February 11, 2014

OSHA Docket Office
Occupational Safety & Health Administration
United States Department of Labor
Room N-2625
200 Constitution Avenue N.W.
Washington, D.C. 20210

Re: Comments of the American Petroleum Institute ("API") and the Independent Petroleum Association of America ("IPAA") in Response to the Occupational Safety & Health Administration ("OSHA") Proposed Rule entitled "Occupational Exposure to Respirable Crystalline Silica" (78 Fed. Reg. 56274 (Sept. 12, 2013)). OSHA-2010-0034.

Dear OSHA Docket Staff:

This letter provides the public comments of the American Petroleum Institute ("API") and the Independent Petroleum Association of America ("IPAA") (collectively referred to as "the Associations") on the Occupational Safety and Health Administration's ("OSHA") proposed rule on Occupational Exposure to Respirable Crystalline Silica ("RCS").[1] The Associations and their member companies share OSHA's commitment to workforce safety and submit these comments to help the record better reflect available data.

API is a national trade association representing over 540 member companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to protecting their employees and meeting environmental requirements, while economically developing and supplying energy resources for consumers. Members of the Associations are impacted by this rule by virtue of potential silica exposures from processes and materials used in refineries as well as during other routine upstream and downstream operations.

IPAA is the national trade organization representing thousands of American oil and natural gas explorers and producers, as well as the service and supply industries that support their efforts. These businesses will be the most significantly affected by the proposed actions in this regulatory framework. IPAA and its member companies are dedicated to placing a priority on worker safety and maintaining a safe work environment while providing a critical energy

[1] 78 Fed. Reg. 56274 (Sept 12, 2013), ("Proposed Rule").

resource for the American economy. IPAA member companies drill about 95 percent of American oil and natural gas wells, produce about 54 percent of American oil, and more than 85 percent of American natural gas.

Throughout their operations, members of the Associations are working to develop, test, and deploy strategies and technologies to reduce dust emissions and protect their workforce. Before implementation, costly, capital-intensive engineering controls must be tested for their efficacy in a variety of circumstances and also carefully analyzed to ensure that they do not create other safety, environmental, or service quality risks. While effective control technologies are being developed and/or proven, member companies of the Associations manage exposures and protect their employees through appropriate measures using the hierarchy of controls, which includes respirators.[2]

Hydraulic fracturing was the only segment of the oil and gas industry which OSHA specifically included in the information accompanying its proposed rule. Our comments therefore focus at length on addressing OSHA's perception of hydraulic fracturing operations, as well as providing additional information to build and correct the official record necessary for a fact-based rulemaking.

Potential RCS exposures are not unique to the oil and natural gas industry. Crystalline silica is the second most abundant mineral in the earth's crust and the challenge of lowering employee exposures is shared by a number of industries.[3] In addition to these industry and hydraulic-fracturing-specific comments, API participated in the American Chemistry Council RCS Panel ("ACC RCS Panel") and with the U.S. Chamber of Commerce in the development of its comments, both of which focused more broadly on risk and feasibility issues across numerous industries. The Associations hereby and herein adopt and incorporate those comments by reference.[4]

Although these comments question significant elements of OSHA's analysis, they do not challenge OSHA's important goal of protecting workers from excessive RCS exposures. The Associations and their members share OSHA's commitment to occupational health and safety and look forward to OSHA's thorough consideration of the comments set forth below.

I. INTRODUCTION

These comments are generally organized to discuss issues pertaining to all aspects of the oil and natural gas industry, hydraulic fracturing-specific feasibility issues and concerns, and

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[2] The hierarchy of controls prefers elimination of the hazard, substitution, engineering controls, employee training and work practices, administrative controls, and personal protective equipment (in that order).

[3] By weight, crystalline silica composes approximately 12% of the crustal mass of the earth. See 78 Fed. Reg. at 56295, OSHA, Controlling Silica Exposures in Construction, OSHA 3362-04 (2009).

[4] In the event that the ACC RCS Panel or the Chamber's comments conflict, or are viewed to conflict, with API's hydraulic fracturing-specific comments, the hydraulic fracturing-specific comment shall constitute the API's position.

requested changes and clarifications to the ancillary provisions. Because this comment letter is rather lengthy and detailed, we herein provide an index of our principal topics of discussion:

OSHA's Proposed Rule would mandate three separate and considerable reductions: (1) reducing the permissible exposure limit ("PEL") by 50% from its current level; (2) instituting an action level 75% lower than the current PEL; and, (3) using the more up-to-date ISO/CEN respirable convention that would reduce both the proposed PEL and Action Level an additional 20%.

OSHA's modeling efforts that underlie these mandated reductions are not supported by the actual statistics from the Center for Disease Control ("CDC"), which demonstrate that current silica-related mortality has declined by over 90% under the current PEL. Further, the Proposed Rule's requirement to utilize ISO/CEN convention for compliance sampling would effectively equate to a 20% reduction in the current PEL because of the collection efficiency using that methodology. Reductions beyond that level are not warranted – and in fact would provide considerable technological challenges to many AIHA labs that are currently unable to reliably measure RCS concentrations below 100 $\mu g/m^3$. The Associations therefore share the conclusion reached in the comments submitted by the ACC RCS Panel that OSHA did not adequately demonstrate that significant risk of material health impairment exists at the current PEL or that the Proposed Rule is feasible for general industry.[5]

With respect to hydraulic fracturing, a detailed review of OSHA's analysis demonstrates that compliance with the PEL is not technologically feasible without the continued use of respirators to protect the workforce. By OSHA's own standards, NIOSH's data set containing a mere 75 samples from only a few geologic basins is inadequate to determine representative exposure profiles. Nevertheless, those same sampling results show that meeting OSHA's proposed reductions would be challenging without the use of respirators. When determining its baseline, OSHA underestimated the silica-related controls already in use at sites and attributed inappropriately large potential reductions to controls that are unproven, cannot be used together, and are not commercially available. Indeed, OSHA's own numbers and analysis indicate that respirators will remain an essential component of worker protection in the hydraulic fracturing industry until new technologies can be developed and deployed.[6]

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[5] For a more detailed discussion, see Section II D.

[6] For a more detailed discussion, see Section III B.

OSHA's economic feasibility analysis of the hydraulic fracturing industry is similarly flawed because OSHA's inability to demonstrate the technological capability of its recommended controls to meet the proposed PEL also made OSHA unable to calculate the full cost of compliance. Further, although OSHA's technological feasibility analysis was primarily based on four types of controls, OSHA's cost estimates considered only the costs of two of the technologies. Where OSHA did project costs for this subset of controls and for requirements to comply with the Proposed Rule's ancillary provisions, it profoundly underestimated the costs of those controls and work practices, and the number of controls needed for a typical hydraulic fracturing company to comply with the rule.[7]

Based upon OSHA's failure to support this Proposed Rule with substantial evidence or demonstrate its feasibility, the Associations strongly recommend that OSHA refrain from finalizing this rule as proposed until it has sufficient information on which to base a rulemaking and provides the opportunity for public comment on that new information. If OSHA were to persist in this rulemaking, however, at a minimum, OSHA should consider changing the current formulaic PEL to a revised PEL of 100 $\mu g/m^3$ 8-hour time-weighted average ("TWA") that uses the ISO/CEN respirable convention. This essentially equates to a 20% reduction in exposures over the exiting PEL because of the increased sampling collection efficiency that is achieved using the ISO/CEN respirable convention. OSHA could also establish an Action Level ("AL") of 50 $\mu g/m^3$ that would trigger compliance with ancillary provisions such as exposure assessments, regulated areas, training, and medical surveillance for those exposed at or above the AL for 30 or more days per year.

II. GENERAL COMMENTS

A. The Associations' Members' Commitment to Health and Safety

The Associations and their members are committed to protecting the safety and health of industry employees. This industry-wide commitment is evidenced through research, standards development, training, information transfer and advocacy. The oil and natural gas industry has demonstrated a high degree of worker safety despite workplace environments that often involve transportation, heavy equipment, hazardous materials, high temperatures, and high pressure equipment.

The oil and gas industry's commitment to employee health and safety has resulted in rates of injury and illness that are not only far below the average private industry rates, but below the rates for analogous industries. In fact, the most recent U.S. Bureau of Labor Statistics' ("BLS") data pertaining to safety found that "private industry" as a whole experienced 3.7 recordable cases per 100 employees ("incidence rate") – far more than any segment of the oil and gas industry. For example, "Petroleum and Coal Products Manufacturing," of which "refining" is a part, experienced an incidence rate of 1.5 – far lower than the "private industry" rate and, significantly, far lower than the overall manufacturing rate of 4.3. Similarly, the "Pipeline Transportation" industry experienced an incidence rate of 2.1 – again, far lower than the overall

[7] For a more detailed discussion, see Section III C.

"private industry" rate and, more importantly, far lower than the overall Transportation and Warehousing rate of 4.9.

Of particular significance to these comments are the incidence rates for the upstream segment of the oil and gas industry. Here again, the BLS demonstrates a powerful industry commitment to employee safety. The incidence rates for "Oil and Gas Extraction" (1.5), and "Support Activities for Mining" (1.9), are lower than the private industry rate of 3.7, the Mining Industry rate of 2.8 (which excludes oil and gas), and the overall Natural Resources and Mining rate of 3.8.

While the Associations and their members will never be satisfied with any incidence rate that exceeds 0.0, we believe that our industry's occupational health and safety efforts are bearing fruit. Member companies of the Associations have extensive safety programs in place and also work through trade associations to increase workforce safety through research, information sharing, training, and through the development of standards.

Following their obligations under the OSH Act and their own commitments to employee health and safety, member companies of the Associations employ health and safety professionals responsible for identifying jobs that may have potential exposures to regulated substances, and also for protecting employees through the traditional hierarchy of controls, (including product substitution, engineering controls, work practices, protective equipment, and workforce training). Among the qualified professionals evaluating employee health and safety are certified industrial hygienists who are not only experts in the particular risks within the oil and natural gas industry, but also often leaders in the field who actively participate in professional groups like the American Industrial Hygiene Association ("AIHA"), the American Conference of Governmental Industrial Hygienists ("ACGIH"), National Service, Transmission, Explorations and Production Safety Network ("nSTEPS"), Society of Petroleum Engineers, American Society of Safety Engineers and the American Society for Testing and Materials International.

B. Silica Controls Within the Oil and Natural Gas Industry

The oil and natural gas industry as a whole was not mentioned as one of the 25 industry subsectors in the overall general industry and maritime sectors or the 10 construction industries identified by OSHA as affected by the proposed rule.[8] Nevertheless, API members engage in a variety of activities that may potentially result in airborne concentrations of RCS. For example, even relatively routine sub-contracting scenarios like facility turn-arounds or large-scale construction projects may trigger obligations for contractors and host employers that are not clearly defined under OSHA's proposed rule.

Wherever feasible, the oil and natural gas industry develops and deploys technologies and strategies to limit or eliminate employee exposures to respirable crystalline silica in accordance with the current PEL and sound industrial hygiene practices. For example, in sandblasting operations, many oil and natural gas companies have limited or eliminated RCS exposures by using media options that do not contain silica. In instances where substitution or

[8] 78 Fed. Reg. 56340-43.

elimination is not feasible, the permanent nature of the work sites for many operations supports installing engineering controls like additional ventilation.

In other scenarios, eliminating or reducing silica emissions is much more difficult. For example, refining operations require frequent refractory maintenance and removal, which involves demolishing silica-containing refractory and spraying a reapplication of silica and other materials within a confined space. In these instances, ventilation cannot be feasibly be initiated and wetting down the spray mixture would risk compromising the integrity of the refractory. In these and other scenarios where engineering and work practices controls alone cannot sufficiently lower employee exposures, members of the Associations compel their workers to wear respirators in accordance with corporate respiratory protection program that meet OSHA requirements.

C. OSHA Did Not Provide Industry With Adequate Time to Fully Analyze the Proposed Rule

Although OSHA worked on its proposed rule for over a decade, the public comment period was limited to the initial 90 days and two very limited extensions. This timeframe was effectively reduced even further by a number of public holidays and religious celebrations including but not limited to Columbus Day, Thanksgiving, Hanukah, Christmas Eve, Christmas Day, New Year's Eve, New Year's Day, and Martin Luther King Junior Day.

The public record reflects that over 20 individual industry associations requested extensions ranging from three to six months – and that many of these groups reiterated their requests after OSHA granted its initial 47 day extension. Many of these extension requests also featured alternatives like separating the comment and testimony deadline or postponing the hearing by an additional parallel length of time. OSHA did issue a second extension 15 day extension; however that extension was announced on January 24 – only three days before the comment deadline. The extra time came with too little notice to allow for meaningful additional work to be undertaken.

Assessing the current economic and technological feasibility of a rule proposing to effectively mandate that employers achieve a 60% reduction in the PEL without the use of the respirators on which many companies currently rely involves asking many complex questions.[9]

In addition to merely digesting the proposed rule, industrial hygiene specialists, operation managers, engineering design teams, attorneys, procurement specialists, and other professionals had to be consulted. Gathering meaningful information from different business units is a time-consuming process. Even scheduling conversations with necessary stakeholders was challenging under OSHA's ambitious timeframe.

[9] The 60% reduction is explained by the 50% numerical reduction and the effective additional 20% reduction from the institution of the new calculation method mentioned in the introduction and discussed in more detail below.

While the Associations appreciated the limited extension provided by OSHA, the short timeframe for review of this comprehensive rule failed to provide the adequate time to fully respond to OSHA's complex proposal and the extensive public docket for this rule.

D. A Reduction in The PEL is Not Necessary Because, When Enforced, the Current PEL Effectively Protects Against Silica-Related Diseases

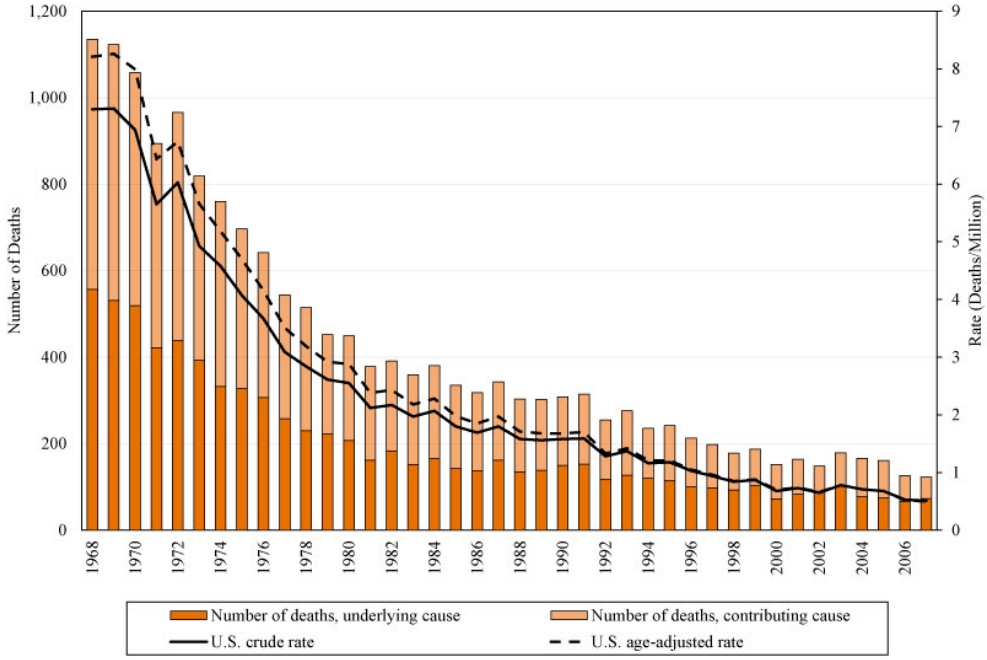
The United States Chamber of Commerce and the ACC RCS Panel will be filing detailed and comprehensive comments by leading medical, scientific, engineering, industrial hygiene, statistical and economic experts. These comments represent a thorough and detailed analysis of the health and risk aspects the OSHA rule. We endorse these comments to the extent that they are consistent with the Associations' comments and reiterate key points below.

Silica-related occupational diseases have been studied for over a century. Modern prevention methods have proven to be very effective and have played a key role in the dramatic decline of silica disease in the United States over the last 45 years.

OSHA's analysis of the scientific data concludes that its current silica exposure limit and regulations are not protective. OSHA's selection of key studies, interpretation of study results, and application of data analysis models, however, are unbalanced with a bias towards accepting adverse effects as real and causally related to silica exposure, while discounting study results that conflict with such interpretations. On balance, the Associations do not believe that an objective assessment of the scientific literature supports the need to lower the PEL to protect workers.

OSHA's conclusion contrasts sharply with the actual data demonstrating (represented below) that silicosis mortality has been reduced by approximately 90% since 1968. Even acknowledging OSHA's criticism that the CDC data may suffer from under-reporting in any given year, there is no contradicting the reality of the clear trend towards the goal of elimination of silica related mortality in the United States.

SILICOSIS MORTALITY: NUMBER OF DEATHS, CRUDE AND AGE-ADJUSTED DEATH RATES, U.S. RESIDENTS AGE 15 AND OVER, 1968-2007



Source: Mortality multiple cause-of-death data from National Center for Health Statistics, National Vital Statistics System. Posted: March 2012

Additionally, OSHA did not seek to analyze the 123 cases reported by CDC for 2007 to determine their industry relationship, the length and initiation of exposure, the age at death, the extent of exposure, the latency of the disease, or the relationship of the historical exposure levels that led to the 123 cases to actual, current exposures in 2013.

OSHA also did not analyze or make available information on current occupational exposures shown by data within its sole control - personal OSHA inspector and regulated employee samples taken during the last five years. What is known from available historical data is that silica exposures generally have fallen, significantly over time, at least partially explaining the CDC recorded trend towards elimination of silica related mortality.

> The International Agency for Research on Cancer (IARC) reports on an analysis of 7,209 personal sample measurements collected during 2,512 OSHA inspections during 1988–2003, which suggest that geometric mean crystalline silica exposure levels declined in some high-risk construction industries during the period under study, and revealed a significant decline when compared with silica exposure levels found in a previous study by Stewart & Rice (1990). Geometric mean airborne silica exposure levels among

> workers in various construction industries were significantly lower in 1988–2003 than in 1979–1987.[10]

Supported by the United States Chamber of Commerce, Yale University Medical School's Dr. Jonathan Borak and a team of 10 experts examined the scientific underpinnings of the OSHA proposal. One of Dr. Borak's observations was that OSHA data demonstrates that about 30% of historical exposures are above the current PEL This has been true during forty years of steeply declining silica related mortality and exposures. He draws the rational conclusion that such historical, very high exposures likely produced the remaining (but declining) silica-related mortality shown in the CDC data above. In contrast, OSHA incorrectly concludes that current silica-related disease is caused because its exposure limit is too high.

E. The Sampling Model Required By The Proposed Rule Effectively Lowers the PEL Below Even the Stated Target

In the new standard, OSHA proposes redefining respirable dust according to the ISO/CEN model, which has a higher collection efficiency for most relevant particle sizes than the current model used by OSHA.[11] Changing the current formula-based PEL and adopting the ISO/CEN convention, OSHA essentially lowers the PEL by 20%.

In short, even if OSHA does nothing to adjust the current PEL, merely adopting this convention would effectively lower the PEL from the current 100 µg/m^3 to approximately 80 µg/m^3. As comments submitted by the American Chemistry Council demonstrate, this 20% reduction would result in substantially increased compliance costs due to the need for additional exposure monitoring and medical surveillance.

F. Even Many AIHA Accredited Commercial Laboratories Cannot Reliably Measure RCS Concentrations Below 100 µg/m^3

Questions remain as to how OSHA determined that it "feasible to measure respirable crystalline silica exposures at the proposed PEL of 50 µg/m^3"[12] without specifying the accuracy level (+/- 25%) or confidence level (95%) typical to occupational health standards.

Comments submitted by the American Chemistry Council analyze OSHA's assumptions in detail and the state of measurability science in detail. The ACC RCS Panel comments note that even among laboratories accredited by the American Industrial Hygiene Association, "there

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[10] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, "SILICA DUST, CRYSTALLINE, IN THE FORM OF QUARTZ OR CRISTOBALITE"Vol. 100C, available in http://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C-14.pdf See Susan E. Dudley and Andrew P. Morris, The George Washington University Regulatory Studies Center, The Occupational Safety and Health Administration's Proposed Standards for Occupational Exposure to Respirable Crystalline Silica, Docket No. OSHA-2010-0034 RIN: 1218-AB70, December 4, 2013.

[11] See id. at IV-19

[12] 78 Fed. Reg at 56448.

is in fact a serious question as to whether crystalline silica can be sampled and analyzed accurately, precisely, and reliably at airborne concentrations below 100 µg/m^3."

Concerns of accuracy and reliability have also been echoed in studies by NIOSH which note that measuring crystalline silica at low sample loadings is difficult due to the difficulties of preparing the sample, the tendency for redeposition, and the challenge of matching particle size with field samples (necessary to minimize analytical bias).[13] An ISO working group also indicated that current methods and instruments have difficulty accurately and reliably measuring exposure limits where the mass on the filter is less than 50 µ.[14] Some of the newer size selective sampling devices (*e.g.*, cyclones and impactors) that sample at higher flow rates have not been fully validated or fully field tested, and might be considered experimental methods.

Even one of OSHA's senior industrial hygienists noted that exposure assessment of respirable crystalline silica is problematic because "the means to collect a representative sample is difficult" and the "analytical variations are wide."[15] Without reliable laboratory analysis as a method for determining compliance and non-compliance, the proposed rule is technologically infeasible.

