		(3) Inspect and replace damaged framework or other structures or fixtures. (.01)	(4) Fill cracks and other defects in plaster or plasterboard and sand patch, using patching plaster, trowel, and sanding tool. (.01)	Total: .04

At-Risk Occupation	OSHA: At-Risk Tasks Performed in this Occupation and Fraction of Time	Us: Additional Drilling Tasks and Fraction of Time	Us: Additional Sawing Tasks and Fraction of Time	Us: Additional Breaking Tasks and Fraction of Time	Us: Additional Abrading Tasks and Fraction of Time	Us: Total Fraction of Time Spent Performing At-Risk Tasks
Plumber and Plumber Helper	None	(1) At-risk task in common with Carpenters: Drilling anchor holes using hand-held drills (0.1) (2) Drilling pass-through holes using hand-held drill (.01)	(3) Cut holes in walls, ceilings and floors (.01)			Total: .03
Electrician and Electrician Helper	None	(1) Drilling pass-through holes using hand-held drill (.01)		(2) Open wall, ceiling and floor surfaces to repair or replace wiring, equipment, or fixtures. (.01)		Total: .02
Tile and Marble Setters	None	(1) At-risk task in common with Carpenters: Drilling anchor holes using hand-held drills (0.1) (2) Drilling pass-through holes using hand-held drill (.01)	(3) Cut, surface, polish and install marble and granite and/or install pre-cast terrazzo, granite or marble units. At-risk task in common with Brickmasons, Blockmasons and Stonemasons: cutting masonry with a stationary saw (.22)	(4) Remove any old tile, grout and adhesive using chisels and scrapers. (.01)	(5) Clean and level the surface to be tiled (.01)	Total: .26

At-Risk Occupation	OSHA: At-Risk Tasks Performed in this Occupation and Fraction of Time	Us: Additional Drilling Tasks and Fraction of Time	Us: Additional Sawing Tasks and Fraction of Time	Us: Additional Breaking Tasks and Fraction of Time	Us: Additional Abrading Tasks and Fraction of Time	Us: Total Fraction of Time Spent Performing At-Risk Tasks
Plasterers and Stucco Masons and Helpers	None	(1) At-risk task in common with Carpenters: Drilling anchor holes using hand-held drills (0.1) (2) Drilling pass-through holes using hand-held drill (.01)			(3) At-risk task in common with Drywall Finishers: surface finishing (.25)	Total: .27
Roofers and Helpers	None	(1) At-risk task in common with Carpenters: Drilling anchor holes using hand-held drills (0.1) (2) Drilling starter holes for sawing (.01)	(3) Cut roofing materials to fit angles formed by walls, vents, or intersecting roof surfaces (.01)	(4) Punch holes in slate, tile, terra cotta, or wooden shingles, using punches and hammers. (.01)		Total: 04

Table 4
Estimates of At Risk-FTEs for Our New Occupations and Worke

	At-Risk FTEs	Carpenters and Helpers (Incremental Only)	Tile and Marble Setters	Electricians and Helpers	Plumb and Help
		Fraction of Time Spent on At-Risl			
		0.03	0.26	0.02	0.0
n	8,278	7,176	202	140	13
g Construction	5,423	4,242	65	256	59
tion	1,006	183	0	123	70
ruction	62	56	0	0	2
idge Construction	401	361	0	16	24
ngineering Construction	241	167	0	28	46
and Building Exterior Contractors	11,471	3,572	0	7	57
ntractors	24,796	200	0	13,109	11,4
ractors	25,737	3,466	10,078	4	0
ontractors	1,459	382	411	33	13
l Government	13,697	3,684	2,874	745	88
Total	92,571	23,488	13,629	14,461	14,0

2. OSHA's analysis focusing on FTEs instead of workers results in drastically underestimating control costs involving equipment (LEV, wet methods, etc.).

By relying on highly unrealistic assumptions about control equipment deployment and use in the construction industry, OSHA grossly underestimates the costs of complying with the engineering requirements of its Proposed Rule. The Agency appears to believe that control equipment can be deployed in a precisely limited fashion exactly when, and only when, a worker actually engages in a dusty task, instead of making the appropriately controlled equipment available at all times when there is some possibility that a dusty task may need to be performed, as is routinely the case for workers in many construction occupations. According to the Agency, engineering control costs are incurred only while workers are actively engaged in dusty tasks, estimated by OSHA to average less than 20 percent of the time construction workers spend on the job.

This assumption would hold true only under two highly unrealistic conditions: i.e., employers know exactly when and where workers will engage in OSHA's at-risk tasks and employers have the ability to deploy and then instantly remove engineering controls to match the episodic nature of the silica-generating activities. Thus, perhaps without conscious intent, but in practical effect, OSHA introduces us to the theoretical employer of a construction worker who can exactly predict when and where this employee will drill a hole in one or another type of silica-containing material. When the worker initiates the dusty task the appropriate control equipment immediately becomes available, and as soon as the task is completed, the employer instantly transfers the protective shroud and LEV used by the worker for his drill, and the HEPA vacuum used to clean up, to another worker in similar need, or back to the equipment rental service, which accepts the returned equipment for a rental charge reflecting only the precise amount of time that the worker used the control equipment to complete the drilling task.

In fact, construction crews who routinely engage in dusty tasks will need to have appropriately controlled equipment on hand and available virtually all the time, whenever there is a possibility that the job at hand requires them to perform the dusty task.