G. Understanding the Unique Nature of Hydraulic Fracturing

Hydraulic fracturing means those operations conducted in and through an individual wellbore designed to increase the flow of hydrocarbons from the rock formation to the wellbore through modifying the permeability of reservoir rock by fracturing it by application of fluids under pressure. "The fluid that is used in hydraulic fracturing is usually accompanied by proppants, such as particles of sand, which are carried in to the newly fractured rock and keep the fractures open once the fracturing process is complete."[16] The accompanying proppant, typically silica sand, normally constitutes 4.5% of the hydraulic fracturing fluid mixture.[17]

While hydraulic fracturing has been "a common and accepted practice" for decades, the widespread use of high volume hydraulic fracturing is relatively recent.[18] The expansion of the

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[13] Key-Schwartz, R. et al., "Determination of Airborne Crystalline Silica," in NIOSH Manual of Analytical Methods, 4th rev. ed. Cincinnati, OH, US Dep't of HHS, Public Health Service, Centers for Disease Control and Prevention, NIOSH, DHHS (NIOSH) Publication No. 03-127, at 273.

[14] See Stacey, P. et al. (ISO Working Group ISO/TC146/SC2/WG7), An International Comparison of the Crystallinity of Calibration Materials for the Analysis of Respirable alpha-Quartz Using X-Ray Diffraction and a Comparison with Results from the Infrared KBr Disc Method. Ann. Occup. Hyg. 2009; 53: 639-649.

[15] Pannell, M.A., Senior Industrial Hygienist, OSHA Office of Health Enforcement, Impediments to Developing a Viable SiO2 Exposure Assessment Program: Slide Presentation at the 2013 American Industrial Hygiene Conference & Exposition, May 18-23, Montreal, Canada.

[16] Proposed BLM Rule at 31638.

[17] Esswein, E.J., M. Breitenstein, J. Snawder, M. Kiefer, and W.K. Sieber: *Occupational Exposures to Respirable Crystalline Silica During Hydraulic Fracturing. In Journal of Occupational and Environmental Health*; pp 347-356. (July 2013) ("*Esswein 2013*").

[18] Proposed BLM Rule at 31638; *See also Esswein 2013* at 347 "hydraulic fracturing has been used since the 1940s").

use of hydraulic fracturing in the past ten years is largely the result of technological advances in horizontal drilling that allows for greater contact between the wellbore and the hydrocarbon-containing rock.[19]

Developing hydrocarbon resources within the matrix of the source rock, as opposed to where the hydrocarbons may pool or become trapped by geologic formations, represents an important shift in oil and natural gas development. The results of such a fundamental shift have been profoundly beneficial to the U.S. energy security and economic profile.

U.S. shale formations could unlock 58 billion barrels of oil and 665 trillion cubic feet of natural gas. Last May, for the first time in 16 years, U.S. oil production surpassed imports. The Energy Information Administration ("EIA") recently estimated that, at the end of 2013, the US became world's top producer of petroleum products and natural gas, surpassing both Saudi Arabia and Russia. Concordant with such increases in development have come lower energy costs, a resurgence of domestic manufacturing, well-paid jobs when Americans needed them most, decreased trade deficits, and a redrawing of the world energy map that provides the U.S. greater leverage to achieve foreign policy goals. According to EIA, increased shale gas development has also helped lower U.S. energy-related carbon dioxide emissions to below 2005 levels, where they are predicted to remain through 2040.

The game-changing nature of hydraulic fracturing has been extensively noted by this Administration. In his 2014 State of the Union Address, President Obama said,

> Now, one of the biggest factors in bringing more jobs back is our commitment to American energy. The all-of-the-above energy strategy I announced a few years ago is working, and today, America is closer to energy independence than we've been in decades.
>
> One of the reasons why is natural gas – if extracted safely, it's the bridge fuel that can power our economy with less of the carbon pollution that causes climate change. Businesses plan to invest almost $100 billion in new factories that use natural gas. I'll cut red tape to help states get those factories built, and this Congress can help by putting people to work building fueling stations that shift more cars and trucks from foreign oil to American natural gas. My administration will keep working with the industry to sustain production and job growth while strengthening protection of our air, our water, and our communities.[20]

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[19] Proposed BLM Rule at 31638; *See also Esswein 2013* at 347-48.

[20] http://www.whitehouse.gov/the-press-office/2014/01/28/president-barack-obamas-state-union-address (accessed 1/29/14)

Administrator McCarthy of the U.S. Environmental Protection Agency called the "responsible development of natural gas an important part of our work to curb climate change and support a clean energy market at home." Secretary Jewell of the U.S. Department of Interior called hydraulic fracturing an "essential tool [that] will be used for decades to come." Without hydraulic fracturing, the U.S. would lose 45% of its domestic natural gas production and 17% of its oil production within 5 years.[21]

Notwithstanding the widespread benefits that can be realized, in part through the use of hydraulic fracturing, the hydraulic fracturing process requires tremendous volumes of silica sand that can produce emissions of RCS resulting in worker exposure at hydraulic fracturing sites that must be controlled through the use of respirators while effective engineering controls are developed and tested. Because of these unique issues, and the fact that OSHA's understanding and analysis of the hydraulic fracturing industry is perhaps the least complete of any industry OSHA analyzed pursuant to this rulemaking, the Associations herein provide these comments on OSHA's analysis of the technological and economic feasibility of its Proposed Rule on the hydraulic fracturing industry.

III. DETAILED COMMENTS

A. OSHA's Profile of the Hydraulic Fracturing Industry

As a prerequisite to promulgating a final standard, OSHA must demonstrate the economic and technological feasibility of that standard for each industry.[22] The prerequisite for that demonstration is a comprehensive understanding of the profile and demographics of each industry that is grounded in reasonable assumptions and substantial evidence.

Without a sufficient understanding of the size, structure, economics, and economic pressures of an industry and its participants, it is impossible to credibly ascertain the universe of potentially impacted employees, the ability of employers to develop and deploy controls, the likely cost and effectiveness of these controls, and the potential impact that compliance costs will have on small businesses and the competitive structure of the industry. Because OSHA's profile of the hydraulic fracturing industry provides the foundation for its conclusions on the technological and economic feasibility of the Proposed Rule, we are addressing this issue first.

1. Number and Size of Hydraulic Fracturing Companies

Information on the number and size of hydraulic fracturing companies and their level of economic activity is not readily available because there is no discrete North American Industry Classification System ("NAICS") code for the hydraulic fracturing industry. The government collects no economic statistics on this specific industry. Instead, the hydraulic fracturing industry is included within NAICS 213112 encompassing "Support Services for Oil and Gas

[21] IHS Global Insight, Measuring the Economic and Energy Impacts of Proposals to Regulate Hydraulic Fracturing, 2009.

[22] 29 U.S.C. § 655(b)(5)

Operations."[23] This "six-digit" industry, however, includes many different support services for oil and gas operations that well owner-operators contract for in addition to hydraulic fracturing, such as exploration services, cementing, casing, logging, rig building, and other services.[24]

In the U.S. government's standard classification scheme for industries, hydraulic fracturing represents only one of the seven "9-digit product codes" (21311233) comprising the six-digit NAICS 213112 industry titled "Support Services for Oil and Gas Operations." As of 2007, the most recent data available for this product code, hydraulic fracturing accounted for only 10.5% of the value of shipments for all products within the much larger six-digit NAICS 213112 industry.[25] Given that the economic activities comprising the remainder of the six-digit industry are quite different from those involved in hydraulic fracturing, so also the economic statistics (*e.g.*, size of firms, revenues, profits, employment, payroll, *etc*.). The statistical totals or averages across the entire six-digit industry are likely quite different from those for the hydraulic fracturing component. Furthermore, the government only very occasionally compiles and publishes limited economic statistics regarding 9-digit product codes, and in the case of hydraulic fracturing, the most recent data is from 2007.[26] The result is that there are no government-published data that provides a profile of current or recent economic activity by the hydraulic fracturing industry. Extensive statistics for the six-digit industry "Support Services for Oil and Gas Operations" are available for 2007 and limited data are available for more recent years, but such information is unlikely to represent with any accuracy the parallel but unknown information for an underlying 9-digit industry that comprises only about 10% of the six-digit industry.

To overcome the lack of granularity in the census data organized under NAICS 213112, OSHA's contractor, ERG conducted discussions with industry contacts, a literature review, and an examination of websites advertising hydraulic fracturing services.[27] In Appendix A to the Silica PEA, OSHA summarized the conclusions that the Agency drew:

> OSHA estimates that approximately 200 entities are engaged in hydraulic fracturing. Three large companies . . . account for approximately 30 percent of the fracking market. A second tier of approximately 10 firms serves a substantial share of the remaining market. . . . These companies have sufficient equipment to handle the largest fracking jobs, but do not provide the same range of technical services as the largest three firms. A third tier consists of approximately 40 to 50 firms that also have capability for large fracking jobs but are not as widely active across oil and gas regions in the United States.

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[23] http://www.census.gov/cgi-bin/sssd/naics/naicsrch (accessed 1/21/14).

[24] *Ibid.*

[25] See Table A-3 in Appendix A of the PEA.

[26] The Economic Census is normally conducted every five years, but data for 2012 are not yet available.

[27] ERG Report at 4-2.

> The final tier consists of small, possibly single-crew, hydraulic fracturing companies that have sufficient capacity to handle only minor, low-pressure refracturing jobs on conventional oil and gas wells. All of the major oil and gas producing regions host a number of these very small fracking firms, and although no reliable figures were identified, OSHA, based on ERG's conversation with industry representatives, estimates that there are approximately 150 of them. Employment within these small companies can be as low as 20 or fewer workers, as very small fracking jobs might be accomplished with as few as 5 or 6 workers.[28]

OSHA and ERG further estimated that the 200 entities (firms) comprising the hydraulic fracturing industry operate 444 establishments.[29] To this point, the Associations have no disagreement with OSHA's profile of the industry, including the approximate number of firms and establishments, and the characterization of the four tiers of firms and the sorts of hydraulic fracturing work that firms in each tier perform, including the 150 "very small fracking firms" that can "handle only minor, low-pressure refracturing jobs on conventional oil and gas wells."[30]

OSHA then estimated employment, revenues and profits among these 200 estimated hydraulic fracturing firms, with particular attention to determining the number of firms that are within the Small Business Administration's size standard ($7 million in annual receipts) defining small entities or small businesses in this industry. In doing so, OSHA estimated the number of hydraulic fracturing firms in each of five employee size categories, (1) entities with fewer than 10 employees; (2) entities with between 10 and 19 employees; (3) entities with between 20 and 99 employees; (4) entities with between 100-499 employees; and, (5) entities with 500 or more employees. With respect to these size categories, OSHA concluded:

- "The number of fracturing firms with fewer than 10 employees is negligible."[31]

- All firms with between 10 and 19 employees might earn an average revenue of $25,000 per job for the small, typically only one-day jobs they perform, which would leave them generally below the SBA's $7 million threshold for annual receipts defining small entities.[32]

- "For firms in the 20-99 employee size category, . . . Most of the firms in this size category are likely to compete for new well completion work, which is considerably more lucrative than the small refracturing jobs. . . . While it is possible that a few [such] firms

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[28] Appendix A at A-8 and 9.

[29] Appendix A at A-9.

[30] *Ibid.*

[31] Appendix A at A-10

[32] Appendix A at A-11.

would fall below the SBA size limit, OSHA judged that the large majority of firms in this size category would exceed the small business revenue limit."[33]

Ultimately, "OSHA concludes that, for purposes of the regulatory flexibility screening analysis, only firms in the 10-19 employee size category are capable of performing hydraulic fracturing work and yet are small enough to remain below the SBA small business cutoff. Moreover, OSHA concludes that a negligible number of firms in the next larger size category would also be small entities."[34]

OSHA and ERG's summary delineation of the hydraulic fracturing industry, which informs all of OSHA's feasibility conclusions, is represented in the following table.

Employee Size Category	**Estimated # of Entities in Hydraulic Fracturing**	**% of Total Entities**	**Estimated # of Establishments per Entity**	**Total Establishments**	**% of Total Establishments**
(10-19)	100	50%	1	100	22.5%
(20-99)	50	25%	1.2	60	13.5%
(100-499)	46	23%	4	184	41.5%
(500+)	4	2%	25	100	22.5%
Total	**200**			**444**	

While the Associations largely find OSHA's assumptions for the economic profile to be rational and supportable, we have concerns that OSHA and ERG may have underestimated the number of smaller entities in the hydraulic fracturing industry, and therefore also underestimated the proportion of the hydraulic fracturing industry that is made up of small entities. While both ERG and OSHA note that certain "very small frac jobs might be accomplished with as few as 5 or 6 workers,"[35] and that "small fracking crews commonly range from 6 to 10 workers,"[36] OSHA assumed that there were no hydraulic fracturing companies with less than 10 workers.

In addition to concluding that there are no hydraulic fracturing entities with less than 10 employees, OSHA and ERG appear to have changed their initial estimate that there are 150 "very small fracking firms" that can "handle only minor, low-pressure refracturing jobs on

[33] Appendix A at A-11

[34] *Ibid.*

[35] ERG Report at 4-2; Appendix A at A-9.

[36] Appendix A at A-15.

conventional oil and gas wells."[37] These 150 very small firms that can handle only minor jobs on conventional wells presumably must have between 10 and 19 employees because the next larger size class (firms with 20 to 99 employees), "compete for new well completion work, which is considerably more lucrative than the small refracturing jobs."[38]

But, without any explanation, OSHA in Table A-4 of Appendix A contradicted the Agency's earlier estimate that there are 150 of these very small firms with between 10 and 19 employees that constitute SBA "small entities," and showed instead in the first row of the table that there are only 100 such firms. This is confusing. Of this category of entities, ERG stated that "ERG estimates that there are approximately 150 of these firms, although this estimate is speculative and no reliable figures were identified."[39] OSHA followed ERG's lead and estimated that there are approximately 150 hydraulic fracturing companies with between 10 and 19 employees, but did so with more conviction. While ERG acknowledged its estimate as speculative and not based on reliable figures, OSHA found ERG's estimate of 150 small firms with between 10 and 19 employees to be appropriately supported "based on ERG's conversations with industry representatives."[40]

Thereafter, without explanation, both OSHA and ERG conclude for analyses subsequent to this point that there are only 100 hydraulic fracturing entities with between 10 and 19 employees.[41] Instead of using the 150-entity estimate that was proffered and discussed by both ERG and OSHA, every subsequent analysis conducted by ERG and OSHA was based on an industry profile that only contains 100 entities with between 10 and 19 employees.

This unexplained change from 150 small entities to only 100 may simply be the result of inadvertently using the wrong figure, but its impact could be quite meaningful. Appropriately estimating the size and proportion of small entities in the industry profile is particularly important because, in assessing the feasibility of the Proposed Rule, technological limitations and cost impacts are more acutely realized by small entities. At issue is whether the small entity portion of the industry comprises 75% of all hydraulic fracturing businesses (150 out of 200) or 50% (100 out of 200). The Associations fully appreciate the difficultly of compiling a profile of the hydraulic fracturing industry in the absence of Census data delineated with a discrete NAICS code, and we generally believe that ERG and OSHA made fair assumptions and estimates. However, in this instance, we are concerned that small entities may be undercounted and underrepresented in the industry profile. As such, the Associations request that, at a minimum, OSHA amend its analysis to reflect its initial estimate (recommended by ERG based on its research), that the hydraulic fracturing industry includes 150 entities with between 10 and 19 employees.

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[37] *Ibid.*

[38] Appendix A at A-11.

[39] ERG Report at 4-2

[40] Appendix A at A-9.

[41] *See, e.g.,* Appendix A at A-10; ERG Report at 4-3, and all characterization of the industry thereafter.

2. Individual Entity and Aggregate Employment in the Hydraulic Fracturing Industry

Basing employment estimates on substantial evidence is important, not only to understand the universe of potentially impacted employees, but also because OSHA's calculation of the cost of its ancillary provisions is calculated on a per-employee basis. As with estimating the total number of entities in the hydraulic fracturing industry, the lack of detailed Census data for a specific NAICS Code for the hydraulic fracturing industry made it difficult for ERG and OSHA to estimate the average and total number of workers employed in the hydraulic fracturing industry, as well as the average number of workers per hydraulic fracturing firm. In this case, however, ERG and OSHA overcame this limitation by building ta profile of employment in the industry from estimates of the number and size of hydraulic fracturing fleets.[42] While the Associations herein disagree with OSHA's bottom-line estimates and provide additional data with which ERG and OSHA can improve and update the employment profile, we generally support the approach and many of the assumptions and estimates that inform OSHA's final estimate of "a total worker population of 16,960 in hydraulic fracturing fleets."[43]

Hydraulic fracturing fleets (also known as spreads) provide a good basis for assessing the size of the industry because fleet numbers and fleet size, which is typically represented by hydraulic horsepower capacity (HHP), are tracked and publicly reported to some degree by market analysts.[44] Fleet-based estimates are equipment-based measures of industry size and activity. Each control technology in OSHA's "combination of controls" is similarly equipment-based and most of the costs that OSHA estimates for this Proposed Rule come from implementation of equipment-based technology. As stated by OSHA, "because most of the costs represent modifications to the fracking equipment, the fleet estimate is a significant driver of the total prospective compliance costs."[45] We agree that building estimates based on the number and sizes of fleets is a reasonable approach for characterizing the size and composition of the entire industry for purposes of estimating the potential costs to comply with the proposed regulation.

The process by which OSHA built estimates of industry employment from fleet data is rather attenuated, but largely transparent and rational. Based on ERG's conversations with an "industry source," and 2012 energy market research published by PacWest Consulting Partners,[46] ERG and OSHA estimated that the hydraulic fracturing industry currently operates 530 fleets with 15.6 million hydraulic horsepower ("HHP") in aggregate pumping capacity.[47] OSHA and ERG then assumed, with limited explanation, that the 530 fleets consisted of "100

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[42] Appendix A at A-15; ERG Report at 4-5.

[43] Appendix A at A-19.

[44] Appendix A at A-15; ERG Report at 4-5.

[45] Appendix A at A-15.

[46] http://pacwestcp.com/2012/09/us-hydraulic-fracturing-market-will-be-oversupplied-by-nearly-3-6-million-horsepower-by-the-end-of-2012-says-report-from-pacwest-consulting-partners/ (accessed 1/23/14).

[47] Appendix A at A-15.

small fleets, 244 medium fleets, and 186 large fleets."[48] OSHA evidently assumed that the 100 small hydraulic fracturing firms (no longer 150 firms, as OSHA originally estimated) each operate only one establishment, and out of each of these 100 establishments each small hydraulic fracturing firm operates only one small fleet, of size sufficient to accomplish only small, low-pressure refractures on existing wells. We agree with this assessment, though continue to question the estimate of only 100 such firms as opposed to OSHA's original estimate of 150. OSHA then evidently assumed that the larger companies in the industry operate more establishments per firm and operate out of each establishment larger hydraulic fracturing fleets that perform mostly the larger, more difficult, more sophisticated and more lucrative fracturing work on new wells.

To convert the 530-fleet estimate to an employment estimate, OSHA and ERG:

(1) assumed that fleets can be staffed by either "large crew" or "small crews;"
(2) estimated that large crews employ between 15-20 workers and assigned a midpoint of 17.5 workers;
(3) estimated that small crews employ between 6-10 workers and assigned a midpoint of 8 workers;
(4) assumed that only large crews can be used for fracturing new wells that are deeper and have horizontal components;
(5) estimated that "84 percent of the wells on which fracturing occurs are new wells and 16 percent are existing wells;"
(6) used the 84/16 ratio to calculate an overall average crew size of 16 workers;
(7) doubled the crew size to 32 to account for multiple shifts; and
(8) multiplied the 530-fleet estimate by the average crew size of 32 for a total estimated employment of 16,960.[49]

While this analysis is rather attenuated, most of its assumptions are fairly well supported and explained. That said, we differ with some of the details of this analysis, and ultimately find OSHA and ERG's total employment calculation is an underestimate for several reasons.

OSHA's estimate that there are 530 hydraulic fracturing fleets with 15.6 million HHP operating in the United States (derived from a 2012 analysis by PacWest Consulting Partners)[50] may be a reasonable estimate for 2012, but it is not the most current or accurate estimate. As noted in PacWest's more recent May 2013 analysis of aggregate pumping capacity, domestic hydraulic fracturing capacity was projected to increase by 700,000 HHP from the 2012 estimate utilized by OSHA and ERG, "bringing total US capacity to 16.3 million HHP," by the end of 2013.[51] Our recent discussion with another well-regarded source of industry financial

[48] Appendix A at A-15.

[49] Appendix A at A-15, A-16; ERG Report at 4-5 to 4-9.

[50] Appendix A at A-15.

[51] http://finance.yahoo.com/news/small-pressure-pumpers-continue-add-192200915.html (accessed 1/29/14).

information, Richard Spears, generally corroborates this estimate regarding the increase in industry capacity by the end of calendar year 2013.[52]

PacWest, however, did not estimate the number of fleets it associated with the increase aggregate pumping capacity. Applying the 4.29% increase in HHP that PacWest reported between 2012 and 2013 to its earlier estimate that 530 fleets operated in 2012, the best available evidence strongly suggests that there are now approximately 553 hydraulic fracturing fleets operating in the United States. Importantly, the 23-fleet increase between 2012 and 2013 is further ratified by dividing the total reported HHP increase of 700,000 by OSHA's estimate of "30,000 horsepower for a typical fleet."[53]

While we appreciate the difficulty in affixing an estimate to a changing demographic, we believe that OSHA must rely on the most recent data available from the sources on which it bases its analysis. As such, the Associations request that OSHA update its employment/fleet profile, and all calculations derived therefrom, based on this "best available evidence."[54]

The Associations further believe that OSHA and ERG underestimated the average number of workers in the "large crews" required for deeper, more complex, higher pressure fractures with horizontal components, and that this difference in the size of large crews should also change OSHA's estimates regarding the size of a "typical" or average crew. OSHA estimated that large crews employ between 15 and 20 workers and assigned a midpoint estimate of 17.5,[55] but never explained the basis for this estimate. Elsewhere, OSHA provided its understanding of the functional distribution of a "typical hydraulic fracturing crew," consisting of 16 workers:[56]

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[52] Personal communication with Richard Spears, December xx, 2013.

[53] Appendix A at A-15.