OSHA offers no evidence to suggest that the Agency, or more importantly, construction industry employers know when and where OSHA's estimated 636,000 work years of silica-generating construction activities will occur. Absent better information, the prudent employer will ensure that appropriate engineering controls must always accompany and be available for all construction crews who routinely engage in dusty tasks. The effect of this alternate, more realistic assumption is reflected in the revised Environomics cost estimate.

The following briefly describes and contrasts OSHA's and our methodological approaches.

OSHA's Approach: OSHA characterizes the need for protective equipment controls prescribed in Table 1 using an estimate of at-risk FTEs representing the time spent on dusty tasks by workers in the construction industry. The agency's approach for estimating the number and distribution of at-risk FTEs across dusty tasks and industries is as follows:

- Select the 14 occupations judged to engage most heavily in 12 dusty tasks chosen as the focus of its analysis.

- Within each of its selected occupations, estimate the fraction of individual worker time spent on each of its selected 12 dusty tasks.

- Within each of its 11 4-digit, construction NAICS industries, allocate fractions of the occupational worker counts to the 12 dusty tasks according to its estimates of time spent by those occupations on each of the tasks. These worker fractions embody a representative job and crew analysis that assigns key and secondary workers with job roles and corresponding amounts of time spent working on or near the dusty task.

The result is a distribution of at-risk FTEs across dusty tasks and industries consistent with OSHA's assumptions about the duration of potential exposure to silica dust, work relationships among crew members, and equipment required to perform its 12 dusty tasks. Control equipment requirements and costs are estimated by OSHA to meet the needs of its at-risk FTEs and not actual workers in its selected occupations, jobs and crews.

Our Approach: We characterize the need for control equipment by identifying workers who engage in dusty work on an ongoing basis reflected in OSHA's estimates of time spent of at-risk tasks and for whom equipment control protection must be generally available. Our approach is as follows:

- Accept OSHA's choice of occupations, judgments regarding time spent by each occupation on its 12 dusty tasks, and representative job and crew profiles for purposes of developing our own estimates and distribution of OSHA's 3.25 million construction workers.

- Sum OSHA's estimates, by occupation, of at-risk FTEs for key and secondary workers by task and industry to obtain a table representing at-risk FTEs by task, industry and occupation.

- Restore at-risk FTEs to at-risk workers in all occupations by distributing the full worker counts on a proportional basis consistent with OSHA's distribution of at-risk FTE.

The result is shown in Table 5, which compares OSHA's distribution of approximately 652 thousand at-risk FTEs with our distribution of the 3.25 million workers. While the appearance of workers and FTEs by tasks and industries is very similar, the ratio of workers to FTEs within a given task and industry combination will vary according to OSHA's estimate of the fraction of worker time on the particular dusty task. For example, the ratio of Hole Driller FTEs and workers is large because OSHA's estimate of the fraction of time spent on the at-risk task is 0.01, or one percent of the worker time. In general, the ratios between actual workers and FTEs are inversely related to the amount of time OSHA judged workers within the relevant occupations to spend on the dusty task. Simply put, this means we had to restore 99 percent of each Hole Driller to re-create a real-world worker in need of Table 1 control equipment protection.

After restoring the construction workforce to its actual size and distribution across tasks and industry, we applied OSHA's assumptions about task crew size and our own assumptions about equipment sharing to estimate the amount and type of control equipment that would be needed to meet the requirements prescribed in Table 1of the Proposed Rule. We proceeded as follows:

- We divided our worker totals (by task and industry) by our characterization of OSHA's crew size assumptions to derive an estimate of the number of work crews among the 3.25 million worker construction workforce.

  We divided work crews estimate by a second "equipment sharing factor" that accounted for likely sharing of equipment and controls that would occur between and among work crews. As explained earlier (see above discussion of Additional Occupations and Workers), we assumed control equipment sharing would occur to a degree that is inversely related to the fraction of time a crew spends on an at-risk task. Or simply: more sharing of control equipment by work crews would occur when control equipment is used for less time by individual crews, thereby making the equipment more readily available to other crews working for the same employer on a given job site. Table 6 presents our control equipment sharing assumptions for OSHA's 12 at-risk tasks.

- After dividing the 3.25 million-person workforce by our crew size and equipment sharing assumptions, we obtained estimates of the amount of equipment by task and industry that would be needed to meet the requirements prescribed in Table 1 of OSHA's Proposed Rule.

- Using OSHA's estimates of total control costs and FTE, we developed a table of average control costs per FTEs by task and industry and applied the average cost estimates to our companion estimates of equipment needs to derive our own total control equipment costs estimates by task and industry. Table 7 presents our estimates of average equipment control costs by task and industry.