[54] 29 U.S.C. § 655(b)(5).

[55] Appendix A at A-15.

[56] Appendix A at A-54.

Estimated Number of Workers	Primary Function
5	Sand Mover Operators
1	Conveyor Belt Tender
2	Blender Tenders
1	Hydration Unit Operator
2	Water/Chemical Hands
3	Pump Operator Technicians
1	Supervisor
1	Ground Guide (Sand Coordinator)
16	

Members of the Associations have stated that crew size and functional distribution are variable depending on region, well size, depth, pressure needs, complexity, and company policies. While they viewed the distribution above as a reasonable portrayal of a hydraulic fracturing crew generally, they did not view it as an accurate portrayal of a "large crew."

In particular, members of the Associations stated that large fracturing jobs frequently require more than five sand movers – sometimes as many as eight or more, with one sand mover operator per sand mover. A large fleet and the crew that is a part of that fleet will thus have more than the five sand mover operators shown in the table above; we would estimate six to be an appropriate average. Similarly, OSHA's profile incorrectly assumes only one hydration unit operator in the crew. On a large crew, however, there are commonly three to four hydration unit operators. Members of the Associations further reported that "large crews" would likely have up to five pump operator technicians, and, if two blenders were in use, could have twice as many blender tenders s well. Additionally, large crews would also likely include repair and maintenance personnel and other technicians and support personnel. As such, the Associations believe it is more accurate to estimate that a large hydraulic fracturing fleet typically contains between 20 and 25 workers, and, in some cases, even more. We will assume 24 as the average crew size for a large crew, and we request that OSHA utilize a similar figure for its estimate of "large crew" size.

This revised estimate for a large crew size would obviously affect what should be estimated for an average or typical crew size. We believe, however, that the most accurate employment profile must be based, not in terms of the average or typical crew size across the entire range of small, medium and large hydraulic fracturing fleets, but instead on the average crew sizes for each of the different sized fracturing fleets. We believe that OSHA's estimate of eight workers for the average crew size for a small fleet is reasonably accurate, and we believe,

as discussed, that the average crew size for a large fleet is roughly 24 workers. To complete our estimates, we believe it would be reasonably accurate to accept OSHA's "typical" crew size of 16 workers[57] instead as the average size of the crew for a medium-sized hydraulic fracturing fleet.

Finally, OSHA's employment profile assumes that, on average, fleets will be staffed by only two crews.[58] This estimate was premised on an appropriate understanding that medium and larger hydraulic fracturing jobs are very frequently conducted on a 24-hour, "round the clock" basis. OSHA addresses this issue by assuming that many larger jobs are performed with three shifts and three crews, smaller jobs typically employ single daytime shifts, and the Agency simply "splits the difference" and assumes that each fleet has two crews.[59] While seemingly reasonable, this approach is inaccurate. OSHA and ERG rightfully note that many 24-hour/continuous fracturing jobs are conducted using two crews, each working 12-hour shifts.[60] OSHA also correctly note that these two crews cannot keep to this schedule indefinitely, that they need time off, and that other "relief" or "rotation" crews will replace them at some point.[61] In fact, the precise schedules by which relief or rotation crews replace the initial crews working at a site vary substantially with such factors as: (1) the hydraulic fracturing company's policies; (2) whether the continuous operation is being staffed by two 12-hour shifts or (less frequently) by three 8-hour shifts; (3) the availability of nearby or more distant accommodations for the crews, and (4) the company's workload at the time. The issue regarding the number of hydraulic fracturing workers working at any given time and the number of additional workers not working but programmed and ready to work in rotation/relief roles is quite complex. We assume the following in generating an overall estimate of hydraulic fracturing employment, and recommend that OSHA do likewise:

- For each small hydraulic fracturing fleet, there is one small crew active on a job, and there are no relief or rotation crews;

- For each medium hydraulic fracturing fleet, there are two medium crews active on a job, and one similar-sized relief or rotation crew that is inactive but will soon be active.

- For each large hydraulic fracturing fleet, there are two large crews active on a job, and one and one-half similar-sized relief or rotation crews that are inactive but will soon be active.

OSHA estimated as of the end of 2012 that there were 100 small fleets, 244 medium fleets, and 186 large fleets, for a total of 530 fleets. With an increase of 4.29% by the end of 2013, we now have an estimated 553 fleets, consisting of 104 small, 255 medium and 194 large

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[57] Appendix A at A-54.

[58] Appendix A at A-15.

[59] Appendix A at A-15.

[60] Appendix A at A-15.

[61] Appendix A at A-15.

fleets. In the Table below, we estimate total industry employment of 29,368 hydraulic fracturing workers in the crews working with these fleets.

Fleet Size	Avg. # Workers Per Crew	# Primary Crews Per Fleet	# Rotation/Relief Crews Per Fleet	# Fleets	Total # of Workers
Small	8	1	0	104	832
Medium	16	2	1	255	12,240
Large	24	2	1 1/2	194	16,296
					29,368

The Associations believe that building a profile of employment in the hydraulic fracturing industry based on the recognized growth of fleets and the number of crew members associated with each size fleet, provides the best available evidence of the hydraulic fracturing industry employment profile.

3. Differing Characteristics of Hydraulic Fracturing Services Performed by the Various Tiers of Companies in the Industry

In addition to dividing the hydraulic fracturing industry by employment size of firms and by fleets, OSHA and ERG provided an important analysis of the different types of services each tier of companies provides within the industry. Like most industries, the hydraulic fracturing industry has within it entities that occupy materially distinct segments of the broad spectrum of well stimulation services provided to oil and gas companies. Hydraulic fracturing is utilized for conventional and unconventional wells, oil or gas wells, for newly drilled wells or to "refracture" existing wells. Hydraulic fracturing techniques and services can also differ based on the depth or complexity of the wells and the wide variety of shale and tight-rock formations from which hydrocarbons are produced. Indeed, OSHA recognized important differences in the types of job hydraulic fracturing companies conduct for well owners and operators, and the orientation of hydraulic fracturing entities relative to these types of jobs.

For instance, OSHA concluded that the Tier 1 entities (those with 500+ employees) are few in number, but account for a large percentage of the hydraulic fracturing market,[62] and operate in numerous markets/basins around the country.[63] OSHA concluded that these companies are broadly capable of conducting all types of hydraulic fracturing work on new or existing wells and conventional or unconventional wells, and can take on the most complex

[62] Appendix A at A-8.

[63] Appendix A at A-9.

multistage, deep well, and high pressure jobs. Because such jobs are more lucrative, however, OSHA assumes that these Tier 1 companies largely target new well work.[64]

OSHA also concluded that a second tier of "approximately 10 firms" hold a similarly large percentage of the market, also operate in multiple regions, and have a capability to take on the full spectrum of hydraulic fracturing work.[65] OSHA and ERG estimate that a third tier of "approximately 40 to 50 firms" "also have capability for large fracking jobs but are not as widely active across oil and gas regions in the United States."[66] OSHA's most important characterizations, however, are those for the smallest entities in the hydraulic fracturing industry because these entities are the most numerous in the industry and because small entities often have the least ability to fund technological improvements or incur added regulatory costs.

According to OSHA, this final tier of 150 entities "consists of small, possibly single-crew, hydraulic fracturing companies that have sufficient capacity to handle only minor, low-pressure refracturing jobs on conventional oil and gas wells."[67] "All of the major oil and gas producing regions host a number of these very small fracking firms . . . Employment within these small companies can be as low as 20 or fewer workers, as very small fracking jobs might be accomplished with as few as 5 or 6 workers"[68] These "small firms are almost certainly operating in [only] one or two locations."[69]

Following on its conclusion that these small entities "have sufficient capacity to handle only minor, low-pressure refracturing jobs on conventional oil and gas wells," OSHA further estimated that "such firms would not be performing any large-scale fracturing jobs but would be restricted to small jobs generating roughly $5,000 to $50,000 in revenues."[70] Indeed, for purposes of assessing revenue, OSHA assumed that these small entities could only earn $25,000 per job,[71] which OSHA and ERG deemed "representative of the work on low-pressure, shallow, conventional wells."[72]

Even though OSHA understood that the smallest entities are confined to single type of low-pressure fracturing work on shallow conventional wells, OSHA still disclaimed that its analysis "might overstate the market and viability of the smallest fracking operators."[73] the Associations share OSHA's concern with the viability of these small entities, and its conclusions

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[64] Appendix A at A-13.

[65] Appendix A at A-8.

[66] Appendix A at A-8.

[67] Appendix A at A-8 to A-9.

[68] Appendix A at A-9.

[69] Appendix A at A-9.

[70] Appendix A at A-10.

[71] Appendix A at A-10.

[72] Appendix A at A-12.

[73] Appendix A at A-14.

on the very limited range of hydraulic fracturing services they can perform. While small entities can offer only a small range of hydraulic fracturing services, they comprise between 50% and 75% of all hydraulic fracturing entities – a material segment by any estimation. As explained in our discussion of OSHA's economic feasibility analysis, if the Proposed Rule threatens the existence of these small entities, the competitive structure of the entire hydraulic fracturing industry will be compromised and undue consolidation will result.

While refracturing work on existing wells is a relatively low-cost type of hydraulic fracturing work, it is not low-value. Refracturing work is a material segment of the industry that provides an important service without America's domestic energy portfolio. Refracturing prolongs the useful life and production rate of existing wells. An effective and efficient energy policy requires not only the development of new wells, but efforts to obtain the highest production possible out of existing wells. Oil and gas development, like any other land use industry or energy source, requires some surface disturbance. These 100 to 150 small hydraulic fracturing companies provide an important and materially distinct service by making sure we are able to produce as much energy as possible from each well that has been drilled.

4. Revenues and Profits for Hydraulic Fracturing Companies

As was the case in other aspects of its profile of the hydraulic fracturing industry, OSHA had difficulty estimating revenues and profits for the industry because the only available Census information on revenues and profits was for the much larger and materially different NAICS 213112 for all oil and gas services. According to data from the 2007 Economic Census, hydraulic fracturing accounted for only 10.5% of all economic activity in this broader NAICS industry. The Associations agree with OSHA's conclusion[74] that the aggregated Census data in NAICS 213112 could not be utilized credibly and effectively to identify revenues for the hydraulic fracturing industry alone.

We further support OSHA's decision not to rely on the 2007 Census data because we do not believe that economic data from 2007 is representative of current economic conditions – particularly in the hydraulic fracturing industry. The 2007 data preceded some of the most dire impacts of America's recession on industries of all kinds. The 2007 data preceded some of the most dire impacts of America's recession on industries of all kinds. For the hydraulic fracturing industry (and the oil and gas industry in general), 2007 also represented period of uncharacteristically high profits and revenues. In the ensuing seven years, however, declining natural gas prices and other factors significantly scaled back revenues and profits in the hydraulic fracturing industry. OSHA appropriately noted this shift[75] and, in fact, relied extensively on revenue data from FTS International Service, LLC that clearly shows a consistent and measurable decline in revenue per fracture stage.[76]

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[74] Appendix A at A-10.

[75] Appendix A at A-19.

[76] Appendix A at A-11.

In lieu of relying on dated, overly aggregated, and unrepresentative Census data, OSHA and ERG utilized a rational "bottom-up" approach to estimate current revenues in the hydraulic fracturing industry.[77] Under this approach, which the Associations endorse, OSHA and ERG built a revenue profile based on: (1) the types of hydraulic fracturing jobs conducted by the various tiers of hydraulic fracturing entities; (2) the estimated revenue associated with those jobs; and (3) the number of those jobs each of tier of entities were likely to accomplish in a year.[78] For the most part, the Associations support the assumptions that OSHA utilized for each component of its "bottom-up" approach to building the revenue profile.

Our only corrections relate to the assumptions on which the revenue estimate for small entities was built. More specifically, we agree that small entities "have sufficient capacity to handle only minor, low-pressure refracturing jobs on conventional oil and gas wells" and with OSHA's assumption that those jobs generate an average revenue of $25,000,[79] but we do not agree with the 60% utilization rate OSHA and ERG employed in order to estimate the average annual revenues these small businesses generate in performing these jobs.

Notably, OSHA may have operated under the misapprehension that "to avoid overestimating revenues, ERG selected a 50% utilization rate for estimating revenues per establishment."[80] Nonetheless, both ERG and OSHA estimate revenues for all tiers based on a 60% utilization rate.[81]

The "utilization rate," as defined by OSHA and ERG, represents the "performance of 1 stage per day for the specified percentage of days in the years,"[82] The 60% utilization rate, therefore, represents an assumption by OSHA and ERG that hydraulic fracturing establishments will fracture 219 stages per year. OSHA and ERG's sole basis for this conclusion is a 2012 press release from PacWest Consulting Partners, which stated that there was "a net reduction of frac capacity utilization of 26% over the course of 2012."[83]

Both ERG and OSHA cite to the 2012 PacWest press release as evidence that "actual utilization rates are quite high and many firms have purchased new equipment."[84] While the 2012 PacWest press release estimates a 75% capacity utilization rate, according to PacWest "[c]apacity utilization is defined as the average annual frac demand divided by average annual

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[77] Appendix A at A-10.

[78] Appendix A at A-10 to A-15.

[79] Appendix A at A-10.

[80] Appendix A at A-15.

[81] ERG Report at 4-8; Appendix A at A-14.

[82] ERG Report at 4-7.

[83] Appendix A at A-13 and ERG Report at 4-5. Both citing to: http://pacwestcp.com/2012/09/us-hydraulic-fracturing-market-will-be-oversupplied-by-nearly-3-6-million-horsepower-by-the-end-of-2012-says-report-from-pacwest-consulting-partners/ (accessed 1/23/14).

[84] Appendix A at A-13; ERG Report at 4-5.

frac supply."[85] The PacWest "utilization rate" estimate represents the relative balance between overall demand and supply in the hydraulic fracturing market – not the number of days per year on which hydraulic fracturing fleets are performing fractures. Nor can such conclusions be drawn from this data. If anything, the PacWest data show that ERG and OSHA's assumptions on fracture frequency are inflated. The 2012 PacWest press release reported that declining rig counts were driving down demand for hydraulic fracturing services at the same time the hydraulic fracturing industry was adding new capacity. As such, PacWest estimated that capacity would fall to 75 percent. This 75 estimate, however, does not support that companies are fracturing 274 stages per year (75% of 365). It means that, at any given time, one quarter of all hydraulic fracturing fleet capacity is sitting idle waiting for a customer.

Not only is ERG and OSHA's 60% utilization rate unsupported (and entirely undermined by the only evidence they cite), it makes no sense from an operational level. ERG and OSHA applied this 60% ration across all tiers of hydraulic fracturing entities.[86] For entities with more than one establishment, ERG and OSHA assumed that each establishment would complete 219 fractures per year. This utilization may be plausible for some, however, because larger establishments can operate more than one fleet.[87] With sufficient demand, establishments with multiple fleets may indeed fracture 219 stages per year. Additionally, larger companies conduct hydraulic fracturing in multi-day projects on large multistage wells.[88] As such, they do not have to conduct site preparation activities, or transport, assemble, and then disassemble their equipment between each stage or between projects with anywhere near the frequency as small companies will need to do in completing single-day, single well projects.

Importantly, the Associations are not suggesting that a 60% fracture frequency is appropriate for large companies. We are simply pointing out that these large-entity utilization efficiencies are not shared by the small hydraulic fracturing entities. As OSHA notes, the small entities are one-fleet businesses that have only been able to enter the hydraulic fracturing market "by purchasing second-hand equipment that is in need of servicing and that is sufficient for use on relatively low-pressure jobs.[89] These low-pressure jobs "typically only require one day to complete."[90]

Consequently, OSHA's 60% fracture frequency assumes that small entities will be able to conduct hydraulic fracturing at 219 different well sites in a single year. This assumption is simply not realistic. OSHA's estimate allows for, at most, a single day's travel time between each well site and the next well site or the small entity's base if the fleet returns to reequip after a

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[85] http://pacwestcp.com/?s=utilization (accessed 1/23/14).

[86] Appendix A at A-13; ERG Report at 4-5.

[87] OSHA and ERG's distinction between establishments and fleets is not well defined. We assume, based on context, that "establishments" essentially refer to offices within the overall "entity" or company. Fleets are the equipment-based teams (or spreads) that actually conduct the fracturing.

[88] ERG Report at 4-4; Appendix A at A-11.

[89] Appendix A at A-9.

[90] Appendix A at A-11.

job. OSHA's utilization assumption does not build in time for site preparation, equipment assembly, equipment dismantling, crew member leave, supply coordination and delay, or the equipment servicing that OSHA assumes is required on small entities' second-hand equipment. Indeed, while OSHA is correct that the actual low-pressure refracturing of a shallow conventional well can typically be accomplished in a day, it significantly underestimates the preparation and mobilization time that is required for such an accomplishment.

As both ERG and OSHA note that these estimates for small entities are "uncertain," based on "limited information," and "might overstate the market and the viability of the smallest HF operators,"[91] the Associations herein provide a more realistic estimate of fracture frequency among small hydraulic fracturing entities. Based on the experiences of members of the Associations, we believe that it is more accurate to assume that small hydraulic fracturing companies with less than 20 employees could refracture 97 existing, shallow conventional wells per year, with typically one stage per well. With a reasonable time assumed for mobilization, site preparation, assembly, and deconstruction, this scenario presumes crews and equipment will be deployed 292 days per year for 80% utilization over the course of a year, with utilization being defined as having the fleet in the field, committed to a job and unavailable for another job. For the typical low pressure refracture job performed by a small firm and small fleet, we assume one day to travel from base to well site and set up and await completion of pre-fracture activities, one day to perform the fracture, and one day to take down, return to base and demobilize. Importantly, based on OSHA's estimate that small entities earn $25,000 in revenue per job, these small entities at 80% utilization for their fleets, would generate $2,425,000 per year in revenues – more than reasonable given their size and, significantly, only about $300,000 more than what the Census estimated as the average revenue for all service companies in NAICS 213112 with between 10 and 19 employees.[92]

As opposed to revenues, which the Associations believe are largely determinable within a reasonable range of precision, the Associations do not believe that profits are determinable for the hydraulic fracturing industry. OSHA derived its profit estimates from its estimates of industry revenues.[93] It utilized a presumed rate profit rate of 10.31% and, once again, applied it equally across all sizes of hydraulic fracturing companies.[94] Further, whereas OSHA rejected 2007 census data on the much larger six-digit NAICS code 213112 for purposes of calculating revenue, OSHA utilized Internal Revenue Service sample tax return data from between 2002 and 2006 for an even larger, more diverse four-digit NAICS code (2131, Support Activities for Mining) for purposes of calculating profit for the hydraulic fracturing industry.[95] And, as a final clearly inappropriate step in estimating profitability for the hydraulic fracturing industry, ERG estimate profitability for the NAICS 2131 by comparing profits as shown in tax returns from mining support companies that earned profits against revenues shown in the tax returns for all

[91] Appendix A at A-14; ERG Report at 4-5.

[92] Appendix A at A-11.

[93] Appendix A at A-14.

[94] Appendix A at A-14.

[95] Appendix A at A-14.

mining support companies, whether they earned positive profits or not. Even apart from the issues about recency of data and whether one can represent profitability for hydraulic fracturing companies with data on profitability for the far larger mining support industry, it is wrong of ERG to attempt to estimate profitability for an entire industry by reviewing tax return data for only those companies in the industry that earned positive profits in the year in question. Profitability for an entire industry ought to reflect the financial performance of both those firms that made money and those that did not. In short, we do not believe that the profitability estimate of 10.31% that OSHA developed for the hydraulic fracturing industry is realistic (particularly for smaller entities). Nor do we have any superior means to estimate profit rates for the hydraulic fracturing industry.

B. The Proposed PEL is Not Currently Technologically Feasible for the Hydraulic Fracturing Industry

Section 6(f) of the OSH Act provides that "the determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole."[96] Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion."[97]

Chief among those determinations that OSHA is required to base on substantial evidence are determinations as to reasonableness of occupational exposure standards like those proposed by OSHA in this rulemaking. Under the OSH Act, the Secretary has an "affirmative burden to demonstrate the reasonableness of an adopted standard."[98] By statute, the Secretary carries his burden by:

> [S]et[ting] the standard which most adequately assures, to the *extent feasible*, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity . . . . In addition, to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the *feasibility of the standards* and experience gained under this and other health and safety laws.[99]

"This requires OSHA to demonstrate that the standard is both technologically and economically feasible."[100] With respect to technological feasibility, " . . .OSHA must prove a reasonable

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[96] 29 U.S.C. § 655(f).

[97] *American Textile Mfrs. Inst., Inc. v. Donovan*, 452 U.S. 490, 522 (1981) (quoting *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 477 (1951)).

[98] *United Steelworkers of America, AFL-CIO-CLC v. Auchter*, 763 F.2d 728, 736 (3d. Cir. 1985); *See also Atlantic & Gulf Stevedores, Inc. v. OSHA*, 534 F.2d 541, 551 (3d Cir. 1976).

[99] 29 U.S.C. § 655(b)(5) (emphasis added).

[100] *Public Citizen Health Research Group v. Dep't of Labor*, 557 F.3d 165 (3rd. Cir. 2009); *See also American Iron and Steel Institute*, 577 F.2d at 832 ("the Secretary is constrained by the requirement of feasibility, both technological and economic.").

possibility that a typical firm will be able to develop and install engineering and work practice controls that can meet the PEL in most of its operations . . ."[101] Consequently, while OSHA is not required to prove technological feasibility with certainty, its record must be able "to show modern technology has at least conceived some industrial strategies or devices which are likely to be capable of meeting the PEL and which the industries are generally capable of adopting."[102]

Importantly, OSHA must conduct this mandated technological feasibility analysis on an industry-by-industry basis.[103] Therefore, at a minimum, the Proposed Rule must identify and reasonably characterize, based on substantial evidence, the hydraulic fracturing industry, the potentially exposed jobs within that industry, and the pervasiveness and severity of exposures in the industry. Without a reasonably delineated exposure baseline for the hydraulic fracturing industry, OSHA has no basis on which to measure the potential effectiveness – and feasibility – of controls.