Comparison of OSHA's At-Risk FTEs With All Industry Workers
3.25M Workers, 652K At-Risk FTEs

		Total	Drywallers	Earth Drillers	Heavy Equipment Operators	Grinders and Tuckers	Hole Drillers	Impact Drillers	Millers	Masons Using Porable Saws	Masons Using Stationary Saws	R Cru
	Workers	574,527	5,725	0	36,982	36,271	364,568	87,369	33,395	7,828	2,389	
	At-Risk FTE	27,669	1,431	0	8,663	2,011	6,606	5,784	1,602	1,048	524	
		394,515	1,930	0	62,664	45,398	167,915	61,710	40,205	10,788	3,904	
		34,788	482	0	17,938	3,135	3,112	5,212	2,301	1,739	869	
on		217,070	50	63,990	118,675	3,372	8,435	14,986	6,693	382	229	
		96,181	13	24,188	65,917	578	164	4,316	765	102	51	
		13,076	0	0	6,440	709	2,234	2,516	1,178	0	0	
		3,255	0	0	2,912	43	43	202	55	0	0	
ge		202,237	0	1,387	113,438	11,442	14,453	17,006	43,642	40	22	
		66,916	0	419	55,367	1,583	279	3,695	4,016	10	5	
		46,813	50	3,715	29,445	1,264	5,708	3,819	2,279	111	69	
		18,835	13	1,015	16,370	171	111	808	215	30	15	
nd tors		643,349	590	0	20,950	141,753	171,882	19,425	111,964	109,506	67,047	
		111,946	148	0	11,929	30,747	3,343	6,235	14,654	29,869	14,934	
ractors		128,499	50	5,238	31,547	3,362	8,613	77,971	965	566	187	
		10,179	13	141	8,061	59	158	1,609	13	84	42	
ctors		405,094	143,229	0	265	28,243	156,262	19,666	9,532	16,112	6,808	13
		60,006	35,807	0	94	2,079	2,943	1,503	530	3,005	1,503	1
		329,514	50	18,228	189,819	24,247	12,944	17,435	52,880	4,039	2,569	

Table 6

ment Sharing Factors Applied to OSHA

o Estimate Control Equipment Costs

rs	Heavy Equipment Operators	Grinders and Tuckers	Hole Drillers	Impac Driller
	3.0	**3.0**	**3.0**	**2.0**
	1.0	**3.0**	**3.0**	**3.0**
	3.0	**9.0**	**9.0**	**6.0**

Table 7
Average Equipment Cost Per FTE

	Drywallers	Earth Drillers	Heavy Equipment Operators	Grinders and Tuckers	Hole Drillers	Impact Drillers	Millers	Masons Using Porable Saws
	453	0	1,173	452	490	1,142	506	398
	558	0	1,322	507	570	1,292	559	445
	438	1,780	1,242	468	536	1,204	521	412
	0	0	1,074	475	519	1,180	532	0
	0	1,860	1,307	500	578	1,283	543	427
	438	1,752	1,189	484	507	1,193	549	382
	546	0	1,314	455	495	1,183	506	399
	391	1,804	1,276	478	543	1,223	537	396
	474	0	1,192	436	519	1,107	516	355
	417	1,787	1,180	452	511	1,146	501	420
	0	530	749	115	320	703	166	298
	474	1,779	1,135	458	511	1,117	492	398

3. OSHA’s productivity penalties understate actual productivity losses.

OSHA's estimates of the percentage losses in time, or productivity penalties, involved in conducting a task with controls (e.g., LEV or wet methods) relative to conducting the task without controls are based largely on best professional judgment by OSHA’s contractor. In contrast, the CISC has surveyed and received responses from more than 75 construction industry employers and specialty trade contractors regarding, among other topics, the productivity penalties that might be associated with performing silica-generating activities consistent with Table 1 specifications. The responses suggest some areas in which OSHA’s estimated productivity penalties should be increased.

Additionally, though, the CISC survey results convey the clear message that OSHA's productivity penalty percentages, while perhaps analytically convenient for the Agency in estimating costs, do not accurately capture actual productivity losses in most work settings. In contrast to OSHA's simplistic overall percentages, productivity penalties have both a fixed and variable component. The fixed component, typically involving activities such as initial set-up and final clean-up of the control equipment, often occur at the beginning and end of a job or work shift. The variable component applies to losses that occur while the control equipment is in use. OSHA's method of estimating productivity penalties, i.e., multiplying the time spent on the silica-generating task by its productivity penalty percentage, strongly suggests that the Agency has focused mainly (if not exclusively) on the variable component. The actual percentage of time represented by the fixed component will depend on the duration of the job, or the number of set-up/clean-up cycles required over the duration of the job.

When required on a daily or other intermittent basis, set-up/clean-up becomes a variable cost. The CISC survey respondents reported that such activities typically require a significant time commitment – on the order of 30 to 60 minutes. When incurred daily, a thirty-minute activity represents a productivity penalty of six percent, and that figure does not include the additional variable penalty incurred while the control equipment is in use.

Using the example of a worker such as a carpenter drilling into silica-containing materials (e.g., concrete) for anchors demonstrates what OSHA's assumptions look like in the real world. According to OSHA, a carpenter spends an average of 4.8 minutes of his day (one percent of his time) performing this task. OSHA’s estimated labor productivity penalty when performing this task using appropriate controls (LEV for the drill and a HEPA vacuum to clean up the dust) is 2 percent of the task duration, or 4.8 minutes multiplied by 2 percent, which is a little less than six seconds per day. If the carpenter is on a ten-day job, the total productivity penalty that OSHA estimates totals less than 60 seconds, hardly enough time to even get the control equipment out of the truck and onto the job site, let alone set it up, use it, take it down, return it, and maintain it from job to job. The 60 seconds clearly accounts for at most perhaps some variable component of productivity loss when operating the LEV while drilling holes.

More significantly, the worker drilling the holes may be working on a one-day job. While his variable productivity loss may be only six seconds, the fixed cost, if even conservatively estimated at 15 minutes, would increase the total (fixed plus variable) daily loss from six seconds to over 15 minutes, or 150 times OSHA's productivity loss estimate.

Moreover, OSHA estimates such productivity losses only for labor, and not also for equipment. OSHA overlooks the fundamental production relationship between workers and the equipment they use in their work. That is, labor and equipment contribute together to the creation of what OSHA calls "project value". OSHA acknowledges this bedrock understanding by defining Total Daily Project Value as the sum of Daily Labor Value and Daily Equipment Value. OSHA defines Daily Labor Value as the worker's hourly wage multiplied by a standard eight-hour job shift. Similarly, Daily Equipment Value is defined by OSHA as a daily rental rate or daily fraction of an annual cost of ownership for the appropriately controlled equipment. Both labor and equipment are fully productive only when used together in a manner consistent with standard industry practice over the course of a standard job shift. If for any reason either labor or equipment is diverted from its usual productive use, neither contributes to project value and both experience productivity losses.

Stated differently, if due to a labor productivity loss, the labor time required to complete a job increases from eight hours to eight hours and 15 minutes, the equipment time required for job completion will also increase to eight hours and fifteen minutes. Additional equipment rental costs will be incurred for the additional fifteen minutes, or equipment owned by the employer will be delayed for use on another job by fifteen minutes. In either case the employer will have experienced a productivity loss equal to the productivity penalty multiplied by the Total Daily Project Value, not just the Daily Labor Value.

While labor intensity, or the fraction of total project cost representing labor costs, varies considerably across OSHA's at-risk tasks, its average is about 58 percent. This suggests that OSHA is underestimating productivity losses associated with performing tasks using the prescribed controls by an amount roughly equal to the average equipment intensity of about 42 percent.

In the draft estimates that Environomics has prepared for the costs of the Proposed Rule, the consultants have included the impact of some of these issues regarding productivity penalties, but have not included the impacts of others of these issues. At some point before the scheduled public hearings on the proposed regulation, they will provide for the record an updated re-estimate of costs.

The following briefly describes and contrasts OSHA's and our methodological approaches.

OSHA's Approach: OSHA estimates labor productivity losses incurred when using control equipment prescribed in Table 1 of the Proposed Rule as follows:

- For each combination of at-risk task and control equipment, OSHA developed a productivity penalty, expressed as an average percent of time lost due to the use of the control equipment when performing the task. These productivity penalties range from a low of zero to a high of five percent.

- OSHA multiplied the percent productivity penalties for task and equipment combinations, (using simplifying assumptions about their frequency of use) by corresponding project labor costs in order to calculate dollar losses (i.e., percentages of estimated total labor costs) due to the use of control equipment. These labor productivity losses may be interpreted as the additional labor costs incurred to complete projects when they are delayed due to control equipment use.

Our Approach: We estimated total productivity losses incurred when both worker and equipment time are diverted from productive activity due to the use control equipment prescribed in Table 1 of the Proposed Rule, as follows:

- We accepted OSHA's estimates of productivity penalties for purposes of developing an alternative set of productivity loss estimates. Knowledgeable construction industry members told us, however, that OSHA's productivity penalties underestimate losses of worker and equipment time due to control equipment use. Alternative estimates of productivity penalties provided by industry practitioners are typically several times higher than OSHA's estimates, due mainly to OSHA's failure to carefully consider two key cost parameters: 1) significant set up, clean up and breakdown time demands for control equipment; and relatedly 2) the sizable effect of set-up, clean up and breakdown times on projects of shorter, but quite common, duration.

- We accepted OSHA's assumption that productivity losses are incurred only during time spent using control equipment, as measured by OSHA's estimates of time spent on at-risk tasks. OSHA aggregated its estimates of time spent on at-risk tasks to derive its overall estimate of at-risk FTEs. We therefore used OSHA's at-risk FTEs estimate as our own estimate of the total amount of time spent by the 3.25 million construction workers in OSHA's analysis using control equipment and thus subject to productivity penalties.

- We used OSHA's labor productivity loss estimates to represent the labor portion of total productivity losses. To derive our more complete total productivity loss estimate we multiplied OSHA's average labor productivity loss estimates, by task and industry, by the reciprocal of its estimates of average project labor intensity by task. The resulting values are equivalent to what would be obtained by multiplying OSHA's productivity penalties by their respective task-level, total project costs (i.e., combined labor and equipment costs). Table 8 presents OSHA's estimates of average labor intensity and our labor intensity reciprocal values. Table 9 presents our estimates of the average labor productivity loss by FTEs developed using OSHA's estimates of at-risk FTEs and labor productivity losses by task and industry.

Table 9
Average Labor Productivity Loss Per FTE

ywallers	Earth Drillers	Heavy Equipment Operators	Grinders and Tuckers	Hole Drillers	Impact Drillers	Millers	Masons Using Porable Saws	Masons Using Stationary Saws	Rock Crushers	Tunnelers
89	0	0	2,668	978	1,068	1,214	674	1,104	0	0
110	0	0	2,989	1,137	1,208	1,342	754	1,278	0	0
86	0	0	2,761	1,070	1,125	1,251	697	1,173	0	0
0	0	0	2,804	1,036	1,103	1,278	0	0	0	0
0	0	0	2,950	1,154	1,199	1,304	722	1,160	0	0
86	0	0	2,854	1,012	1,115	1,318	646	1,032	0	0
107	0	0	2,685	987	1,106	1,214	676	1,158	0	0
77	0	0	2,820	1,083	1,143	1,288	670	1,136	0	0
93	0	0	2,574	1,035	1,035	1,238	601	950	0	0
82	0	0	2,670	1,020	1,071	1,203	711	1,256	0	0
0	0	0	679	638	657	399	504	1,518	0	0
93	0	0	2,702	1,020	1,044	1,180	674	1,151	0	0