As explained in Section IIa above and in detail below, the Proposed Rule does not delineate nor characterize the hydraulic fracturing industry, or the potential exposures therein, based on substantial evidence. Nor does the Proposed Rule rationally estimate the effectiveness or availability (or existence) of controls to show that the PEL can be met. To the contrary, the technological feasibility analysis for the hydraulic fracturing industry rests on manifestly inadequate data that OSHA and its contractor further undermined by extrapolating through unsupported analogy and surmise. Indeed, the technological feasibility conclusions in the Proposed Rule are inconsistent with the findings of the NIOSH experts on whose research OSHA and OSHA's contractor, ERG, most rely. The Proposed Rule's conclusions for the hydraulic fracturing industry also conflict with OSHA's conclusions for other industries examined in the PEA and with ERG's conclusions. With an appropriate sense of humility as to its ability to estimate costs for control technology that are not presently in use or available in the hydraulic fracturing industry, ERG urged that such estimates "should be considered speculative."[104] While the Associations understand and appreciate the difficulty of assessing the technological feasibility of the Proposed Rule on the hydraulic fracturing industry – particularly under the time constraints that OSHA has imposed on analysts and consultants who only recently began examining the hydraulic fracturing industry – the OSH Act requires OSHA to base this action on substantial evidence, not speculation.

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[101] *Public Citizen Health Research Group v. Dep't of Labor*, 557 F.3d 165 (3rd. Cir. 2009) (quoting *United Steelworkers of America v. Marshall*, 647 F.2d 1189, 1272 (D.C. Cir. 1981). The standards for economic feasibility are discussed in Section II(C) of these comments.

[102] *United Steelworkers*, 647 F.2d at 1266.

[103] "the undisputed principle that feasibility is to be tested industry-by-industry demands that OSHA examine the technological feasibility of each industry individually." *Color Pigments Manufacturers Association, Inc. v. OSHA*, 16 F.3d 1157, 1160 (11th Cir. 1994); (quoting *United Steelworkers*, 647 F.2d at 1301).

[104] ERG Report at 6-17.

1. OSHA Relied on an Inadequate Data Set in Estimating Exposure Profiles

As previously discussed, hydraulic fracturing was not analyzed, nor even identified as an impacted industry for the majority of the nearly four decades that preceded this rulemaking.[105] Consequently, while exposures in the industries analyzed within the main body of the Preliminary Economic Analysis ("PEA") are characterized by thousands of monitoring samples from decades of studies, NIOSH reports, OSHA Special Emphasis Program ("SEP") inspection reports, site visits, and OSHA's Integrated Management Information System,[106] OSHA's sole basis for characterizing exposures across the entire hydraulic fracturing industry are six NIOSH reports from 11 hydraulic fracturing sites visited between 2010 and 2011.[107] Seven of the 11 hydraulic fracturing sites examined by NIOSH (64%) were located in the Denver-Julesburg Basin ("DJ Basin") that underlies the high plains east of the front range of the Rocky Mountains.[108] One site each was studied in the Eagle Ford formation, Fayetteville formation, Marcellus formation, and Bakken formation.[109] No sites were examined in the Permian Basin, the Woodford formation, the Barnett formation, or any other significant basin or formation where hydraulic fracturing operations are widespread.

Of the 111 personal breathing zone ("PBZ") samples taken during the NIOSH, only 83 were based on fully functioning sampling equipment and which also met OSHA's criteria for "full shift" samples,[110] that OSHA considers most accurate.[111] Notably, eight of the 83 "full shift" samples PBZ samples were obtained by NIOSH at "Hydraulic Fracturing Site 6" ("Site 6") in the Bakken formation in North Dakota, at which 58% of the proppant used *was not silica-containing sand*.[112] Instead, a ceramic proppant called BlackCat™ was used.[113] As disclaimed

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[105] 78 Fed. Reg. at 56292.

[106] PEA at IV-2, IV-3. API has not extensively reviewed the PEA's analysis of other industries and, therefore, is not expressing an opinion as to the sufficiency of the data underlying those exposure profiles. Instead, this juxtaposition is intended to point out how limited OSHA's understanding of exposures in the hydraulic fracturing industry is, even compared to other industries about which OSHA's understanding may also be limited.

[107] Appendix A at A-22; [107] *See NIOSH Report on Hydraulic Fracturing Site 1-6*

[108] Esswein 2013 at 350.

[109] Esswein 2013 at 350.

[110] OSHA considers "PBZ samples collected over periods of 360 minutes or more . . . as 'full-shift.'" Appendix A at A-20. According to the NIOSH Site Reports, 26 of the 111 PBZ samples were collected over periods of less than 360 minutes. Two other samples (sample 2-12 and sample 4-20) experienced pump failures. While not explicitly stated, we believe that OSHA and ERG's reference to 83 samples (in Appendix A, Table A-10 and ERG Report, Table 14) subtracted from the 111 PBZ samples the 26 samples collected over periods of under 360 minutes and the 2 pump failures.

[111] PEA at IV-7 – IV-9.

[112] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.7.

[113] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.7.

by the safety data sheet ("SDS"), and as confirmed by NIOSH sampling, BlackCat™ contains less than 1% quartz.[114]

As acknowledged by OSHA, NIOSH, and OSHA's contractor ERG, and as supported by all the evidence in the docket for this proposed rule, use of ceramic proppant is neither typical nor widespread.[115] Indeed, Dr. John Snawder, the NIOSH Research Toxicologist that conducted the sampling at the hydraulic fracturing sites, estimated that 90% of the proppant used in the hydraulic fracturing industry is sand, of which 2-5% might be coated sand,[116] which is also a more expensive manufactured product. Indeed, use of manufactured ceramic proppant in hydraulic fracturing is so marginal that neither OSHA, NIOSH, or ERG considered its use to be a feasible control.

Not only was Site 6 unrepresentative in that it sampled workers working primarily with proppant that contained less than 1% silica, it also was the only site (and the first site ever) where NIOSH monitored with the Haz-Dust IV™ device.[117] "The Haz-Dust IV™ is a real-time air monitor with an internal air sampling pump and an optical sensor."[118]

Significantly, NIOSH stated in its report on Site 6, that the sampling taken at Site 6 was being used "to evaluate performance with the Haz-Dust IV™ instrument,"[119] and "to provide a degree of insight (albeit at this point a qualitative measure) of when peak concentration of certain chemical exposures may occur."[120] NIOSH's performance evaluation of the Haz-Dust IV™ indicates mixed success. While the unit was able to "track exposures of concern synchronously,"[121] NIOSH reported that it may have biased sample 6-14 by "roughly 50%,"

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[114] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.8. Significantly, even though the majority of the proppant used contained less than 1% silica, 9 of the 10 PBZ samples taken exceeded the proposed PEL. (11 samples were taken. One was noted to have experienced a pump failure and two were for durations of less than 360 minutes).

[115] See Appendix A at A-46, "alternate proppants tend to be reserved for special circumstances (particularly high-pressure wells) where the special characteristics (increased durability, uniformity, roundness) are needed to help extend well life."; See also ERG Report at 6-1, "Ceramic or coated sand proppant are roughly an order of magnitude more expensive than sand . . ."; See also October 3, 2012 ERG Phone Call with Eric Esswein, NIOSH Senior Industrial Hygienist, "Black Cat proppant, which is a ceramic proppant that is only 1 percent silica is 3-10 times as expensive as sand and not always appropriate."; See also National STEPS Network Respirable Focus Group Minutes and Notes (June 26, 2012) ("nSTEPS Minutes") reporting Mr. Esswein explain that "substitution [of synthetic proppant for sand] works, but it does not work for everyone; black cat is more expensive."

[116] September 10, 2012 Phone Conversation Between ERG and Dr. John Snawder.

[117] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.5.

[118] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.5.

[119] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.5.

[120] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.8.

[121] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.8.

biased sample 6-15 by as much as 71%, and, for sample 6-3, it "stopped collecting data after an hour and consequently no data were available."[122]

Importantly, samples 6-14 and 6-15 (both area samples) were apparently the only samples that NIOSH attempted to verify by simultaneously sampling with a collocated "pre-weighted, 5 micron, PVC filter in a three-piece, 37mm polystyrene sampling cassette."[123] As such, under the best reading of the Site 6 sampling data, NIOSH found that the Haz-Dust IV™ instrument failed, or otherwise provided inaccurate readings in nearly a quarter of the samples collected.[124] If one assumes, however that the 50-71% bias identified in the only two samples subject to comparison was present, to some degree, in the remaining samples, all of the Site 6 sampling data is called into question. Indeed, this seems to be the conclusion NIOSH reached. As prominently stated in NIOSH's Site 6 Report:

> Because the instrument was new to the investigators it has not been field verified by NIOSH, and consequently the instrument results should only be interpreted as qualitative in nature. In other words, instrument reported values should only be considered as relative dynamic concentrations of respirable particles as measured by the instrument (i.e., decreased or increased airborne particulate concentrations) in relation to the work activities being performed.[125]

Given that operations at Site 6 primarily utilized ceramic proppant that is not typically used hydraulic fracturing and that the monitoring equipment utilized was not field tested, shown to be inaccurate, and confirmed by NIOSH as inappropriate for determining employee exposures, none of the samples collected at Site 6 should be included within the exposure profile.

With the appropriate removal of the eight full-shift PBZ samples collected at Site 6, the dataset that underlies the exposure profile is reduced to 75 full-shift PBZ samples. These 75 full-shift PBZ samples covered 11 different job titles[126] in three different job categories delineated and defined by OSHA's contractor, ERG.[127] The chart that follows breaks down by job title and job category the number of full-shift PBZ samples taken by NIOSH.

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[122] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.6.

[123] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.6.

[124] NIOSH collected 11 PBZ and two area samples. The unit malfunctioned for sample 6-3 and significantly biased samples 6-14 and 6-15. As such, 23% of samples produced erroneous results.

[125] NIOSH Report on Hydraulic Fracturing Site 6, 2011 at p.5.

[126] Esswein 2013 at 351.

[127] Appendix A at A-21.

Job Title	Job Category	Number of Samples
Blender Operator	Fracturing Sand Worker	13
Chemical Truck Operator	Ancillary Support Worker	1
Fueler	Remote/Intermittent Support Worker	2
Hydration Unit Operator	Ancillary Support Worker	5
Mechanic	Remote/Intermittent Support Worker	3
Operator, Data Van	Remote/Intermittent Support Worker	0
Pump Truck Operator	Fracturing Sand Worker	0
QC Tech	Remote/Intermittent Support Worker	0
Roving Operator	Remote/Intermittent Support Worker	4
Sand Coordinator	Remote/Intermittent Support Worker	7
Sand Truck Driver	Remote/Intermittent Support Worker	0
Sand Mover Operator	Fracturing Sand Worker	25
T-Belt Operator	Fracturing Sand Worker	0
Water Tank Operator	Fracturing Sand Worker	3
Wireline Operator	Remote/Intermittent Support Worker	0
Conveyor Belt Operator	Fracturing Sand Worker	2
Wireline Pump Down Crew, Fueler	Remote/Intermittent Support Worker	1
Sand Mover/Conveyor Belt Operator/Blender Operator	Fracturing Sand Worker	1
Sand Mover/Acid Truck Worker	Fracturing Sand Worker	1
Blender Operator/Conveyor Belt Operator	Fracturing Sand Worker	1
Sand Mover/Blender Operator	Fracturing Sand Worker	1

Significantly, these samples constitute the sole basis on which OSHA and its contractor characterized exposures for the entire hydraulic fracturing industry, and every potentially exposed job performed therein (including several job categories, such as pump truck operators, T-belt operators, wire line operators, and sand truck drivers, for which no full-shift PBZ samples were taken at Sites 1-5). Indeed, OSHA characterized 28.5% of the 21 job titles identified by NIOSH without any full-shift PBZ samples for these job titles, and over 76% of job titles with three or fewer full-shift PBZ samples. Notably, OSHA excluded the agricultural sector from the applicability of this Proposed Rule due, in large part to, "limited data on exposures . . ."[128] A cursory examination of the studies cited by OSHA on agricultural sector exposures, however, shows that they contained over 200 samples, some of which showed exposures as high as 3,910 $\mu g/m^3$.[129]

OSHA provides no explanation as to why over 200 samples in the agricultural sector constitutes "limited data" for which exclusion from the Proposed Rule was appropriate, while 75 samples over 21 job titles in the hydraulic fracturing industry constitutes a reasonable characterization of the industry. It would be entirely arbitrary for OSHA to use different and potentially inconsistent data thresholds for determining which industries will be subject to the Proposed Rule. Nor does OSHA explain how such limited sampling corresponds to the level of sampling OSHA would require of businesses if the Proposed Rule were to be finalized.

The Proposed Rule requires employers to "assess the exposure of employees who are or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level."[130] In lieu of requiring that employers sample each potentially exposed employee individually, OSHA proposes to allow employers to sample a "representative fraction" of employees.[131] While the "representative fraction" option is characterized by OSHA as providing compliance flexibility, the types of samples OSHA considers representative are so restrictive that representative sampling may cease to be an option for most employers – particularly in the hydraulic fracturing industry.

OSHA only permits representative exposure sampling "when a number of employees perform essentially the same job on the same shift and under the same conditions."[132] Consequently, in order for an employer to avail itself of this option:

> [r]epresentative exposure monitoring must include at least one full-shift sample taken from each job function in each job classification, in each work area, for each shift. . . In many cases, full-shift samples on two or more days may be necessary to adequately characterize exposure and obtain

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[128] 78 Fed. Reg. at 56442.

[129] See Archer *et. al.* (2002), Swaneopoel *et. al.* (2010), and Lee *et. al*. (2004), discussed at 78 Fed. Reg. at 56442.

[130] 78 Fed. Reg. at 56487.

[131] 78 Fed. Reg. at 56487.

[132] 78 Fed. Reg. at 56447.

> results that are representative of employees with the highest exposure for each job classification.[133]

The difference between OSHA's position on "representativeness" for purposes of promulgating a RCS standard and OSHA's position on "representativeness" for purposes of complying with the standard could not be more stark. For purposes of promulgating a rule that could impact 444 establishments employing more than 29,000 workers across numerous jobs and job categories, and which may cost in excess of $360,000,000, OSHA finds it sufficient to rely on 75 full-shift samples: (1) from only 11 sites 70% of which were in the same basin); (2) for which 57% of jobs were never sampled or based on a single full-shift PBZ sample; and (3) for which no data or analysis exists regarding the identity of the company, the configuration of the well pad, employee shifts, functions, work areas, or conditions.[134] For purposes of characterizing exposures at a single company or in a single facility, however, OSHA will require at least "one full-shift sample taken from each job function in each job classification, in each work area, for each shift."[135]

Applying the most relevant and analogous standard for characterizing employee exposures – the standard OSHA provides in its Proposed Rule - OSHA's exposure profile for the hydraulic fracturing industry is plainly insufficient. As such, any technological or economic feasibility conclusions derived therefrom are, *per se*, arbitrary and capricious. That OSHA and NIOSH, for whatever reason, have only recently examined RCS exposures in the hydraulic fracturing industry or that NIOSH and OSHA, for whatever reason, have too few full-shift PBZ samples to better characterize exposures within the industry does not remedy an unsupported exposure profile or permit OSHA to base its rule on a profile it knows to be incomplete or flawed.

NIOSH's sampling is also not representative in that it features relatively few of the geologic basins where hydraulic fracturing occurs. Extensive variability occurs among job sites. For example, whether the well pad is situated on indigenous soils, caliche or sand, limestone, granite or sandstone (the quartz content of which varies widely) can significantly vary employee exposure scenarios – particularly if the topography and climate generate windy conditions. These factors are outside of the risk management control of the oil service companies but can greatly impact exposures. Moreover, these are merely temporary employment sites where the fracturing operation is completed in less than a week. The challenge of developing appropriate engineering controls is coupled with the fact that equipment may routinely rotate to other U.S. regions with dissimilar environmental conditions and must also comply with transportation requirements (including on-road posted weight or size limits).

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[133] 78 Fed. Reg. at 56447.

[134] Although we do not know how many different companies participated in the NIOSH site visits, it certainly was no more than six - and potentially far fewer. Reliance on data from so few companies is potentially significant because different companies utilize different work practices, equipment, preferred equipment configurations and health and safety practices that may materially impact employee exposure levels.

[135] 78 Fed. Reg. at 56447.

Section 6(f) of the OSH Act requires "determinations of the Secretary . . . be supported by substantial evidence in the record." The evidence on which OSHA proposes to characterize the entire hydraulic fracturing industry is far from "substantial" – OSHA's own standards for exposure characterization state as much. Nor would a reasonable mind accept it "as adequate to support a conclusion."[136] Indeed, for the agricultural section, OSHA deemed twice as many data points collected over decades insufficient to characterize the industry.

2. OSHA's Data Demonstrates Profound Technological Feasibility Issues

As detailed above, 75 full-shift PBZ samples from NIOSH Reports 1-5 are, by OSHA's own standards, insufficient to characterize exposures for the hydraulic fracturing industry. Even based on these 75 samples, however, OSHA's hydraulic fracturing industry profile demonstrates that RCS emissions in the industry present profound technological (and economic) feasibility issues that OSHA failed to consider or appreciate.

To be clear, the Associations are not suggesting that members of the Associations are not adequately protecting their workers from RCS. To the contrary, members of the Associations are working hard to design, test, implement, and deploy a wide range of strategies and technologies to reduce dust emissions at hydraulic fracturing sites. At the same time, and until such technologies and strategies are shown to be fully effective in protecting employees to below the PEL, members of the Associations are ensuring that each and every employee potentially exposed to regulated levels of RCS are provided access to and properly utilize state-of-the-art respiratory protection and utilize safe work practices. This fact has been each of the NIOSH reports and by the primary NIOSH researchers in numerous contexts.[137] OSHA's contractor, ERG, reached the same conclusion based on its research:

> NIOSH's on-site work indicated a relatively high level of safety awareness among the workers. While some of the crew had grown beards and therefore might have compromised their respirator fit, all of the fracking crews had respirators and were fairly consistent about using them when appropriate. Use of the respirators was closely correlated with the actual exposures workers incurred, with workers at some distance from the sand operations often not wearing the equipment. On site workers are aware of wind direction relative to the sand operations and consider that factor in their use of respirators. . . ERG's contacts to industry generally also indicated widespread use of respirators for workers nearest to the silica exposures. One well engineer commented, for example, that many production companies contractually enforce safety

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[136] *American Textile Mfrs. Inst., Inc. v. Donovan*, 452 U.S. 490, 522 (1981) (quoting *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 477 (1951)).

[137] *See NIOSH Report on Hydraulic Fracturing Site 1-6; See also September 10, 2012 Phone Conversation Between ERG and Dr. John Snawder*; *See also Esswein* (2013) at 355.

> requirements for their vendors. Other commenters similarly suggested widespread use of respirators.[138]

Members of the Associations support ERG's conclusions regarding the high level of safety awareness of their employees, the widespread and appropriate use of respirators, and the fact that many companies contractually enforce worker safety and health provisions at the well site. Members of the Associations train employees who are required to wear a respirator on their proper use, they strictly enforce shaving and other respirator use requirements, and they work hard to foster a culture that puts employee health and safety above all other considerations. In addition, members of the Associations utilize both incentives and penalties to ensure every supervisor and employee do their part to protect employees health and safety.

Following the OSHA/NIOSH Hazard Alert and the industry's own increased outreach through nSTEPS and trade associations' programs, many companies have increased their use of focused safety stand-downs on the subject of RCS with their employees to re-enforce their own internal respiratory protection programs that incorporate RCS, the NIOSH alert including references to being clean shaven, and accountability towards compliance. Importantly, the employee "exposures" discussed in this section and by OSHA, and throughout these comments, refer to PBZ samples collected from devices worn within the breathing zone of the employee – but which are outside the respirator. "Exposure" is a term of art in industrial hygiene that is used to represent potential employee exposure levels based on ambient concentrations. As such, these samples do not represent actual employee exposures because, as noted above and throughout the rulemaking docket, exposed **employees in the hydraulic fracturing industry are protected with respirators and safe work practices**.

Therefore, the "employee exposures" noted herein are used by OSHA to represent what employee exposures would be if the employee were not wearing a respirator. The risk assessment conducted by OSHA also assumes that employees are not wearing respirators. OSHA and its contractor, ERG, use this exposure data to conclude that engineering and work practice controls exist, are available, and can effectively lower the vast majority of these exposures to below the proposed PEL – thereby eliminating the need to use respirators in most situations.

The Associations' comments suggest that OSHA underestimates the levels at which employees would be exposed if they ceased wearing respirators and further argue that OSHA overestimates the presumed efficacy (and, in fact, existence) of controls to reduce RCS emissions at the source. The Associations are not suggesting that workers are being exposed without adequate respiratory protection. Indeed, we are suggesting that respiratory protection is necessary, and should continue, as it is an important component in the hierarchy of controls and one of the most effective means of protecting employees from RCS. Members of the Associations will continue to pursue a wide-variety of dust control technologies and strategies, but until such time as those technologies and strategies are proven to reduce potential exposures to below regulated levels, members of the Associations will continue to fully protect potentially exposed employees with respirators and safe work practices.

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[138] ERG Report at 6-14.

a. Sampling Results Found in the 75-Sample Exposure Profile

OSHA's sampling results for hydraulic fracturing provides startling evidence that that compliance with the proposed PEL without the use of respirators will be exceptionally difficult. Indeed, by OSHA and ERG's own estimation, 73.6% of results exceed 50 µg/m^3 and, in fact, 54.3% of results exceed 100 µg/m^3. [139] These results alone demonstrate the breadth of the dust reduction that would be required to comply with the proposed PEL without respirators – and they are skewed by the unrepresentative Site 6 data.