Table 8
Labor Intensities and Labor Intens
Used to Estimate Total Product

	Drywallers	Earth Drillers	Heavy Equipment Operators	Grinders and Tuckers	Hole Drillers	Imp Drill
Labor Intensity	1.00	0.53	0.42	0.95	0.99	
Labor Intensity Reciprocal	1.00	1.88	2.40	1.06	1.01	

4. **OSHA's cost estimates for engineering controls do not reflect construction employers' inability to forecast accurately exactly which at-risk workers will be overexposed relative to a new PEL and which will not.**

OSHA estimates the costs for construction industry engineering controls by: 1) identifying appropriate control measures that can arguably reduce exposures to below the proposed PEL; 2) estimating the cost for a single worker at-risk of silica exposure to employ these control measures; and then 3) multiplying the cost per worker for the controls by the number of workers who would likely be overexposed relative to the new PEL in the absence of such controls.

While there is some logic to this approach, there is a question as to whether employers will be able accurately to distinguish the particular at-risk workers who will be overexposed when they perform a silica-generating task from the remaining at-risk workers who will not be overexposed when they perform the task. Whether a particular construction worker performing the at-risk task on a given day will or will not be overexposed is effectively unpredictable. The exposure information that OSHA has assembled shows that workers performing at-risk tasks (e.g., jack hammering, tuck pointing, sawing bricks or concrete blocks, drilling into masonry, etc.) are sometimes exposed above the PEL and sometimes below the PEL depending on numerous aspects of the task and environment that are exceedingly difficult to identify, understand and predict.

For example, the silica exposure that a jackhammer operator will incur over his work shift depends importantly on such factors as how much of the shift he spends jack hammering; whether the work is performed indoors or in other confined spaces or outdoors; the silica content of the material he is breaking up; whether the wind is blowing or not; whether he stands upwind or downwind of the dust he generates; whether it is raining or not; and so on. Many of these factors are not knowable in advance, and the exact impact of these factors on the worker's exposure cannot reliably be predicted in advance. As a result, the employer cannot be certain in advance of a jackhammer operator's work shift whether the employee is likely to be overexposed or not. The prudent employer and the prudent employee will want to use the exposure-reducing controls in all instances when the at-risk task is performed and overexposures could perhaps result if controls were not to be used. Indeed, this is the presumption inherent in Table 1 – whenever a construction worker performs a listed silica-generating task, he is expected to perform it in a manner consistent with the protective controls specified in Table 1.

Environomics recalculated OSHA's costs for engineering controls for the construction industry based upon the assumption that employers will need to adopt controls for all workers when they perform any of the construction tasks that OSHA identifies in Table 1. This is in contrast to OSHA's costing approach – seemingly contrary to Table 1 – in which the costs the Agency estimates to do all Table 1 tasks as the Table requires is then discounted to reflect the fraction of time that performance of the task, when assessed after the fact with perfect hindsight, would not have resulted in overexposure relative to the proposed PEL. Extending engineering controls to all workers performing at-risk tasks instead of only to the half or so, on average, that end up being overexposed relative to OSHA's exposure profile results in roughly doubling OSHA's cost estimate for engineering controls for the industry.

The following briefly describes and contrasts OSHA's and our methodological approaches.

OSHA's Approach: Under OSHA's Proposed Rule, employers must provide protective control equipment and respirators to workers engaged in dusty tasks that result in silica dust exposures over the proposed PEL of 50μg/m^3. OSHA's analysis assumes that knowledge of worker exposure levels will be available to employers, allowing them to act in accordance with the Proposed Rule by providing the required protections only to workers who need them. OSHA uses the following approach to estimate the number of workers exposed over the PEL:

- OSHA developed its estimate of 652 thousand at-risk FTEs by task and industry. The task-level characteristics of OSHA's at-risk FTEs include exposure profiles (i.e., frequency distributions estimating numbers of FTEs falling within different ranges of silica dust exposure) and requirements for control equipment and respirator usage. Table 10 presents the critical ranges of task-level exposure profiles used by OSHA to estimate the numbers of workers anticipated to be exposed below and above the proposed PEL.

- The industry-level characteristics of OSHA's at-risk FTEs include estimates of the extent to which dusty tasks are distributed among workers in the 11 NAICS industries. For example, OSHA estimated that the 27,669 at-risk FTEs in Residential Building Construction will yield 138,345 at-risk workers, a result arrived at by multiplying its industry at-risk FTE estimate by a distribution factor of 5. Similarly, OSHA multiplied its at-risk FTE estimate for the Non-Residential Building Construction industry by a distribution factor of 2, thus judging that dusty tasks are more narrowly distributed among industry workers in Non-residential Building Construction industry than in the Residential Building Construction. Each estimate of at-risk FTEs in the 11 construction NAICs is multiplied by a distribution factor of 2 or 5 to obtain industry estimates of at-risk workers. In a few industries OSHA's approach to estimating at-risk workers yielded worker counts that exceeded the total number of workers in those industries. In those industries OSHA constrained its estimate so as not to exceed the industry employment count. OSHA's approach resulted in an estimate of about 1.8 million at-risk workers across the 11 construction NAICS.

- OSHA used its task-level exposure profiles to estimate fractions of at-risk workers that would be exposed at levels above the proposed PEL of 50 µg/m^3. Using this approach, OSHA calculated that about 645 thousand workers, or 36 percent of its estimated 1.8 million at-risk workers would be exposed above 50 $\mu g/m^3$, thus exceeding the proposed PEL and requiring protective control equipment and respirators in accordance with Table 1 of the Proposed Rule. The difference, or about 1.2 million workers (and their associated at-risk FTEs) are excluded from most of OSHA's cost analysis, presumably because in OSHA's view those workers would not need and receive control equipment and respirator protections required under the Proposed Rule.

Our Approach: Given the common nature of OSHA's dusty tasks and common knowledge that those and other dusty tasks are inextricably part of construction work, we have taken a very different approach to estimating the size of the at-risk construction workforce, as follows:

We characterized all 3.25 million workers in OSHA's construction occupations (as well as the 1.5 million workers in our additional occupations) to be at-risk workers – that is, workers who may expect to be at least occasionally exposed to significant levels of silica dust.

- Furthermore, we contend that employers typically will not be able to distinguish between workers who are exposed over the proposed PEL and those who are not. In the face of uncertainty and a requirement to act, employers will choose to err on the side of worker safety by providing control equipment and respirator protections to all of their workers. Thus, unlike OSHA's estimate of the at-risk construction workforce, our estimate is not adjusted downward to reflect employer decisions based on information that they usually will not possess. Table 10 compares our 3.25 million at-risk workers by task with OSHA's over-exposed 645 thousand workers.

Table 10

Workers Excluded From OSHA's Analysis Because Th

To Be Exposed Below the Proposed P

Drywallers	Earth Drillers	Heavy Equipment Operators	Grinders and Tuckers	Hole Drillers	Impact Drillers	Mill
86.7%	35.9%	79.2%	10.0%	14.3%	18.3%	54.3
6.7%	17.9%	8.3%	8.5%	28.6%	8.3%	20.0
93.3%	53.8%	87.5%	18.4%	42.9%	26.6%	74.3
77,387	77,056	945,047	120,007	46,258	108,182	89,7
72,228	41,492	826,916	22,091	19,825	28,782	66,7
5,159	35,564	118,131	97,916	26,433	79,400	23,0
151,674	92,907	794,813	297,461	923,762	395,149	332,0

5. OSHA underestimates the costs of the ancillary provisions.

Environomics also believes that OSHA has underestimated the costs of the ancillary provisions for several reasons. First, the number of construction workers to whom the provisions will apply will be much higher than OSHA estimates. Second, OSHA has underestimated the unit costs for activities associated with many of the ancillary provisions in comparison to the cost experience that construction and other businesses have reported in the various industry surveys that have been conducted relating to this Proposed Rule. Third, OSHA's cost estimating methodologies do not, in some important respects, appear to match the specific requirements of the proposed regulation. For example, the requirement for reassessing workers' exposure whenever a "change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level," when read in the context of frequently varying construction work sites and durations for performing dusty tasks, would appear to require far more exposure assessments than those for which OSHA estimates costs. There are several additional reasons why OSHA's cost estimates for the ancillary provisions are too low.

The following briefly describes and contrasts OSHA's methodological approaches for estimating the costs of ancillary program requirements with our own.

Respirators

OSHA's Approach: OSHA estimates the costs of establishing a respirator program and providing respirators as prescribed in Table 1 as follows:

- Estimate respirator unit costs that incorporate the various requirements in the Proposed Rule for respirator equipment and an employer program, and assumptions about how frequently shift lengths of less than and more than 4 hours will occur. OSHA reduces the respirator unit costs by about 50 percent to reflect its assumptions that only half of all workers will experience shift lengths of longer than 4 hours. OSHA's unit cost estimates for the employer program are weighted by industry-level, company size distributions to capture cost differences due to employer program scale.

- Determine how many of OSHA's estimated 1.8 million workers engaged in dusty tasks need respirators. OSHA assumes that only workers exposed to silica dust at levels above the PEL will need and receive respirators from their employers.

- Adjust the estimate for workers exposed above the proposed PEL downward to reflect OSHA's estimate of the percentage of construction industry employers already providing respirators to their workers.

- Multiply the remaining workers – i.e., those workers needing respirators under Table 1 and who are not already using them – by OSHA's unit cost estimates to derive a total respirator cost estimate.

Our Approach: We adopted OSHA's respirator unit cost assumptions and estimates and focused instead on the number of workers who would be expected to receive respirators as prescribed under Table 1 of the Proposed Rule, as follows:

- We began with the full 3.25 million workers in OSHA's 14 construction occupations and our additional 1.5 million workers.

- We assumed that employers would not know which workers were exposed below and above the proposed PEL and thus would provide respirators to all workers subject to the requirements in Table 1.

- We adopted OSHA's assumptions about the fractions of workers who are expected to engage in dusty tasks for less than, and more than, four hours.

- We applied OSHA's estimate of current respirator use to our remaining total to derive an estimate of the number of workers receiving respirators. Table 11 compares OSHA's and our own estimates of number of workers receiving respirators under the Proposed Rule.