When the Site 6 data is appropriately removed from the profile, 80% of results exceed the proposed PEL of 50 µg/m^3 and, in fact, 60% of results exceed the PEL of ~ 100 µg/m^3.[140] As discussed further in the subsections below, there are several ways OSHA's profile may be biased even further. Nonetheless, as indicated by the table below, even without consideration of potential further biases, OSHA's profile (with the Site 6 data removed) demonstrates the compliance difficulty the Proposed Rule would present the hydraulic fracturing industry.

	Summary of Results			Range of Results		Profile of Results							
Job Category	Number	Mean (µg/m^3)	Median (µg/m^3)	Min (µg/m^3)	Max (µg/m^3)	<25 (µg/m^3)	≥25 and ≤50 (µg/m^3)	>50 and ≤100 (µg/m^3)	>100 and ≤250 (µg/m^3)	≥250 and ≤500 (µg/m^3)	>500 and ≤1000 (µg/m^3)	>1000 and ≤2000 (µg/m^3)	>2000 (µg/m^3)
Fracturing Sand Workers	46	510.22	408.5	40	2570	0	2 (4.3%)	7 (15.2%)	10 (21.7%)	11 (23.9%)	11 (23.9%)	4 (8.7%)	1 (2.2%)
Ancillary Support Workers	6	243.2	142	9.2	820	1 (16.7%)	2 (33.3%)	0	1 (16.7%)	1 (16.7%)	1 (16.7%)	0	0
Remote/ Intermittent Workers	23	96.81	51	17	630	5 (21.7%)	5 (21.7%)	9 (39.1%)	2 (8.7%)	1 (4.3%)	1 (4.3%)	0	0
Total	75	362.08	150	9.2	2570	6 (8%)	9 (12%)	16 (21.3%)	13 (17.3%)	13 (17.3%)	13 (17.3%)	4 (5.3%)	1 (1.3%)

Not only do the data show a high percentage of results in excess of the proposed and existing PELs (80% and 60% respectively), it also shows a large number of results that exceed the PEL by a wide margin. For example, the mean and median results for the job category "Fracturing Sand Workers" ("FSW") are over 510 µg/m^3 and 408 µg/m^3 respectively. 44 of 46 results (95.6%) exceed the proposed PEL and 36 of 46 results (78.2%) exceed the existing PEL. Moreover, 56.5% of FSW results exceed 250 µg/m^3 and over 17 of FSW results exceed 820 µg/m^3.

[139] Appendix A at Table A-10.

[140] 60 of 75 exposures exceed the proposed PEL and 45 of 75 exposures exceed the existing PEL.

Even for the "Ancillary Support Worker" ("ASW") job category that OSHA describes as employees that generally work outside the "sand-handling area,"[141] three of the six results OSHA used to characterize this entire job category were significantly above the existing PEL.[142] A Chemical Truck Operator (the only one sampled by NIOSH for a full-shift) had a result of 240 $\mu g/m^3$, while two Hydration Unit Operators had results of 320 $\mu g/m^3$ and 820 $\mu g/m^3$.[143] Indeed, employees in the ASW job category (albeit, based on only six samples) had a mean result of 243 $\mu g/m^3$ and a median result of 142 $\mu g/m^3$.[144]

Finally, for the Remote/Intermittent Support Workers ("RIS") job category, which OSHA characterizes as the least impacted hydraulic fracturing workers, 56.5% of results exceed the proposed PEL, including two results of 330 $\mu g/m^3$ and 620 $\mu g/m^3$.[145] Indeed, employees in the RIS job category had a mean result of 96.8 $\mu g/m^3$ and a median result of 51 $\mu g/m^3$.[146]

Notably, while we presented the spectrum of sampling results without including the Site 6 data in the interest of providing the best, most-representative data to OSHA – not because it provided an additional point for advocacy. Table A-10 presents the same information with the Site 6 data included, and the mean and median results for FSW are still over 464 $\mu g/m^3$ and 330 $\mu g/m^3$ respectively, ASW results are entirely unchanged, and half of all RIS results remain above the Proposed PEL.

These elevated sampling results, and the large percentage of jobs and job categories that are characterized by them, provide the baseline that underpins OSHA's entire technological and economic feasibility analyses. OSHA cannot meet its analytical obligations under the OSH Act, and substantial case law thereunder, unless, at a minimum, it can provide "substantial evidence" that a typical hydraulic fracturing company can reduce these significant and pervasive results to below the proposed PEL though engineering and work practice controls and that doing so will not alter the competitive structure of the industry. While the data set on which OSHA bases its analysis is certainly inadequate, all the available information, as noted above, demonstrates that RCS-sampling results in the hydraulic fracturing industry are substantial and diffuse, and that considerable reductions will be needed for results to broadly and consistently fall below the existing PEL. Moreover, as suggested by the data provided by OSHA in the docket, the 75 samples on which OSHA characterized the hydraulic fracturing industry likely also underestimate the level of engineering and workplace controls required to reduce results to the proposed PEL.

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[141] Appendix A at Table A-9.

[142] Appendix A at Table A-10.

[143] NIOSH Reports for Site 2 and Site 3.

[144] Appendix A at Table A-10.

[145] 13 of the 23 full-shift samples collected at NIOSH Sites 1-5. See also NIOSH Report for Sites 3 and 4.

[146] Appendix A at Table A-10.

b. OSHA's Profile Likely Contains Inaccurate Results

While the sampling results for the hydraulic fracturing industry more than adequately demonstrate the considerable level of reductions OSHA's recommended engineering and work practice controls will need to achieve in order for the Proposed Rule to be considered technologically feasible for the hydraulic fracturing industry, substantial evidence exists – indeed, in OSHA's own docket for this rulemaking – that OSHA's profile fails to represent accurately the results that form the baseline from which OSHA measured the feasibility of its recommended controls. The following examples are but a few of the inaccuracies that undermine OSHA's sampling profile for the hydraulic fracturing industry and the feasibility conclusions OSHA derived therefrom:

- Baseline Issue – OSHA's sampling profile for the hydraulic fracturing industry assumes that there were no controls in place during the NIOSH sampling effort.[147] Indeed, the assumption that underlies every aspect of OSHA's technological feasibility analysis is that the hydraulic fracturing industry is essentially starting from zero.[148] If controls that OSHA proposes for use in its technological feasibility analysis were already in place at some or all of these sites, OSHA's assumptions regarding the ability of its proposed controls to reduce the results presented in the profile are clearly erroneous. As it happens, there is substantial evidence that several sites that NIOSH sampled were using important controls:

    - Substitution of non- or low-silica proppant – OSHA and ERG estimate that substitution of non- or low-silica proppant can "reduce silica exposure levels by up to 99 percent or more . . ."[149] In addition to the primary use of ceramic sand at Site 6, NIOSH reported that "[a]t some sites, a proportion of the total proppant load included resin-coated sand, but proportions, usage time, and volumes were not available."[150] Unquestionably, when evaluating the amount of silica released, it is important to understand the amount used –particularly given the exposure reduction efficacy OSHA attributes to proppant substitution ("up to 99 percent or more"). While it may be impossible to calculate a precise profile because NIOSH was not able to provide data on sites or proppant use proportions, certainly the use of substitution at the sampled sites must be accounted for in some way. Simply

[147] Appendix A at A-22

[148] While OSHA assumes no controls for purposes of estimating how effective controls will be in reducing results once installed, for purposes of assigning costs to those controls, ERG assumed that 10% of all hydraulic fracturing firms already utilize: (1) baghouse controls; (2) caps on fill ports; (3) dust curtains; (4) wetting methods; and (5) conveyor skirting systems. (ERG Report at Table 18). As such, ERG assumed that 10% of firms will incur no new costs for these controls. *Id.* Assuming the presence of a control for cost purposes, but denying its existence for purpose of estimating technological feasibility is the very definition of arbitrary and capricious.

[149] Appendix A at A-45.

[150] Esswein (2013) at 350, See also nSTEPS Minutes.

ignoring this information and treating all results in the profile as the product of silica sand use is arbitrary and capricious.

Similarly, proppants are chosen for their efficacy in delivering results in a particular geologic play in conjunction with the other additives in the solution. While low or no silica solutions may be commercially available, they raise other health, safety and/or environmental considerations (*e.g.*, propane has a higher risk of explosion). To date, natural sand is most widely used due to its engineering effectiveness, ready availability, and relatively low cost compared to resin coated or ceramic proppants.

- Wetting – For purposes of determining the efficacy and feasibility of wetting as a control technology, OSHA estimates that wetting "provides a 63-percent reduction in exposure level . . ."[151] As noted above, for purposes of estimating technological feasibility, OSHA assumes that no wetting was used at the sites sampled by NIOSH and is not presently used by any hydraulic fracturing company. For purposes of assessing controls costs, however, ERG assumes 10% of hydraulic fracturing companies utilize wetting as a control technology.[152] Further, OSHA further ignores that nature provided this control technology at four of the six sites sampled by OSHA – it rained at Sites 3, 4, 5, and 6.[153]

- Worker Enclosures - For purposes of determining the efficacy and feasibility of worker enclosures as a control technology, OSHA estimates use of enclosures can decrease worker exposures by at least 45%.[154] Significantly, however, OSHA did not apply this 45% reduction ratio to Sample 5-15, which was collected from a worker in an enclosure.[155] Nor did OSHA apply this reduction ratio to the 16 samples collected from Blender Operators, which NIOSH noted as typically working in enclosed cabs, or the Chemical Truck Operators and Hydration Unit Operators that NIOSH noted worked in closed cabs.[156] If these results were takes from enclosed workspaces, it is simply inaccurate for OSHA to suggest that enclosures can further reduce these results.

OSHA's failure to account for these important baseline controls lead to significant inaccuracies and caused OSHA to analyze the technological feasibility of reducing a significantly lower level of baseline RCS results. While, in some cases, it is difficult to account for baseline controls, in other cases, OSHA's own technological feasibility analysis provides precise ratios to be applied. Whether doing so is difficult or easy,

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[151] Appendix A at A-44.

[152] ERG Report at Table 18.

[153] See NIOSH Reports for Sites 3-6; See also Esswein (2013) at Table 1.

[154] Appendix A at A-42.

[155] See NIOSH Report for Site 5.

[156] Esswein (2013) at 354.

OSHA must account for baseline controls *in some way*. Simply ignoring their existence (while acknowledging them for cost purposes) is arbitrary, capricious, and seriously undermines the substantiality of the evidence supporting its Proposed Rule.

- OSHA Ignores NIOSH Disclaimers Regarding Inaccuracies in its Sampling Effort – Throughout its six site reports and in ancillary communications available in OSHA's docket, NIOSH appropriately identified those situations wherein it believed that the sampling result was potentially inaccurate. Indeed, on the basis of NIOSH's disclaimers as to the representativeness of Site 6, and the efficacy of sampling methods utilized thereon, we recommended that Site 6 be removed from the profile for the hydraulic fracturing industry.

  In addition to the Site 6 concerns, NIOSH identified two other types of samples for which results were likely inaccurate. Based on overloaded samples and sampling malfunctions, NIOSH identified three precise samples, for which NIOSH estimated that actual conditions were potentially significantly different than those recorded (Samples 3-24, 5-04, and 5-13).[157]

OSHA's failure to recognize the dust control challenges in the hydraulic fracturing industry calls into question the entire technological feasibility analysis. Without substantial evidence of a realistic profile of the hydraulic fracturing industry, OSHA cannot credibly surmise that engineering and work practice controls can be brought to bear in a typical hydraulic fracturing firm to bring most operations into compliance with the proposed PEL without the use of respirators. Indeed, members of the Associations are working hard to develop and deploy additional engineering and work practice controls. Until such time as those technologies and strategies are proven to be effective in reducing exposures to below regulated levels, members of the Associations will continue to fully protect workers through the use of respirators.

3. OSHA's Analysis of Controls "Available" for the Hydraulic Fracturing Industry is Arbitrary, Capricious, and Not Based on Substantial Evidence

OSHA compiled a suite of engineering and work practice controls that it concluded were both available to the hydraulic fracturing industry and effective in controlling RCS results in the hydraulic fracturing industry.[158] OSHA then assigned each of the proffered engineering and work practice controls a presumed efficacy in reducing RCS emissions in the hydraulic fracturing industry. [159] OSHA then added up the presumed RCS-reducing capabilities of those engineering and work practice controls, and, depending on the estimated severity of the sampling result control (and the percentage of workers attributed those levels), concluded that one or more of the proffered controls could feasibly achieve the proposed PEL.[160]

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[157] See NIOSH Report for Sites 3 and 5.

[158] Appendix A at A-28.

[159] Appendix A at A-29 to A-52.

[160] Appendix A at A-45 to A-52.

For example, for the FWS job category, OSHA concluded that engineering and work practice controls could control 94% of estimated exposures through the following combinations of controls.

Exposure Range	**% of Workers Exposed at this Level Based on OSHA's Exposure Profile (Which Included Samples From Site 6)**[161]	**Controls Needed for Workers in that Range to Comply with Proposed PEL**[162]
less than 50 µg/m^3	12%	none
between 50 µg/m^3 and 99 µg/m^3	14%	Local Exhaust Ventilation ("LEV") for thief hatches
between 100 µg/m^3 and 290 µg/m^3	24%	partial enclosure and LEV on belts/conveyors/hoppers + LEV for thief hatches
between 291 µg/m^3 and 770 µg/m^3	35%	wet methods + partial enclosure and LEV on belts/conveyors/hoppers + LEV for thief hatches
between 771 µg/m^3 and 1,400 µg/m^3	10%	operator enclosures + wet methods + partial enclosure and LEV on belts/conveyors/hoppers + LEV for thief hatches
greater than 1,400 µg/m^3	6%	use of all controls still not sufficient. Respirators still required.

Importantly, these estimated exposure levels and percentages are taken from OSHA's profile, which is critiqued above. If OSHA attempted to account for any or all of the known

[161] Percentages taken from Appendix A, Table A-10.

[162] Appendix A at A-43 to A-45.

sources of inaccuracy in its profile, the percentage of worker exposures that would require more controls – and that could not be controlled to the PEL (without respirators) despite utilization of all OSHA's proffered controls – would increase significantly.

Nonetheless, we need not utilize the amended profile discussed above because OSHA's own profile demonstrates how tenuously OSHA's technological feasibility analysis depends on each of its proffered engineering and work practice controls being both available for widespread use in the hydraulic fracturing industry and 100% as effective as OSHA estimated. As the table below illustrates, even based on OSHA's profile, the technological feasibility of this rule for the hydraulic fracturing industry collapses if any of OSHA's proffered engineering and work practice controls proves unworkable or in any way less effective than OSHA estimated.

IF X Control Cannot be Utilized...	**% of FSW Workers That Cannot Meet Proposed PEL Without Respirators[163]**
Operator enclosures	16%
Wet Methods	51%
partial enclosure and LEV on conveyors/drop points/hoppers	75%
LEV for thief hatches	88%

Members of the Associations support protecting workers through the use of the hierarchy of controls and the option to use respirators until technologies can be developed, deployed, and shown to be successful should remain. OSHA's "combination of controls" analysis seeks to move industry away from its appropriate use of respirators based on the presumed success of these four technologies. As it were, and as discussed further below, OSHA has not shown any of these controls to be effective, failed to consider evidence that these controls cannot be utilized effectively in the hydraulic fracturing industry, nor taken into account that controls may be unique to regional environmental and seasonal conditions combined with the fact that equipment is often rotated in other regions of the U.S. with very little notice, and, most strikingly, grounded its analysis on technologies that are not available, in existence, or which cannot be used in conjunction with other recommended controls.

Indeed, some of the controls OSHA proffers as part of its "combination of controls" approach are mutually exclusive, and cannot be implemented in conjunction with other controls. For instance, if employers follow OSHA's recommendation to control emissions from thief hatches, side ports, conveyors, drop points, and hoppers through enclosure/LEV, the employers cannot simultaneously leave these components unenclosed for control through a water misting system.

[163] Derived from OSHA's exposure profile in Appendix A, Table A-10 and OSHA's "combination of controls" analysis at Appendix A, A-43 to A-45.

In addition to the practical impossibility of combining some of these controls to sum up the presumed efficacy of each, OSHA's "combination of controls" approach improperly assumes that subsequent controls installed in addition to existing controls will deliver the same reduction efficacy as when used alone. For instance, to the extent OSHA is proposing to use water misting to control emissions from conveyors, drop points, and hoppers (which is not at all clear from the record or feasible from a practical perspective), it should not assume that the technology will deliver the full estimated 63% reduction in employee exposures if OSHA already assumes that enclosures/LEV on those emission points already lowered employee exposures by 66%. Logically, if the control installed first delivers the control efficiency OSHA presumes, the impact of the latter-installed control must be diminished. While the Associations agree with OSHA that RCS emissions at some hydraulic fracturing sites are so complex that reliance on a single technology may be insufficient and use of multiple controls maybe necessary, we do not agree that the collective efficacy of a "combination of controls" is the sum of 100% of the presumed efficacy of each control used independently.

Importantly, ERG, OSHA's contractor that analyzed the feasibility of these controls and developed the component-by-component approach that OSHA utilized its own analysis, seemingly understood these diminishing returns, and offered its results with far less conviction:

> This component by component approach is intended to produce a combined reduction in silica dust exposures sufficient to bring the observed personal samples to within the control levels of the intended PEL. The actual field observations, however, are limited to those made by NIOSH. *Thus, the individual or combined effectiveness of these controls is not established*.[164]

ERG further disclaimed that "[t]here is considerable uncertainty involving the applicability or adaptability of some of these controls because they have not been deployed in the oilfield or on the type of mobile equipment used in the oilfield,"[165] and that:

> ERG lacks information on how well the various silica dust controls will work in combination. The field experience with the suggested controls is limited. While the combination of controls appears capable of reducing silica dust exposures substantially, *ERG's estimates of the exact silica dust reduction are based on extrapolations of the effectiveness of similar control in substantially different circumstances.*[166]

While ERG was broadly noting this uncertainty for all the proffered control technologies (and combinations thereof) on mobile equipment in transitory outdoor environments, as discussed

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[164] ERG Report at 5-5 (emphasis added).

[165] ERG Report at 6-15.

[166] ERG Report at 6-39 (emphasis added).

below, its admonition is particularly relevant to LEV – the control that is the lynchpin for OSHA's entire technological feasibility analysis. In its examination of the rock-crushing industry, which OSHA considered analogous to the hydraulic fracturing industry,[167] OSHA found that LEV was not technologically feasible for the mobile equipment.[168] OSHA's analysis therein for RCS-generating mobile equipment provides a rationale that should apply equally to hydraulic fracturing equipment:

> Although LEV shows promise for some types of construction equipment, it has yet to be proved practical for mobile rock crushing equipment . . . a notable amount of air (6,500 to 8,500 cubic feet per minute [cfm], with a wet scrubber system) must be exhausted from crushing machines used underground in the mining industry. A somewhat lesser amount might suffice above ground, but other challenges would need to be overcome, and this technology has not become popular for dust control in the construction industry. The challenges include problems with maintaining airtight enclosures around the crusher and conveyors on this type of equipment, which vibrates violently, and with housing a power generator, fan, and air-cleaning device of sufficient size on the mobile crusher chassis. One alternative, where the machine can be left in place in place for days at a time, is to use a portable generator and large industrial vacuum suction system with air cleaner on one platform (e.g., a parked trailer), connected by ductwork to the nearby crushing machine. Due to the vibration generated by crushing equipment, maintaining an airtight enclosure would likely require that the construction site also maintain numerous replacement parts and perform daily maintenance on the housing.[169]

OSHA's feasibility analysis for analogous RCS-generating mobile equipment in the rock-crushing industry was reasonable, reflected the real-world challenges of using precisely-calibrated control equipment in diverse, transitory, all-weather environments, and was based on substantial evidence in the record. The same feasibility challenges apply equally to hydraulic fracturing equipment. While hydraulic fracturing equipment does not "vibrate violently" like the mobile rock crushers mentioned above, OSHA noted that hydraulic fracturing equipment emits 20 times more dust than rock crushers[170] and dust with more silica than rock crushers.[171] OSHA therefore has even more reason to conclude that LEV is not a feasible control for hydraulic fracturing equipment.

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[167] Appendix A at A-32.

[168] PEA at IV-492.

[169] PEA at IV-492.

[170] Appendix A at A-32.

[171] PEA at IV-492.

OSHA, however, relied on this same study to show that LEV would be feasible and highly effective when applied to hydraulic fracturing equipment. That OSHA, relying on the same study as in its rock-crushing analysis, reached an irreconcilable contradictory conclusion is arbitrary and capricious. As explained below in the discussions of the specific applications for which LEV was proposed, OSHA's conclusion that LEV would be feasible and effective for the hydraulic fracturing industry is unsupported, and, in fact, undermined by information available in the docket.

a. LEV For Thief Hatches

The availability and efficacy of emission controls for thief hatches is fundamental conclusions to each of the control scenarios that OSHA uses to demonstrate the technological feasibility of the Proposed Rule. OSHA, however, lacks substantial evidence to show that: (1) emissions from thief hatches are a major source of worker exposures to RCS; (2) LEV can effectively control thief hatch emissions; and, (3) LEV is available in sufficient quantities to allow the hydraulic fracturing industry to utilize it on more than a marginal basis. The PEA provides no support for any of these findings.

i. OSHA's Analysis of the Proportion of RCS Results Attributable to Thief Hatches is Unsupported and Irrational

NIOSH identified dust ejected from the thief hatches on top of sand movers as a major source of RCS exposures – particularly when the sand movers are being filled.[172] OSHA's conclusions regarding potential worker exposures attributable to emissions from thief hatches are not based on objective, or reliable measurements or data. Neither NIOSH nor ERG attempted to quantify the percentage of worker exposures to RCS attributable to emissions from thief hatches. Rather, OSHA concluded that at least 50% of worker RCS exposures come from thief hatch emissions based solely on OSHA's visual inspection of "photographs and videos of hydraulic fracturing worksites [on the website of a company that markets dust controls systems] . . . suggests that thief hatches account for at least half (and likely more than half) of the visible dust released at these sites over the course of a day."[173]

Stated another way, OSHA's entire efficacy analysis for LEV for thief hatches is based on OSHA's "visual impressions" after viewing pictures and videos provided by a company selling services to control emissions from thief hatches.[174] This hardly constitutes "best available evidence." OSHA had access to, and continues to have access to, the NIOSH site investigators on whose work OSHA built its exposure profile, yet there is no evidence in the docket that OSHA ever inquired as to the proportion of worker exposures attributable to thief hatch emissions. Further, even if looking at photographs were sufficient to estimate the proportion of worker exposures attributable to thief hatch emissions, OSHA should have at least based its "visual impressions" on photographs that were not provided by a company selling

[172] See NIOSH Reports for Sites 1-6; See also Esswein (2013) at 355.