Table 11

OSHA's and Our Estimates of the Number of Construction W
g Respirators As Prescribed in Table 1 of the Proposed Rule

	OSHA's Estimate	Our Estimate for 3.25 Million Workers
n	4420.847	43,833
ction	5531.648	44,533
	4765.964	12,860
	112.5855	1,093
struction	3295.079	18,386
ng Construction	660.1879	2,422
ling Exterior		
	44377.32	133,138
	699.1768	19,440
	5410.507	33,530
rs	15271.24	30,168
	6191.82	23,547
ers	90,736	362,951

Exposure Assessments

OSHA's Approach: OSHA estimates the costs to employers of establishing and implementing exposure assessment programs as follows:

- Estimate exposure assessment unit costs that incorporate the various requirements in the Proposed Rule for establishing an exposure assessment program and conducting exposure assessment for qualifying employees. OSHA's unit cost estimates for the employer program are weighted by industry-level, company size distributions to capture cost differences due to employer program scale.

- Determine how many of OSHA's estimated 1.8 million workers engaged in dusty tasks are exposed to silica dust at levels between the proposed Action Level of 25 $\mu g/m^3$ and proposed PEL of 50 $\mu g/m^3$.

- Multiply the number of eligible workers by the unit cost estimate to derive a total cost for employers to establish and implement an exposure assessment program.

Our Approach: We adopted all of OSHA's assumptions concerning unit costs for exposure assessment. We also agreed with OSHA that within this specific requirement it made sense to assume that employers would acquire information about worker exposure levels. We therefore limited our own worker count for exposure assessment to those workers among our 3.25 million workforce and additional 1.5 million workers expected to be exposed between the proposed Action Level and PEL. Table 12 compares OSHA's and our estimates of the number of workers eligible for exposure assessment.

Table 12

arison of OSHA's and Our Estimates of the Number of Worke

at Levels between the Proposed Action and Propo

	OSHA's Estimate for Its 1.8 Million Workers	Our Estimate for Our 3.25 Million Workers
	7,815	81,134
ion	19,805	44,920
	23,614	23,614
	573	1,150
ruction	19,168	18,919
Contruction	4,250	4,250
g Exterior Contractors	73,464	84,439
	1,804	11,390
	11,250	37,972
	26,373	31,666
ent	14,768	26,117
ls	202,883	365,570

Medical Surveillance

OSHA's Approach: OSHA developed its estimates of employer costs for establishing and implementing medical surveillance programs required under the Proposed Rule as follows:

- Estimate unit costs for medical surveillance that capture both the costs of establishing a program and conducting periodic worker medical surveillance. OSHA's unit cost estimates for the employer program are weighted by industry-level, company size distributions to capture cost differences due to employer program scale.

- Estimate the number of qualified workers among OSHA's 1.8 million workers – i.e., those who: 1) are expected to be exposed to silica dust at levels that exceed the proposed Action Level; and 2) have not undergone an exempting medical examination in two or more years.

- Adjust OSHA's estimate of qualifying workers to account for employee turnover and the resulting entry and exit of workers to and from the medical surveillance cycle.

- Multiply the OSHA's unit cost estimates for medical surveillance by the adjusted estimate of qualifying workers to derive a total cost estimate for medical surveillance.

Our Approach: We adopted OSHA's unit cost analysis and focused on developing a more accurate estimate of the number of workers who would be expected to undergo medical surveillance as prescribed in OSHA's Proposed Rule. We also accepted OSHA's estimates of the fraction of workers exposed above the Action Level, fraction of workers having undergone exempting medical examinations, and the effects of the industry turnover rate. We applied all of these assumptions to our 3.25 million workers and additional 1.5 million workers to derive medical surveillance program costs for a workforce significantly larger than the workforce estimated by OSHA. Table 13 compares OSHA's and our estimates of the number of workers expected to undergo medical surveillance under OSHA's Proposed Rule.

Table 13

Numbers of OSHA's and Our Workers Requiring Med

	OSHA's Estimate for Its 1.8 Million Workers	Our Estimat Our 3.25 Million
	8,842	91,796
	27,658	62,732
	10,756	10,756
	225	452
	10,090	9,959
ion	1,641	1,641
r Contractors	221,887	255,035
	1,398	8,826
	26,169	108,254
	21,314	26,440
	6,264	11,078
	336,244	586,969

Training

Under the Proposed Rule employers must provide training to all workers who may be exposed to silica dust on their construction jobs. Training would include communication of the hazards posed by prolonged exposure to suspended silica dust and employee information provided by in-house safety or supervisory staff.

OSHA's Approach: OSHA developed unit cost estimates for training and applied a downward adjustment to reflect an assumed amount of current, ongoing silica training by some construction employers. OSHA's unit cost estimates for the employer program are weighted by industry-level, company size distributions to capture cost differences due to employer program scale. OSHA multiplied their unit cost estimates by all 1.8 million members of their at-risk workforce in expectation that every employee would require some additional training to meet the training requirements under the Proposed Rule.

Our Approach: We adopted OSHA's unit cost estimates and assumptions and multiplied them by our own estimates of the at-risk workforce, i.e., 3.25 million workers representing OSHA's occupations and our additional 1.5 million workers in our additional occupations. Table 14 compares OSHA's and our estimates of the number of workers expected to receive training under OSHA's Proposed Rule.