[173] Appendix A at A-31.

[174] http://www.fracsanddc.com/index.php/solution (accessed 12/2/2013).

solutions to such emissions. OSHA has numerous NIOSH photographs of thief hatch emissions within its docket. OSHA even used one in its Hazard Alert for Worker Exposure to Silica During Hydraulic Fracturing.[175]

Moreover, OSHA never explained how its visual impression that thief hatches account for 50% of dust emissions at hydraulic fracturing sites results in an assumption that 50% of worker exposures to RCS is attributable to thief hatches emissions. OSHA itself acknowledged that "[v]isible dust is not a measure of respirable dust concentration, but it is a marker for airborne dust in general, of which respirable dust is typically one component."[176] Indeed, NIOSH reported that quartz was the only silicate material detected during the sampling and that its median concentration was only 53%.[177]

Further, OSHA attributed thief hatch emissions to 50% of RCS exposures for "all workers," regardless of proximity to the thief hatches.[178] Proximity to emission sources is certainly a major factor in evaluating worker exposures. In fact, OSHA limited its technical and economic feasibility analysis solely to workers in the hydraulic fracturing industry because it found that other workers known to be on the site (oil and gas company representatives, suppliers, venders, *etc*.) were not proximate enough to the RCS emissions sources to warrant inclusion.[179] The Proposed Rule's requirement to establish regulated areas is similarly based on concerns over proximity to emissions sources.[180] It is therefore unclear, why OSHA (or ERG) attributed thief hatch emissions equally to worker exposures regardless of proximity to thief hatches and, importantly, regardless of those workers' proximity to other significant RCS emission sources on the site.

ii. OSHA has Not Identified Any "Available" Thief Hatch LEV

After concluding that emissions from thief hatches accounted for 50% of employee exposures to RCS, OSHA then "identified two commercial providers offering ***powered LEV systems*** built for the purpose of controlling dust emissions from dust sources associated with filling sand movers:" (1) the Frac Sand Dust Control Service ("Frac Sand Service"); and (2) the NOV-Appco System.[181]

While ERG identified the NOV-Appco System, it did not discuss the system at all. OSHA, on the other hand, simply noted that the NOV-Appco System was an add-on control

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[175] https://www.osha.gov/dts/hazardalerts/hydraulic_frac_hazard_alert.html (accessed 12/2/2013).

[176] Appendix A at A-31 to A-32.

[177] Esswein (2013) at 350.

[178] Appendix A at A-32.

[179] Appendix A at A-16.

[180] 78 Fed. Reg. at 56540.

[181] Appendix A at A-29 (emphasis in original).

system for sand movers, and that it operated at a speed of 3,200 cubic feet per minute (cfm).[182] OSHA's technological feasibility analysis for this system contained no additional information. OSHA provides no information as to the commercial availability of the system, no air monitoring data or test data of any kind, and no information to suggest that the system was feasible for use in most hydraulic fracturing operations. Indeed, the Associations consulted with companies that have tested the NOV-Appco system who reported significant functionality issues and that it did not obviate the need to use respirators to protect workers to even the existing PEL.

The ERG Report identified Frac Sand Service, but referred to it by the name of its acquiring company - Dupre Energy Systems.[183] ERG surmised that the Dupre system could potentially be technologically feasible, but deemed it economically infeasible based on its estimated annualized cost of nearly 143 million dollars.[184] OSHA never mentions this estimate or references "Dupre Energy Systems." Instead, OSHA provided a terse description of Frac Sand Service as a "service package providing trailer-based equipment (45,000 cfm) and personnel to set up and operate it on a per-job basis."[185] The nSTEP Meeting minutes OSHA provided in the docket further revealed that the system must be staffed by two employees working 12-hour shifts, and that set-up requires several hours per sand mover and a crane."[186]

OSHA further noted, as did the Frac Sand Service representative at the June 26, 2012 nSTEPS meeting, that the company had conducted no air monitoring from which to judge the efficacy of the service and technology. At that same meeting, however, the U.S. Lead for Encana Oil and Gas's Occupational Health and Industrial Hygiene Program reported that Encana tested the Frac Sand Service technology and that it found that respiratory protection was still needed in order to protect workers.[187] Some Members of the Associations have reported that that some encouraging test data has been developed since 2012, but no such evidence is available in the docket, nor was such data utilized in OSHA's conclusion that this technology would eliminate 100% of emissions from thief hatches.[188]

Even if the Frac Sand Service were effective, however, it remains technologically infeasible because it is unavailable. As prominently noted at the June 26, 2012 nSTEPs meeting, though conspicuously absent from Appendix A, Frac Sand Service *only has two units in the field and one unit in production.*[189] Given OSHA's estimates of the size of the hydraulic fracturing

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[182] Appendix A at A-29 to A-30.

[183] ERG Report at 6-35.

[184] ERG Report at Table 32.

[185] Appendix A at A-26.

[186] See nSTEPs Minutes.

[187] See nSTEPS Minutes.

[188] Appendix A at A-32.

[189] See nSTEPS Minutes.

industry, there is simply no basis to contend that Frac Sand Service's two to three LEV units make this technology "available" to the hydraulic fracturing industry.[190]

Appendix A also references a "mini baghouse passive dust collection system" conceived by NIOSH for controlling thief hatch emissions.[191] At present, however, the system remains a prototype in the proof of concept stage, and is not fully tested or commercially available.[192] As such, NIOSH's efforts to develop thief hatch controls do not support OSHA's conclusions of the technological feasibility of controlling thief hatch emissions with LEV. To the contrary, NIOSH's efforts provide strong evidence of the present unavailability and infeasibility of controlling thief hatch emissions with LEV. As stated by NIOSH, "Until a variety of engineering or other controls can be conceived, developed, evaluated and confirmed to be effective for controlling respirable silica exposures to hydraulic fracturing work crews, the use of respiratory protection will be required."[193]

iii. OSHA's Assumption that Thief Hatch LEV Would be 100% Effective is Entirely Unsupported

As noted in Section II(b)(3)(A)(i) above, OSHA estimated that 50% of worker exposures to RCS were attributable to thief hatch emissions. OSHA then assumed that by utilizing the "available" LEV technologies in Section II(b)(3)(A)(ii), the hydraulic fracturing industry could reduce exposures by "at least 50-percent" across all job categories.[194] In other words, OSHA estimates that LEV will be 100% effective in controlling the 50% of worker exposures it attributes to thief hatch emissions.

The analytical process by which OSHA arrived at its conclusion that thief hatch LEV will be 100% effective is not entirely clear – but certainly flawed. OSHA's analysis begins with an acknowledgement that "OSHA has not identified studies or data demonstrating the effectiveness of LEV for controlling silica exposures"[195] and that "no documentation exists showing to what extent the commercial systems currently available or under development control respirable silica . . ."[196] Importantly, these statements do not consider that Encana provided evidence at the June 26, 2012 nSTEPS meeting that at least one of the "available" controls was not fully effective, and that OSHA itself elsewhere noted that fact.[197]

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[190] Some members of the Associations have reported that Frac Sand Service may now have more than three units, however, they further reported that they do not have enough units to service even one of the larger hydraulic fracturing companies – much less the entire industry.

[191] Appendix A at A-32.

[192] Esswein (2012) at Online Supplement.

[193] Esswein (2012) at Online Supplement.

[194] Appendix A at A-44.

[195] Appendix A at A-30.

[196] Appendix A at A-31.

[197] Appendix A at A-30.

Lacking information demonstrating that thief hatch LEV is effective in the hydraulic fracturing industry, OSHA looked to the efficacy of LEV used by other industries to control emissions of silica-containing materials.[198] OSHA found that "[i]n the ferrous sand-casting foundry industry, monitoring data obtained by OSHA at a foundry showed an 83 percent reduction in sand system operator silica levels (from 231 $\mu g/m^3$ to 40 $\mu g/m^3$) after the foundry installed LEV and repaired leaks in the mixer."[199] Although OSHA acknowledged that the percent reduction experienced through use of LEV at the foundry may not be matched through use of LEV at hydraulic fracturing sites because "conditions in foundries are substantially different from those found in hydraulic fracturing sites . . .,"[200] OSHA then concluded that thief hatch LEV at hydraulic fracturing sites would be 100% effective.[201]

An 83% reduction efficacy in a controlled and stationary factory environment with modest silica emissions, however, does not constitute substantial support for a conclusion that the same equipment would provide 100% reduction efficacy in a significantly higher-emitting industry that operates in all-weather environments and which would need to disassemble, transport, and reinstall its LEV weekly, if not more frequently. Indeed, OSHA can point to no evidence that LEV was 100% effective for any of the industries it examined in the PEA.[202] OSHA's conclusion that thief hatch LEV would be 100% effective for the hydraulic industry is erroneous and contradicted by all of the available evidence.

In sum, OSHA's conclusion that thief hatches account for 50% of worker exposures based on its visual impression of a sand control company's marketing materials is, undermined by OSHA's own docket. OSHA's conclusion that technology is available to control thief hatch emissions is not based on any actual analysis of the technology, and, in fact, ignores clear evidence that the technology was largely untested, likely ineffective, and almost entirely unavailable. OSHA's final conclusion that the unavailable and untested technology would be

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[198] Appendix A at A-30.

[199] Appendix A at A-31.

[200] Appendix A at A-31.

[201] Appendix A at A-31.

[202] In static, controlled, indoor environments where LEV could be precisely engineered and meticulously calibrated, inspection data cited in the PEA demonstrated LEV to be effective but, in no instance, 100% effective: (*e.g.*, Concrete Products: 74-95% (PEA at IV-86); Mineral Processing: 82- 98% (PEA: IV-88); Stone Cutters: 42% (PEA at IV-104); Sand System Operators at Foundries: 83% reduction (combined with leak repair) (PEA at IV-148); Molders at Foundries: 60% when combined with misting, enclosures, and housekeeping improvements (PEA at IV-150); Coremakers at Foundries: 42% reduction when LEV applied to grinding benches (PEA at IV-157); Cleaning/Finishing Operators at Foundries: 69% (PEA at IV-169); Hole Drillers using Hand-Held Drills: 57%-85% (PEA at IV-406); Masonry Cutters using Stationary Saws: 88%, 91%, 96% (PEA at IV-433).

In transitory and outdoor scenarios, inspection data showed LEV to be far less effective (*e.g.*, Rock Crushing: 20-79% (PEA at IV-55).

OSHA's own estimations of LEV efficacy in all other industries is also far lower than 100%: (e.g., Mixer Operators in concrete product facilities: LEV 70% effective when combined with barrel wetting, misting, and other controls (PEA at IV-90); Finishing operators at Foundries: LEV 90% effective when castings are also pre-cleaned (PEA at IV-170).

100% effective in controlling the highly-questionable 50% of exposures attributable to thief hatch emissions has no support.

Thief hatch LEV has not been shown to be technologically feasible. OSHA has no basis to conclude that employers can reduce worker exposures by 50% through its use, and a strong basis to conclude otherwise. As OSHA relies on the presumed 50% reduction from LEV as the basis for controlling 88% of exposures in the hydraulic fracturing industry, OSHA's flawed analysis here alone makes this rule technologically infeasible for the hydraulic fracturing industry.

b. Partial Enclosure and LEV for Conveyors, Drop Points, and Hoppers

In addition to the 50% exposure reduction that OSHA estimated would be achieved through thief hatch LEV, OSHA estimated that partial enclosure of, and LEV for, conveyors, drop points, and hoppers will further reduce employee exposures by 66%.[203] While OSHA's analysis of the technological feasibility of this technology is quite different than the its analysis of thief hatch LEV, it is equally arbitrary.

First and foremost, OSHA only identified one commercially available LEV system that could be configured to control emissions from conveyors, drop points, and hoppers – Frac Sand Service.[204] As discussed above, Frac Sand Service has too few units available to even service a single industry member.[205] There is no evidence in the docket that the technology has been tested by the manufacturer.[206] The only efficacy data in the docket is Encana Oil and Gas' statement that its use did not obviate the need for employees to wear respirators for protection.[207]

Importantly, there is no evidence in the record that suggests that the Frac Sand Service LEV has ever been tested on conveyors, drop points, or hoppers. Indeed, there is no evidence in the docket that the Frac Sand Service LEV has ever *even been used* on conveyors, drop points, and hoppers. As noted by OSHA, LEV requires enclosure of the emission source to create the negative pressure needed to draw off emissions.[208] As NIOSH explained to ERG, however, it is not feasible to enclose conveyor belts.[209]

Moreover, companies with whom the Associations have inquired have stated that enclosing conveyors is particularly problematic because it inhibits monitoring of the flow of sand into the blender. Hydraulic fracturing companies very closely and continually inspect the flow

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[203] Appendix A at A-44.

[204] Appendix A at A-32. ERG did not identify any companies or products.

[205] nSTEPS Minutes.

[206] nSTEPS Minutes.

[207] nSTEPS Minutes.

[208] PEA At IV-493.

[209] *October 3, 2012 Phone Conversation Between ERG and Eric Esswein.*

of sand into the blender because an interruption of sand flow can cause the fracturing process to fail. Without adequate sand in the hydraulic fracturing fluid matrix, fractures would not be held open, and hydrocarbons will not be recovered. Either the stage would have to be re-fractured at significant cost and time or the fracture stage will not produce hydrocarbons.

In spite of (or because of) the unavailability and infeasibility of LEV for conveyors, drop points, and hoppers in the hydraulic fracturing industry, OSHA looked to an "analogous" industry to construct its 66% efficacy estimate.[210] In particular, OSHA looked to "a study of rock-crushing equipment used to crush pure quartz stone in the Iranian quartz powder production region."[211] How OSHA deemed Iranian rock crushing machines to be appropriate surrogates for the U.S. hydraulic fracturing machines is unclear – particularly so because OSHA elsewhere concluded that Iranian rock crushing machines were *"not necessarily directly analogous to U.S. rock crushers used in the construction industry*."[212]

If OSHA could not extrapolate LEV control efficacy from the Iranian study to the same industry using similar equipment, it should not extrapolate its efficacy to a completely unrelated industry. OSHA itself noted the dissimilarities between these industries: "[H]ydraulic fracturing equipment is markedly larger scale, and worker exposure levels tend to be correspondingly higher . . ."[213] "Fifty of the 51 largely uncontrolled respirable dust PBZ sample results for fracturing sand workers evaluated by NIOSH [were] up to 20 times higher than uncontrolled area concentrations [in the Iranian study]."[214] Additionally, two of the four components on which the Iranian LEV was used do not exist on hydraulic fracturing equipment.[215]

In addition to relying on sharply dissimilar equipment, emissions, and controls, OSHA relied on a study that lacked nearly all the details necessary to credibly extrapolate an efficacy estimate from the LEV used on the Iranian rock-crushing machines to the LEV proposed to be used on hydraulic fracturing equipment. Indeed, the Iranian study notes only that LEV was used at "hoppers, rotary grinders, screeners, and conveyor belts."[216] It did not describe the LEV at all.[217]

The 99% dust reduction reportedly attributable to LEV used on Iranian rock-crushing machines[218] bears absolutely no relevance to the efficacy or feasibility of LEV on conveyers, drop points, and hoppers. OSHA did not even find it relevant for the rock-crushing industry and,

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[210] Appendix A at A-32.

[211] Appendix A at A-32.

[212] PEA at IV-491 to IV-492 (emphasis added).

[213] Appendix A at A-32.

[214] Appendix A at A-32.

[215] PEA at IV-491 (screeners and rotary grinders).

[216] PEA at IV-491.

[217] PEA at IV-492.

[218] Appendix A at A-32.

based on such, found that LEV was not a technologically feasible control for the rock-crushing industry.[219]

Nor is the 99% an appropriate measure of efficacy. The reported 99% reduction was in *ambient dust levels* – not worker exposure levels.[220] PBZ samples of respirable collected in the Iranian study *after the LEV was in place* show mean exposures of 190 µg/m^3 and 400 µg/m^3 respectively for process and hopper-filling workers.[221]

That OSHA attempted to account for these deficiencies by arbitrarily discounting the erroneous 99% efficacy by 1/3 does not remedy its deeply flawed analysis. In fact, OSHA's unexplained discount to a 66% efficacy only serves to make its analysis more capricious and inconsistent.

There is no basis for OSHA to conclude that LEV on conveyors, dust drops, and hoppers will reduce exposures by 66% across all impacted hydraulic fracturing job categories. There are an exceptionally limited number of LEV units in the U.S. that claim to be capable of being used on these components. There is no evidence they have been tested by the manufacturer, found ineffective by at least one company, and never shown to actually have been used on a conveyor, dust drop, or hopper. While OSHA found the Iranian rock crushing industry analogous to the hydraulic fracturing industry for purposes of using the favorable LEV efficacy rates reported therein, it seemingly found the domestic rock-crushing industry so dissimilar from the hydraulic fracturing industry that its finding that LEV was not technologically feasible did not apply to hydraulic fracturing equipment.

OSHA's original technological feasibility analysis for the rock-crushing industry is the correct one. The Iranian study is too opaque to be useful. The 99% reduction reported therein is misleading. LEV has not been proven practical for mobile equipment and is therefore technologically infeasible. For OSHA to conclude otherwise for the hydraulic fracturing industry is arbitrary and capricious – certainly not based on substantial evidence.

As OSHA relies on the presumed 66% reduction from LEV for conveyors, dust drops, and hoppers as the basis for controlling 75% of exposures in the hydraulic fracturing industry, OSHA's flawed analysis here alone makes this rule technologically infeasible for the hydraulic fracturing industry. Combined with OSHA's failure to provide any evidence – much less, substantial evidence – of the feasibility of thief hatch LEV, there is simply no scenario where OSHA can conclude that its Proposed Rule is technologically feasible for the hydraulic fracturing industry.

c. Wet Dust Suppression Methods

OSHA's examination of the technological feasibility of wet dust suppression methods concluded that, "when combined with LEV controls on thief hatches, conveyors, and other

[219] PEA at IV-491 to IV-492.

[220] Appendix A at A-32.

[221] PEA at IV-492.

sources of emissions, the installation of a water misting/fogging [system] provides an additional 63% reduction in dust emissions."[222] OSHA's 63% estimate was taken from a study that examined the efficacy of water misting systems applied to rock-crushing machinery in India Gottesfeld, *et al.* 2008).[223] Curiously, when OSHA reviewed this same study in its analysis of the emissions from rock-crushing machinery in the U.S., it discounted the study's reported 63% efficacy to 50% because, "without 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."[224]

As with its analysis of LEV for conveyors, drop points, and hoppers, OSHA provided no explanation as to how it determined foreign rock-crushing equipment to be more analogous to hydraulic fracturing equipment than domestic rock-crushing equipment. While OSHA's analysis of LEV based on Iranian rock-crushing equipment was itself flawed, even there OSHA discussed some of the differences between the foreign rock-crushing equipment and hydraulic fracturing equipment, and discounted its projected efficacy from the efficacy reported in the study. Here, without any discussion of the appropriateness of the surrogate, OSHA projected the hydraulic fracturing industry would obtain the exact same efficacy reported by Gottesgeld 2008 in the Indian rock-crushing industry. As such, not only is OSHA's analysis herein inconsistent with its analysis of the rock-crushing industry, it is inconsistent with its earlier analysis of the hydraulic fracturing industry.

Further, it is not even clear which emissions sources would be controlled by the "water misting/fogging system." We presume that Appendix A was not suggesting that the proppant would be watered prior to introduction into the blender – in several contexts, OSHA, ERG, and NIOSH each recognized the infeasibility and unworkability of doing so.[225] OSHA and NIOSH identified seven RCS emissions sources at hydraulic fracturing sites:

(1) dust ejected from thief hatches;
(2) dust released from conveyor belts under sand movers;
(3) dust generated by truck traffic;
(4) dust created as sand drops into, or is agitated by, the blender hopper;
(5) dust released from the conveyor belt;
(6) dust released from the top of the sand belt on sand movers;
(7) dust ejected from the fill ports on the side of sand movers.[226]

Of these seven sources, we can conclude only that OSHA did not calculate the 63% reduction based on dust generated from vehicle traffic because OSHA based the 63% estimate

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[222] Appendix A at A-39.

[223] Appendix A at A-38.

[224] PEA at IV-489.

[225] See Appendix A at A-36; Esswein 2013; September 10, 2012 Phone Conversation Between ERG and Dr. John Snawder.

[226] Appendix A at A-28; nSteps Minutes.

on "[a] general mist system of the type described above (see Gottesfeld et. al., 2008) . . .."[227] Gottesfeld 2008 describes a "water misting/fogging system" that was applied to mobile rock-crushing equipment.[228]

Of the remaining six equipment-based RCS sources identified by OSHA, we know that OSHA did not suggest that the "water misting/fogging system" would be applied to proppant on conveyor belts and drop points because, after calculating the 63% reduction, OSHA concluded that "[*a]dditional* exposure reductions can be achieved by moistening the proppant on conveyor belts and drop points."[229] As such, OSHA's 63% efficacy estimate cannot be based on emission source numbers 2, 4, 5, or 6 above. Additionally, OSHA, ERG, and NIOSH all recognized that directly wetting or chemically amending proppant material prior to introduction to the blender can cause serious binding issues and cause a fracture to fail.[230]

Further, OSHA's analysis of the combination of controls that can be utilized to bring exposures to within the proposed PEL concluded that the estimated 63% reduction in employee exposures from "wet methods" is *in addition to* the 66% reduction estimated through enclosure of, and LEV for, conveyors, drop points, and hoppers.[231] It is impossible, however, for these emissions points to be enclosed for purposes of LEV control, yet open for purposes of misting control. Not only is it impossible to use these controls in combination, the fact that OSHA assumes that conveyors, drop points, and hoppers are already controlled by enclosure/LEV would make OSHA's reliance on Gottesfeld 2008 even more misplaced. Gottesfeld 2008 examined the impact of misting systems on equipment that was previously uncontrolled. The 63% reductions reported in Gottesfeld 2008, therefore, were measured from a zero-control baseline, and do not represent the additive impact of misting systems on equipment already furnished with control technology.

Similarly, OSHA cannot be suggesting that the "water misting/fogging system" would be applied to thief hatches. As discussed above, OSHA's "combination of controls" approach states that wet methods will be used in addition to, not in lieu of, LEV for thief hatches.[232] As OSHA already estimates that LEV will be 100% effective on controlling emissions from thief hatches, there is no way OSHA can estimate an additional reduction of 63% in emissions from thief hatches (or of any of other level, for that matter). Nor could these technologies be used in combination. If the dust is being captured in a baghouse fitted over the thief hatch, there is no place to direct the misting system. Somehow directing a mist spray at the baghouse or inside the baghouse would be antithetical to the dry manner in which a baghouse is intended to operate.

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[227] Appendix A at A-38.

[228] As such, the 63% reduction reported in Gottesfeld 2008 is potentially relevant only to equipment-based systems. OSHA elsewhere cites to studies on the efficacy of ground-based wetting, however, it relies solely on the efficacy reported in Gottesfeld 2008 in developing its 63% estimate.

[229] Appendix A at A-39.

[230] Appendix A at A-36

[231] Appendix A at A-45.

[232] Appendix A at A-45.

Nor can OSHA's 63% estimate be based on reduced emissions from side fill ports. Appendix A clearly states that capping side fill ports "will prevent silica emissions from this source,"[233] and that "OSHA assumes the step of closing the side fill ports is taken at the same time as LEV is applied to the thief hatches . . ."[234] As OSHA's combination of controls assumes that employers will already effectively control side fill port emissions by capping them in conjunction with the thief hatch control, it is not possible that employers can reduce employee exposures by an addition 63% through a water misting/fogging system.

OSHA has neither specified where the misting system would be applied n nor identified any RCS emission source on hydraulic fracturing sites that is capable of being controlled by a water misting/fogging system. In fact, OSHA's own analysis elsewhere establishes that OSHA did not base its estimate that employee exposures can be reduced by 63% on the use of water misting/fogging systems to control any of the seven identified sources of RCS at hydraulic fracturing sites.[235]

The estimate is not based on truck traffic emissions because Appendix A stated that the proposed control was for sand equipment, and because it generated the estimate from a study that examined equipment-based misting systems. The estimate was also not based on blender hopper emissions or emissions from any of the three conveyor belt systems because Appendix A states as much, and because under OSHA's combination of control approach, those mechanisms are already enclosed and controlled. Nor is the estimate based on thief hatch or side port emissions because Appendix A assumes that employers will have already enclosed, and control with 100% efficacy, emissions from those sources.

In sum, OSHA concluded that water misting systems will reduce employee RCS exposures by 63% in the hydraulic fracturing industry based on a foreign study of rock-crushing equipment that it elsewhere found to be too insufficient and inapplicable to use for the *very same rock-crushing industry* in the U.S. While adopting the full 63% efficacy in the study it elsewhere discounts under more analogous circumstances is arbitrary and capricious, OSHA never attempts to remedy the inconsistency by explaining how the system could be used to control emissions on hydraulic fracturing equipment. Indeed, based on OSHA's own statements and analysis under its "combination of controls" approach, water misting is not a feasible control for any of the sources of RCS emissions identified at hydraulic fracturing sites.

OSHA's estimate that water misting can reduce employee exposures by 63% has no support and is based on an analysis that contains serious logical and practical flaws. Even if OSHA's use of the 63% efficacy reported in Gottesfeld 2008 was rationale and supportable, either the feasibility of water misting fails for lack of an emissions source to control or OSHA's fundamental premise that "combinations of controls" make the Proposed Rule technologically

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[233] Appendix A at A-39.

[234] Appendix A at A-40.

[235] The ERG report suggests that water mists and sprays can be beneficial control methods for all the seven identified RCS emission sources except side fill ports and thief hatches. (ERG Report at Table 16). This conclusion, however, is never explained, and, in fact, unsupportable given OSHA's contrary conclusions and the mutually exclusive nature of the controls in Appendix A's "combination of controls" approach.

feasible is wrong. It cannot be both. Combined with OSHA's inability to provide any evidence – much less, substantial evidence – of the feasibility of LEV thief hatches, conveyors, drop points, or hoppers, there is simply no scenario where OSHA can credibly conclude that its Proposed Rule is technologically feasible for the hydraulic fracturing industry.

d. Operator Enclosures

Even assuming all the controls above were available, could be used in combination, and achieved the ambitious silica-reducing efficacies estimated by OSHA, 21.7% of all fracturing sand workers and 13.3% of all hydraulic workers would remain exposed to RCS above the proposed PEL.[236] Of these persistently high exposures, OSHA presumes that most (but not all) can be controlled by placing the exposed worker in pressurized clean air control booths.[237]

In particular, OSHA estimates that such "dust booths" will reduce worker exposures by 45% based on a presumption that the booths are 90% effective and that the nature of many of the more highly-exposed hydraulic fracturing jobs would require frequent movement in and out of the booth.[238] We commend OSHA for recognizing the worksite realities that make a worker's exclusive presence in the booth unrealistic. Indeed, member companies of the Associations believe the nature of many of the more highly exposed job categories would require the worker to spend much of his shift outside the booth, at the piece of equipment that he is responsible for monitoring and controlling. Significantly, OSHA is not proposing to relocate the controls or instruments for any of the equipment that the workers are managing inside the dust booths. Indeed, such relocation of the controls for this equipment would be quite difficult and very costly, if even possible, a fact that OSHA acknowledges.[239] As a result, the operators of the equipment must often be outside of an enclosure to oversee the proper operation of the equipment, to manage the controls, to check the progress of the work, and to respond immediately to upsets or potential problems as they occur.

These job responsibilities not only require the worker to be outside the dust booth for significant portions of his shift, they also lead to frequent opening and closing of the door as needed to enter and exit the booth. As the worker enters from the outside, he will potentially bring in the ambient air. Each time he opens and closes the door to enter or leave the dust booth, he will cause a near complete exchange of the cleaner air inside the dust booth with the much dustier air outside the booth. OSHA has presented no data to show that these limitations on the exposure-reducing capabilities of a dust booth amount to a 45% exposure reduction for hydraulic fracturing workers (*i.e.*, 90% effective for 50% of shift.) OSHA's data drawn from operator

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[236] Notwithstanding the aggressiveness of OSHA's estimations, it was not able to calculate that the combination of LEV at multiple emission points and wetting could allow employees with exposures of 770 $\mu g/m^3$ or above to meet the proposed PEL. (Appendix A at A-43). 10 samples in the 75-sample exposure profile exceed 770 $\mu g/m^3$. The use of the term "hydraulic fracturing workers" herein refers to those employees identified by OSHA as within the three potentially impacted job categories.

[237] Appendix A at A-40.

[238] Appendix A at A-42.

[239] Appendix A at A-40.

enclosures from other industries address situations where: 1) the process controls that operators must manage have been relocated to within the booth, such that operators can spend half or more of their shift within the booth; 2) there appears to be no additional need for the workers within the booth to enter and exit frequently; and 3) RCS concentrations outside the booth are likely much lower than can be expected outside booths in hydraulic fracturing sites, with much less quantity of dust being brought into the booth by workers with clothes and shoes grossly contaminated with silica-laden dust.

We are also perplexed by OSHA's limited identification of hydraulic fracturing worker job categories for which this technology might need to be provided. For purposes of estimating costs, OSHA assumes that dust booths would only need to be installed for sand mover operators.[240] Sand mover operators, however, account for only one of at least six sorts of hydraulic fracturing workers that may be more highly exposed and will likely require this .[241] OSHA explicitly says that dust booths may be required for "fracturing sand workers," which include, in addition to sand mover operators, conveyor belt tenders, blender tenders, water operators, and pump truck operators.[242] Elsewhere, OSHA explicitly says that dust booths will benefit "the most highly exposed workers" "at the sand mover and conveyor belt operator work stations"[243] Indeed, the highest result sampled by NIOSH was a conveyor belt tender,[244] yet OSHA did not project the need for or cost of dust booths for this job category. At other locations in Appendix A, OSHA says that dust booths may be required for any jobs with sample results above 770 ug/m^3,[245] which would include hydration unit operators.[246] OSHA attempts to dismiss this sample as presumed to have been influenced by either an upset condition or work practices." Such dismissal of 20% of the available exposure data pertaining to hydration unit operators is inappropriate. OSHA has cited no evidence there were indeed upset conditions or unusual work practices prevailing when this worker was sampled, nor is such evidence in the NIOSH sampling report.

In sum, under OSHA's "combination of controls" framework, in addition to sand mover operators, dust control booths may be necessary for conveyor belt tenders, blender tenders, water operators, pump truck operators, and hydration unit operators. Among these five additional job categories, OSHA has sampling results suggesting that two of these categories (conveyor belt tenders and hydration workers) explicitly will need dust booth protection.[247]

Dust control booths do not lower ambient dust concentrations at the site such that the presumed control efficacy of the technology can be applied across all job categories. The only

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[240] Appendix A at A-57.

[241] Appendix A at A-57 – A-60.

[242] Appendix A at A-21.

[243] Appendix A at page A-40.

[244] Appendix A at page A-42.

[245] Appendix A at A-42.

[246] See sample 1-14.

[247] See Sample 1-14 and Sample 3-10.

employee that benefits from such a reduction is the employee utilizing equipment that can accommodate the worker being absent from the equipment and at the booth and only for the time the employee can stay in the booth. As such, OSHA must either estimate the engineering feasibility of installing such booths, as well as their costs, for other highly-exposed job categories, or it must change its technological feasibility analysis to reflect the limited applicability of the booths.

Further, OSHA provides no evidence that dust booths are available for, or can be added to, hydraulic fracturing equipment, nor that the controls for the equipment can be relocated to wherever a booth could be placed on the equipment. Member companies of the Associations report that dust control booths cannot be feasibly added to retrofit hydraulic fracturing equipment – particularly sand movers, but also conveyor belts.

Sand movers, by virtue of their rugged use, are stoutly made and extremely heavy. Absent any additional controls, sand movers can easily approach or exceed gross vehicle weight restrictions, require special (and costly) permitting (*e.g.*, state, county, municipal), and be restricted entirely from some roads. To the greatest extent possible, hydraulic fracturing companies try to ensure that the equipment is transported empty and devoid of all unnecessary components so that they can be freely transported. According to knowledgeable industry sources, adding control booths (or LEV, for that matter) would push many sand mover transporters over weight thresholds. As such, in order to utilize the technology, the booth would have to be capable of being removed, shipped separately, and reinstalled between each hydraulic fracturing site. Nor has OSHA investigated and shown that it is possible to relocate the sand mover controls to wherever the booth might be. Either OSHA must account for these additional control, shipping, and set-up needs in its engineering and economic feasibility analysis or limit the applicability of this control option in its technological feasibility analysis. Nor is there any evidence that controls could be relocated and booths could be affixed to the various conveyor and T-belts that may be used at a hydraulic fracturing site. A failure to amend its analysis one way or the other is failure to rely on best available evidence.

e. Technological Feasibility Conclusion

As NIOSH advised, "Until a variety of engineering or other controls can be conceived, developed, evaluated and confirmed to be effective for controlling respirable silica exposures to hydraulic fracturing work crews, the use of respiratory protection will be required."[248] Members of the Associations support this pragmatic conclusion and will continue to fully protect their workers with respirators while working to develop, test, and deploy more effective control technologies and strategies as per the hierarchy of controls. Consistent with NIOSH's advisory, we do not believe that OSHA has provided any evidence – much less substantial evidence – that controls have already been "conceived, developed, evaluated, and confirmed to be effective for controlling respirable silica exposures to hydraulic fracturing work crews . . ."

[248] Esswein (2012) at Online Supplement.

None of OSHA's key conclusions are "supported by substantial evidence in the record considered as a whole."[249] Nor does its analysis present "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion."[250] Indeed, where evidence was available to OSHA in the docket or elsewhere, OSHA either did not use it or applied it in an arbitrary and internally inconsistent manner.

OSHA based its technological feasibility analysis on an exposure profile that would not even meet the requirements for representative sampling that OSHA proposes to impose on businesses through this Proposed Rule. Even so, OSHA's profile demonstrated that the Proposed Rule would present the hydraulic fracturing industry with significant compliance issues – perhaps more so if OSHA accounted for known inaccuracies in its profile.

The "combination of controls" that OSHA concludes are confirmed to be effective in controlling dust and largely obviating the need for respirators includes some technologies which cannot be used in combination, none with efficacy data for the hydraulic fracturing industry, and many which have not yet developed or available for commercial use. Yet, for each component in the "combination of controls," OSHA assigned overly-ambitious efficacies based either on studies that it elsewhere dismissed or no evidence at all.

As such, OSHA has not proven " a reasonable possibility that a typical firm will be able to develop and install engineering and work practice controls that can meet the PEL in most of its operations . . ."[251] Nor has OSHA shown "modern technology has at least conceived some industrial strategies or devices which are likely to be capable of meeting the PEL and which the industries are generally capable of adopting."[252] Based on this demonstrated technological infeasibility alone, OSHA cannot promulgate this Proposed Rule for the hydraulic fracturing industry. OSHA should amend its conclusions on the present day availability and efficacy of dust controls and acknowledge, as NIOSH and the Associations do, that "Until a variety of engineering or other controls can be conceived, developed, evaluated and confirmed to be effective for controlling respirable silica exposures to hydraulic fracturing work crews, the use of respiratory protection will be required."

C. The Proposed PEL is Economically Infeasible for a Material Segment of the Hydraulic Fracturing Industry

In drafting the OSH Act, Congress never intended to protect employees by putting their employers out of business.[253] Indeed, Congress imposed on OSHA an "affirmative burden to

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[249] 29 U.S.C. § 655(f).

[250] *American Textile Mfrs. Inst., Inc. v. Donovan*, 452 U.S. 490, 522 (1981) (quoting *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 477 (1951)).

[251] *Public Citizen Health Research Group v. Dep't of Labor*, 557 F.3d 165 (3rd. Cir. 2009) (quoting *United Steelworkers of America v. Marshall*, 647 F.2d 1189, 1272 (D.C. Cir. 1981).

[252] *United Steelworkers*, 647 F.2d at 1266.

[253] See *AFL-CIO v. Hodgson*, 499 F.2d at 478.

demonstrate the reasonableness of an adopted standard,"[254] and that compliance with the rule is "economically feasible."[255]

"A standard is [economically] feasible if it does not threaten 'massive dislocation' to, or imperil the existence of, the industry."[256] While OSHA is not required to prove economic feasibility with certainty,[257] as with technological feasibility, OSHA's estimations of costs in a given industry are factual determinations which must be supported by substantial evidence.[258] Courts have interpreted this standard to require OSHA to "provide a reasonable assessment of the likely range of the costs of its standard, and the likely effects of those costs on industry so as to 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."[259] While OSHA can promulgate standards that "portend disaster for some marginal firms," it cannot promulgate standards under which compliance is "likely to disable the industry from competing with substitute products, or markedly to increase concentration within the industry."[260] Similarly, the compliance costs in relation to the revenues of the industry cannot be so high as to "force a material segment of the industry out of business."[261]

To meet its obligations under the OSH Act and the substantial case law requiring assessment of the impact of its standards on profitability, revenues, competition, and the structure of the affected industries, OSHA has applied a rule of thumb under which compliance costs in excess of either 1% of revenues or 10% of profits can be viewed as a threat to the profitability and competitive structure of an industry. Importantly, this approach has been challenged and upheld in court.[262]

When showing that the compliance costs facing an industry from a proposed regulation are lower than this "rule of thumb," and thereby demonstrating a "reasonable likelihood" of economic feasibility, OSHA must show substantial evidence that its cost data are accurately derived from, and representative of, each affected industry. As a necessary corollary, OSHA must start by accurately profiling each affected industry so that the cost estimates derived from

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[254] *United Steelworkers of America, AFL-CIO-CLC v. Auchter*, 763 F.2d 728, 736 (3d. Cir. 1985); *See also Atlantic & Gulf Stevedores, Inc. v. OSHA*, 534 F.2d 541, 551 (3d Cir. 1976).

[255] *Public Citizen Health Research Group v. Dep't of Labor*, 557 F.3d 165 (3rd. Cir. 2009); *See also American Iron and Steel Institute*, 577 F.2d at 832 ("the Secretary is constrained by the requirement of feasibility, both technological and economic.").

[256] *United Steelworkers*, 647 F.2d at 1265 (citing *AFL-CIO v. Brennan*, 530 F.2d at 123; *American Iron and Steel*, 577 F.2d at 836).

[257] *United Steelworker*, 647 F.2d at 1266.

[258] See *Texas Independent Ginners*, 630 F.2d at 411.

[259] *AFL-CIO v. OSHA*, 965 F.2d at 982 (citing *United Steelworkers*, 647 F.2d at 1266, 1272).

[260] *National Cottonseed Products Ass'n v. Brock*¸ 825 F.2d 482, 487 (D.C. Cir. 1987).

[261] *Ibid.*

[262] See *Hexavalent Chromium, supra*, 557 F.3d at 181-182; 71 Fed. Reg. 10,100, 10,300-10,301 (Feb. 28, 2006).

the industry profile reasonably represent the typical firms in the various segments of the industry, given varying operations, exposure levels, and processes.[263]

OSHA's economic feasibility analysis for the hydraulic fracturing industry falls far short of complying with these important evidentiary and analytical requirements. Whereas, the economic feasibility analysis for the general, maritime, and construction industries was based on three extensive analyses conducted by ERG in at least three iterations each (with massive reports) over the course of at least ten years,[264] the economic feasibility analysis for the hydraulic fracturing industry was based on a relatively short analysis that was appended to the PEA on the eve of promulgation. Indeed, OSHA's economic analysis of the hydraulic fracturing industry is so "last minute" that the compliance cost estimates for hydraulic fracturing are not even included in the aggregate cost estimates for the proposed General Industry, Maritime and Construction regulations as shown in the PEA.

Whereas the economic feasibility analysis for all the other affected industries begins with an exposure profile for these industries based on thousands of worker exposure samples over several decades, the profile for the hydraulic fracturing industry consists of only 75 samples over two years at most. Whereas the economic feasibility analysis for the general, maritime, and construction industries was informed by Small Business Regulatory Enforcement Fairness Act ("SBREFA") proceedings convened with the Office of Management & Budget ("OMB"), the Small Business Administration ("SBA"), and panels of industry representatives and stakeholders,[265] OSHA did not conduct any SBREFA proceedings for the hydraulic fracturing industry or coordinate with OMB or SBA in analyzing the potential impact of regulation on small business entities within the hydraulic fracturing industry. Whereas the SBREFA process conducted for every other industry subject to this Proposed Rule provided for public comment, evaluations of regulatory alternatives, employment impacts, and more detailed analysis of the potential impacts on small entities, the hydraulic fracturing industry was not provided a comparable opportunity for public comment or analysis on regulatory alternatives or small business impacts because OSHA's SBREFA proceedings preceded the widespread expansion of hydraulic fracturing and horizontal drilling.

These examples are presented, not to show that OSHA appropriately analyzed the economic feasibility analysis of the rule for every other industry, but once again to show how OSHA's analytical approach and evidentiary basis for the hydraulic fracturing industry are so profoundly thin and inconsistent.[266] Indeed, OSHA's economic feasibility analysis for the hydraulic fracturing industry fails for the same reason its technological feasibility analysis failed – OSHA has not taken the time necessary to understand the hydraulic fracturing industry and

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[263] See generally *United Steelworkers*, 647 F.2d at 1272.

[264] PEA at V-1.

[265] 78 Fed. Reg. at 56295.

[266] To be clear, API does not endorse the feasibility analysis for all industries or the processes from which they were derived. The ACC Silica Panel comments that API joined critique these analyses in detail. As flawed as those processes were, however, they far exceed the level of scrutiny and analysis OSHA employed for its examination of the hydraulic fracturing industry.

assess accurately the unique economic, technological, employment, and compliance issues involved in regulating this industry. As noted by other industry stakeholders, the remedy for such analytical errors must start with the initiation of new SBREFA proceedings that consider the impact of this Proposed Rule on small businesses, including those that comprise 50%-75% of the hydraulic fracturing industry. OSHA's unwillingness to conduct such proceedings is impermissible.

As a result, and as discussed in the subsection below, OSHA has not reasonably estimated the costs required for the hydraulic fracturing industry to comply with the proposed rule, or the particular impact these costs will have on small businesses and on the competitive structure of the industry.

1. OSHA Significantly Underestimated the Costs to the Hydraulic Fracturing Industry of Attempting to Comply With the Proposed Regulation

First and foremost, the Associations disagree that use of OSHA's "combination of controls" will be sufficient to achieve compliance with the proposed PEL. These comments have identified in great detail the many ways in which OSHA has misapprehended the efficacy and availability of its combination of controls:

- None of OSHA's proposed controls have been credibly shown to achieve the percentage reductions in silica exposures that OSHA asserts.

- Several of OSHA's proposed controls likely pose very significant operational problems on hydraulic fracturing sites, and OSHA has provided no information to suggest that these operational problems can be mitigated. Wetting or misting, for instance, cannot be used in a manner that waters the proppant prior to blending, cannot be used in conjunction with enclosed sand transport processes and LEV, and cannot be used in the many important oil and gas regions that are below freezing for many months per year.