Table 14

n of the Numbers of OSHA's and Our Workers Requiring Tr

	OSHA's Estimate for Its 1.8 Million Workers	Our Estimate fc Our 3.25 Million Wc
	55,338	574,527
	173,939	394,515
	217,070	217,070
	6,511	13,076
	204,899	202,237
tion	46,813	46,813
ɔr Contractors	559,729	643,349
	20,358	128,499
	120,012	405,094
	274,439	329,514
	170,068	300,770
	1,849,175	3,255,464

Regulated Areas and Access Control Plans

Under the Proposed Rule employers must implement measures to minimize silica exposure for employees not directly involved in operations that generate respirable crystalline silica. To meet this performance objective, employers have the option of either establishing regulated areas or establishing and implementing an access control plan.

OSHA's Approach: OSHA developed its cost estimates for Regulated Areas and Access Control Plans as follows:

- OSHA calculated unit estimates for this requirement by first estimating separately the annual employer costs for developing and implementing either a Regulated Area or an Access Control Plan and then combining them into a single, weighted average unit cost estimate.

- OSHA then multiplied this average unit cost estimate by its estimated number of at-risk FTEs using respirators. By doing so, OSHA has assumed that employers will be able to meet the requirements for Regulated Areas and Access Control Plans for only the amount of time workers spend on at-risk tasks, rather than for the duration of construction jobs on which workers may be exposed to respirable silica dust.

Our Approach: We adopted OSHA's unit cost estimates for Regulated Areas and Access Control Plans, but unlike OSHA, we multiplied these costs by our own estimates of workers requiring respirators – among both our at-risk workforce of 3.25 million workers and additional 1.5 million workers in additional occupations. Table 15 compares OSHA's and our estimates of the number of workers expected to receive protections under the Regulated Areas and Access Control Plan requirements of OSHA's Proposed Rule.

Table 15

Comparison of the Numbers of OSHA's and Our W

Requiring Regulated Areas or Access Plans

	OSHA's Estimate for Its 652 Thousand At-Risk FTE	Our Estimate fc Our 3.25 Million Wc
	4,421	99,621
	5,532	101,212
	4,766	29,228
	113	2,485
	3,295	41,786
:tion	660	5,504
or Contractors	44,377	302,587
	699	44,182
	5,411	76,204
	15,271	68,564
	6,192	53,515
	90,736	824,889

B. Environomics Currently Estimates The Costs For The Construction Industry To Comply With The Proposed Rule At Between Four And Five Times OSHA's Estimate.

The tables below show Environomics' current cost estimates for the Proposed Standard, as of the date of filing of the CISC's pre-hearing written comments, and contrast these estimates with OSHA's.

Table 16

Estimated Compliance Costs for the Construction Industry

(in millions of dollars per year)

	OSHA Estimate	Our Estimate (draft)
Engineering Controls	242.6	1,124.0
Program Costs	268.6	1,045.4
Total	511.2	2,169.4

Table 17
Total Estimated Costs by Industry
($ per year)

	OSHA Estimate			Our Estimate		
	Controls	Program Req'ts	Total	Controls	Program Req'ts	Total
Residential Building Construction	14,610,121	8,678,760	23,288,881	88,220,682	125,027,349	213,248,031
Nonresidential Building Construction	16,597,147	23,067,767	39,664,914	92,312,438	103,872,685	196,185,123
Utility System Construction	30,877,799	15,840,363	46,718,162	88,774,923	35,408,081	124,183,004
Land Subdivision	676,046	434,743	1,110,789	3,599,844	2,413,265	6,013,109
Highway, Street, and Bridge Construction	16,771,688	14,036,174	30,807,862	76,737,678	40,609,749	117,347,427
Other Heavy and Civil Engineering Construction	4,247,372	2,916,838	7,164,210	17,810,031	6,616,403	24,426,435
Foundation, Structure, and Building Exterior Contractors	66,484,670	149,422,541	215,907,211	228,638,370	350,635,214	579,273,585
Building Equipment Contractors	3,165,237	1,736,902	4,902,139	148,555,486	113,329,439	261,884,925
Building Finishing Contractors	34,628,392	15,630,847	50,259,239	156,254,322	123,804,421	280,058,743
Other Specialty Trade Contractors	43,159,424	24,844,554	68,003,978	136,602,039	73,978,568	210,580,607
State and Local Governments	11,361,299	11,976,934	23,338,233	86,510,382	69,707,663	156,218,045
Total	242,579,194	268,586,424	511,165,618	1,124,016,195	1,045,402,837	2,169,419,032

Finally, we note that there are a variety of other costs that are missing from OSHA's cost estimates and these should be included when assessing the economic impacts of the Proposed Rule on the construction industry: 1) the likely cost increases for construction materials (concrete, brick, block, tile, stone, etc.) that construction materials manufacturers will incur as a result of the General Industry portion of the Proposed Rule, of which some significant part will likely be passed on to the construction industry; 2) the likely cost increases that will result when the 2.5 million self-employed construction workers – not covered by the OSH Act and not considered by OSHA in the Agency's cost analysis – nevertheless begin to conduct dusty construction tasks consistent with the Table 1 specifications; and 3) the costs that will likely be passed on to the construction industry if MSHA adopts the proposed OSHA PEL for mining industries, and prices increase for construction raw materials such as cement, stone, sand, gravel, clay, etc.

We will provide additional material on costs, and estimates regarding economic impacts and economic feasibility of the Proposed Standard in an expanded and final version of this report prior to the public hearing.