- Several of OSHA's proposed controls are not available and likely will not be available on a commercial scale sufficient for deployment to much of the hydraulic fracturing industry within the time period required for compliance with the proposed regulation.

- OSHA's "combination of controls" illogically assumes that each of the Agency's suggested combination of controls will reduce exposures in a multiplicative fashion, irrespective of the efficacy of the prior control – if one control reduces exposures by 50% and another control reduces exposures by another 50%, then OSHA incorrectly assumes that application of both controls will reduce exposures by 75%.

The Associations cannot provide economic analysis for any different or larger combination of controls that might enable compliance with the proposed regulation because members of the Associations have not identified combinations of technologies that will allow the hydraulic fracturing industry to consistently comply with the proposed PEL across widely varying work environments and on the schedule OSHA has proposed without the use of respirators. Members of the Associations are working diligently to develop and deploy effective

control technologies, but there is no identifiable industry-wide package of controls that can be deployed over the next few years on a national basis to meet the PEL without use of respirators.

This lack of an available, workable, and effective emissions control "fix" is the reason members of the Associations rely on respirators to fully protect their workers. This lack of an available, workable, and effective emissions control "fix" is also the reason OSHA's economic feasibility analysis is wrong – OSHA cannot calculate the costs of meeting the proposed PEL if it has not identified a set of controls that are available and will be effective in meeting the proposed PEL. Unless and until OSHA substantially changes and significantly improves its technological feasibility analysis to identify controls that will allow a typical hydraulic fracturing company to achieve the PEL without use of respirators, the Agency cannot even begin to conduct a reasonable economic feasibility analysis.

Nevertheless, assuming for the purposes of argument that OSHA's combination of controls does represent the full spectrum of controls that will be necessary for a typical hydraulic fracturing company to comply with the proposed PEL, OSHA still significantly underestimated the potential cost of this rule on the hydraulic fracturing industry because OSHA failed to account accurately for the cost of the full "combination of controls."

For purposes of evaluating economic feasibility, OSHA has calculated only those costs associated with reducing exposures from the existing PEL to the proposed PEL.[267] Despite concluding that compliance with this Proposed Rule would require companies to install each of OSHA's "combination of controls," OSHA based its cost estimate on the costs of only two of those controls – "LEV controls at thief hatches and operator enclosures"[268] – that the Agency postulates hydraulic fracturing companies can use to achieve the increment of exposure reduction between the current PEL and the proposed lower PEL. In estimating the cost of compliance with the proposed regulation, OSHA considered none of the costs associated with misting controls for equipment or ground traffic, or the costs of enclosing and installing LEV on conveyors, belts, hoppers, or drop points, evidently believing that such controls will be used by hydraulic fracturing companies in the course of applying engineering controls to comply with the current PEL without resort to respirators.[269]

This approach is impermissible. The OSH Act requires OSHA to base its feasibility analysis on the best available evidence.[270] According to OSHA, the best evidence available on the exposure levels that will need to be mitigated to comply with the Proposed Rule is the NIOSH sampling data - "These samples represent the best available silica exposure data for hydraulic fracturing workers."[271] Notably, well over 50% of those samples were in excess of the current PEL.[272] (Importantly, the fact that the hydraulic fracturing industry experiences sampling

[267] Appendix A at A-55.

[268] Appendix A at A-55.

[269] Appendix A at A-55.

[270] 29 U.S.C. § 655(b)(5)

[271] Appendix A at A-22.

[272] Appendix A at A-27.

results that are above the PEL does not mean companies are not complying with the PEL. As these comments have clarified repeatedly, engineering and work practice controls sufficient to reach either the current PEL or the proposed new PEL have not been shown to be feasible – and for that reason, hydraulic fracturing companies have protected, and are protecting, their employees through the use of respirators).

OSHA knows that feasible controls will need to be developed and deployed in order for industry to reduce monitoring results to below the proposed PEL – it is one of principal conclusions of Appendix A. Acknowledging, on the one hand, industry's need to develop and deploy technologies sufficient to control exposure sampling results that exceed the current PEL of 100 µg/m^3, while, on the other hand, counting only the additional costs the Agency assumes will be needed to reduce samples from below 100 µg/m^3 does not meet courts' requirement that OSHA make logical, rational and reasonable determinations.[273] In fact, this exact analytical flaw was extensively discussed and strongly questioned by the United States Court of Appeals for the District of Columbia in its review of OSHA's lead standard:

> OSHA concluded that its own expert, DBA, had 'includ[ed] in the cost of the new lead standard the costs that intransigent firms have yet to expend in meeting the old and more generous PEL of 200 ug/m^3'. DBA explained that segregating these costs would be impossible. OSHA, however, disputed the inclusion of the costs necessary to reach the 200 ug/m^3 level. Therefore, the agency concluded that DBA's estimates were "considerably overestimated."
>
> OSHA's conclusion is far too simplistic. For an industry to reach the 200 ug/m^3 level, as previously required, it may only have needed respirators, or simple engineering controls at a minimal cost. However, for that industry to reach 100 ug/m^3 or 50 ug/m^3 from *either* the 200 ug/m^3 level, or a higher exposure level, it may be necessary to completely rebuild its plant at an outrageous cost. OSHA fails to give consideration to such possibilities. Furthermore, what the agency *should* have been concerned with is the ultimate cost and burden or effect on the industry, despite the initial starting point for calculating the cost. It is agreed by all that an OSHA standard is infeasible if it causes massive dislocation to the industry, or imperils its existence. Should this be any less true just because substantial segments of the industry might not have complied with the 200 ug/m^3 standard? Such ruling is open to serious doubt.[274]

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[273] See generally *United Steelworkers*, 647 F.2d at 1265.

[274] *United Steelworkers*, 647 F.2d at 1325.

While we do not concede (and in fact disagree) that the costs associated with OSHA's proffered "combination of controls" accurately represent the full costs a typical hydraulic fracturing company will need to incur to comply with the proposed PEL, the Associations strongly believe that, at a minimum, OSHA must consider the full costs of all of the controls that the Agency regards as necessary for a typical company to comply with the Proposed Rule. It is this full set of costs that must inform an analysis of whether costs "threaten massive dislocation;" "imperil the long-term profitability and competitive structure of the industry;" "disable the industry from competing with substitute products;" "markedly to increase concentration within the industry;" or "force a material segment of the industry out of business."

a. Where OSHA Did Calculate Costs for Engineering Controls, It Underestimated Costs Significantly

While OSHA, in Appendix A, estimated and considered only the compliance costs associated with the two controls it judged to be necessary for a typical hydraulic fracturing company to reduce exposures from the current PEL to the proposed PEL, the Agency's contractor ERG did attempt to estimate the costs for each of the controls that OSHA included within its "combination of controls." ERG described the measures within the "combination of controls," plus additional potential control measures, in Table 17 of their report to OSHA.[275] ERG then estimated the cost for these controls for the entire industry, on both a total cost basis (*i.e.*, costs to progress from current exposure levels to compliance with the proposed PEL) and incremental cost basis (*i.e.*, total costs less the costs estimated to comply with the current PEL).[276] The costs OSHA and ERG estimated for the engineering controls, however, fall well short of the true costs of those controls.

The Associations have attached to these comments two workbooks that utilize the same structure and format as the workbooks OSHA and ERG used to develop their own cost estimates. The first Hydraulic Fracturing Workbook ("Total Costs and Revenues for Small Hydraulic Fracturing Entities") estimates the costs for small hydraulic fracturing companies to attempt to comply with the proposed regulation, and compares these costs against the revenues these firms are estimated to accrue from hydraulic fracturing activities. The second Hydraulic Fracturing Workbook ("Total National Cost for the Hydraulic Fracturing Industry") estimates the costs (costs only, not revenues) for the entire industry (small, medium and large hydraulic fracturing fleets) to attempt to comply with the proposed regulation. Both Workbooks estimate costs on a total, not incremental basis, estimating the costs for different segments of the industry to implement the combination of engineering controls that OSHA projects as needed to comply with the proposed PEL, plus the costs to comply with the Proposed Rule's ancillary requirements. Both workbooks estimate the costs for these segments of the industry to attempt to comply with the proposed regulation – as noted, we do not believe that implementation of OSHA's suggested combination of engineering controls will allow a typical hydraulic fracturing company to achieve compliance without use of respirators, nor do we believe that these controls

[275] ERG Report at page 6-6-6-13.

[276] ERG Report at page 6-34.

are available on a national basis within the timeframe over which the proposed regulation requires compliance.

These Hydraulic Fracturing Workbooks are being provided in response to OSHA's request for additional or superior data on the costs of engineering controls and all other costs reasonably expected to be incurred in order to comply with the Proposed Rule.[277] These Hydraulic Fracturing Workbooks were developed by Environomics, Inc., an economic consulting firm specializing in sophisticated regulatory analysis. Stuart Sessions from Environomics, who principally constructed the Hydraulic Fracturing Workbooks, is a highly-regarded economist with more than 30 years of experience for the government and the private sector in evaluating environmental, energy and health and safety regulatory actions. He has particular experience in analyzing the costs of complying with OSHA health standards. To develop the costs and assumptions utilized in the Hydraulic Fracturing Workbooks, Mr. Sessions worked closely with the Associations, many members of the Associations, hydraulic fracturing companies, vendors and suppliers. The Hydraulic Fracturing Workbooks are informed by the research, experience, and insights of appropriately experienced industrial hygienists, oil and gas industry technical experts, and energy market analysts. We believe the Hydraulic Fracturing Workbooks provide the best available evidence of the likely cost of this Proposed Rule in the hydraulic fracturing industry, and we have provided our estimates and calculations transparently and in such a manner that they can be utilized by OSHA and ERG to recalculate the Agency's estimated compliance costs.

As the Hydraulic Fracturing Workbooks contain a comprehensive analysis of each instance where we believe OSHA and ERG underestimated the costs associated with engineering controls as necessary to attempt to comply with the Proposed Rule, we need not repeat all of those instances here. Instead, this section provides a few examples and explains some of the thematic errors that we believe to be the source of OSHA and ERG's underestimates of engineering control costs.

Underestimating the Frequency With Which a Particular Engineering Control Will Need to be Applied- OSHA's technological feasibility analysis stated that dust booths are necessary for all job functions identified in OSHA's profile as having exposure monitoring results in excess of 770 µg/m^3.[278] OSHA's exposure profile includes three job functions for which monitoring results have been obtained in excess of 770 µg/m^3: sand mover operators, conveyor belt operators, and hydration unit operators. Additionally, the NIOSH sampling results for other "fracturing sand workers" in the "central sand-handling area," strongly suggest that dust control booths may be necessary for any additional categories of workers in this area that have not been sampled extensively and shown not to incur exposures similar to other workers in this area, including perhaps the "blender tender," "water operator," and "pump truck operator."[279]

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[277] 78 Fed. Reg. at 56286.

[278] Appendix A at A-40.

[279] Appendix A at A-21, Table A-9.

Even though there are six job categories that may need dust booths, in attempting to quantify the engineering cost of dust booths, the Agency assumed that dust booths would need to be available only for sand mover operators.[280] OSHA estimated no costs for the dust booths the Agency suggests may be needed for conveyor belt operators, hydration unit operators, or any other "fracturing sand workers." This error alone more than doubles OSHA's estimated costs for dust booths, presuming the distribution of workers among job categories as shown in OSHA's "typical hydraulic fracturing crew."[281]

Further, despite estimating that a "typical" hydraulic fracturing crew includes five sand mover operators[282] and therefore presumably five sand movers requiring dust booths, OSHA's engineering cost analysis[283] assumed that only one sand mover would require a dust booth in small fleets, three would require dust booths in medium fleets, and four dust booths would be required in large fleets. Calculating a weighted average by applying OSHA's assumption that there are 100 small fleets, 244 medium fleets and 186 large fleets, OSHA estimates an average of 2.97 sand movers and 2.97 dust booths needed per fleet. The 2.97 dust booths, sand movers or sand mover operators per fleet across the industry is far short of the five sand mover operators that OSHA estimates to be in a "typical" hydraulic fracturing crew. Because of this error, as well as the complete omission of other higher exposed job categories altogether from the Agency's dust booth cost analysis, we estimate that the number of dust booths likely needed to meet OSHA's exposure reduction goals would be more than six times OSHA's estimate.

Additionally, while OSHA did not calculate the costs associated with misting controls because it deemed them as among the controls necessary to comply with the existing PEL, ERG attempted to calculate the cost of such systems.[284] ERG calculated that hydraulic fracturing fleets of all sizes – small, medium or large – will each require only one $60,000 "Water Misting/Spray System" to control dust emissions at the site regardless of the size of the fleet or the number of pieces of equipment within the fleet.[285]

As we noted in our discussion of technological feasibility, OSHA does not provide any information from which to guess which equipment or dust sources it expects will be controlled with 66% efficacy by the misting system. ERG, for its part, suggests variously that the single "Water Misting/Spray System" may control "dust ejected from the thief hatches on the top of the sand movers,"[286] "dust from conveyor belts,"[287] "dust created as sand drops into, or is agitated in the blender hopper,"[288] and then in a table without explanatory text,[289] ERG suggests additionally

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[280] Appendix A at A-57.

[281] Appendix A at A-54, Table A-12.

[282] Appendix A at A-54.

[283] Appendix A at A-57-A-60.

[284] ERG Report at 6-20, A-4, A-10.

[285] ERG Report at 6-20, A-4, A-10.

[286] ERG Report at 6-6.

[287] ERG Report at 6-11.

[288] ERG Report at 6-8 and 6-9.

that "Wet Methods (water mist or spray)" can control all of: "conveyor belts (under sand movers)," "drop point (e.g., at top of the sand belt)," "conveyor belt operation (in general)," "blender hopper" and "road dust" (though the table appears to retract ERG's assertion at page 6-6 that the misting system could control emissions from the sand mover thief hatches). The Associations are not aware of any single water misting system that could control all of these dust sources at a cost anywhere near ERG's "one size fits all" figure of $60,000. In particular, a misting system that covers thief hatches at multiple sand movers (some 10+ feet above the ground, or, in the case of vertical "silo" style sand movers, some 40 feet above the ground), the entire conveyor system, drop points, the blender hopper and major areas of truck traffic (most of the well pad while equipment is staged and set up, off-site sand delivery truck staging areas, off-site parking areas for workers, and a substantial length of access roads) would need water spray potentially covering several acres horizontally and a substantial height vertically. Such a misting system would douse much of the site, including workers, sensitive electronic equipment, dust collection equipment and proppant in conveyance to the blender, as well as potentially creating mud, pooled water, ice, and other dangerous nuisance conditions.

While we request that OSHA consider the costs associated with all elements of the "combination of controls," including misting systems, we urge OSHA not to accept ERG's incorrect assertion that a single fixed-priced, modest cost misting system can feasibly control dust emissions from truck traffic and all sand handling equipment irrespective of the amount of equipment used. We submit that, if OSHA continues to conclude that misting is appropriate for all these pieces of equipment and areas, the Agency provide cost estimates for a more realistic set of multiple, precisely directed misting systems that will each address each one of the areas or pieces of equipment that OSHA believes need attention. The present costing approach has badly underestimated the frequency with which this control may be utilized – the need is not for one very large, area-wide (and under-costed) misting system, but instead for many more precisely directed systems.

Overestimating Useful Life and Underestimating Maintenance Costs - Sand is extremely abrasive. As such, it can damage equipment and significantly shorten the useful life of equipment used in environments with large amounts of sand. Importantly, control equipment that is designed to collect sand or is otherwise placed where sand emissions are highest are the most likely to experience damage and reduced useful lives from clogging and abrasion. OSHA certainly recognizes this likelihood because, for instance, they caution industry that sand deteriorates seals on dust booths and other enclosures.[290] NIOSH similarly recognized that dust and sand can undermine controls and require more frequent replacement of equipment and filters.[291]

Despite an apparent understanding that engineering controls for sand emissions would require frequent repair and maintenance and have short useful lives, OSHA did not account for these facts in their engineering cost estimates. While these operational realities are true for all

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[289] ERG Report at Table 16 on page 6-5.

[290] Appendix A at A-10.

[291] See generally *Dust Control Handbook for Industrial Minerals Mining and Processing*.

industries subject to the Proposed Rule, they are even more significant in the hydraulic fracturing industry because of the significantly higher volume of sand used by the hydraulic fracturing industry and because engineering controls in the hydraulic fracturing industry are also impacted by outdoor, all-weather environments, and the stresses inherent in the very frequent need for assembly, transport, and deconstruction of controls and equipment between each well site. OSHA has simply and wrongly transferred to the hydraulic fracturing industry that Agency's blanket assumption for all of General Industry that sand management and sand emissions control systems will have a useful life of 10 years and annual operating, maintenance and repair costs amounting to a standard 10% of capital costs. The Associations believes that the costs in the Hydraulic Fracturing Workbooks provide the best available evidence of the true useful lives and operating and maintenance costs of engineering controls in the hydraulic fracturing industry. We request that OSHA amend its analysis to reflect this information.

Underestimating Costs to Transport and Assemble/Disassemble the Control Equipment – Transportation costs constitute a significant segment of operating costs for hydraulic fracturing companies. Hydraulic fracturing equipment is extremely heavy, requires frequent transportation, and, oftentimes, long-distance transportation to remote areas. Logically, whenever the equipment is transported, so too will the engineering controls OSHA assumes will be needed for the equipment. OSHA, however, either underestimates the necessary costs to transport this equipment, or in some instances, estimates no transportation cost at all. It may be the case that OSHA assumes that such controls are simply attached once to the fracturing equipment and can thereafter be transported at no additional cost beyond the costs that are routinely incurred to transport the fracturing equipment. This, however, is unrealistic.

As we explained in our technological feasibility discussion, sand movers, by virtue of their rugged use, are stoutly made and extremely heavy. Absent any additional controls, sand movers can easily approach or exceed gross vehicle weight restrictions, require costly permitting, and be restricted entirely from some local roads. Adding further weight with substantial engineering controls (*e.g.*, roughly a ton for the suggested NOV-APPCO baghouse add-on) would push many sand mover transporters over weight thresholds or reduce the volume of sand that can be transported in a sand mover that is otherwise under the weight limit. Blenders, hoppers, conveyors and other sorts of hydraulic fracturing equipment to which OSHA also proposes attaching controls (*e.g.*, curtains, shrouds, covers, sideboards, operator booths, and perhaps misting equipment) may also have transport weight issues and other issues with controls impeding their ability to stow securely for transport over rough roads and to deploy smoothly and quickly on-site.

For most of this hydraulic fracturing equipment, it is not possible simply to affix OSHA's proposed control once and leave it in place while the equipment is being transported, placed, used, demobilized and then transported again. In order to use most of OSHA proposed controls in association with a piece of hydraulic fracturing equipment, the controls will need to be capable of being removed from the equipment after the equipment is used, shipped separately, and reinstalled at each successive hydraulic fracturing site. OSHA accounts inadequately for these costs in the Agency's cost analysis.

Engineering control requirements, therefore, create costs - not only for the separate transportation of such controls - but for the time, effort, and additional equipment (*e.g.*, cranes,

hoists, boom trucks, fork lifts) needed to frequently unload, assemble, disassemble, and reload control equipment. Because such equipment has not yet been widely deployed, accurate assembly/disassembly costs are difficult to estimate. For its control equipment, however, Frac Sand Service estimates that two workers would need 6-8 hours and a crane to install the unit on-site for four sand movers, and an unspecified amount of time to remove it after the fracturing job is completed.[292]

The Hydraulic Fracturing Workbooks provide best available evidence to account for these significant costs in transporting, assembling and disassembling control equipment. We request that OSHA amend its analysis to reflect this information.

Underestimating Unit Costs – In addition to underestimating the number of controls that will be needed and the costs to operate, maintain, transport, and assemble/disassemble such controls, in many cases OSHA also underestimated the costs of individual elements that contribute to the total cost of a control. For example, OSHA assumed the cost of an hour of on-site labor to perform tasks associated with the proposed controls (*e.g.* install conveyor skirting) at various unrealistic levels such as $15.34 per hour for "Metal and Plastic Machine Workers."[293] We figure costs for on-site labor instead at $36/hour, including benefits.[294] Likewise, OSHA estimates the costs to transport a dust booth to and from a fracturing site at $37.25 per booth, including driver, truck and fuel. We figure the cost of transportation for dust booths instead as a function of the driver wage, fuel price, number of trucks needed (up to six booths carried per truck), distance from company base to fracturing site, and other factors, arriving at an average cost of $513 for delivery and return of the dust booths needed by a small fracturing fleet and twice that, ($1,026) for the larger number of booths likely needed by medium or large fracturing fleets. Again, while our complete portrayal of the unit costs associated with engineering controls is found in the Hydraulic Fracturing Workbooks, the Associations believe that these are two representative examples of the underestimations endemic to OSHA's unit cost calculations.

b. OSHA Significantly Underestimates the Costs Hydraulic Fracturing Companies Will Incur to Comply With the Ancillary Requirements

OSHA also significantly underestimated the costs hydraulic fracturing companies will incur to comply with the ancillary provisions in the Proposed Rule. While these requirements are supplementary to the Proposed Rule's primary engineering control requirements, the costs associated with ancillary provisions are by no mean marginal. OSHA calculated that ancillary provision costs exceed 20% of the total cost to the hydraulic fracturing industry of the Proposed Rule.[295] Again, within the Hydraulic Fracturing Workbooks we provide a detailed analysis of

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[292] nSTEPS Minutes.

[293] ERG Report at 6-21

[294] U.S. Department of Labor, Bureau of Labor Statistics. Occupational Employment Statistics. May, 2012. Average hourly wage for all occupations in NAICS 2131 $24.94/hour. Marked up by 44.6% to account for benefits to yield $36/hour (Source: BLS. Employer Costs for Employee Compensation – September 2013. Private sector average benefits equal 44.6% of wages and salaries)

[295] Appendix A at A-61.

the costs the hydraulic fracturing industry may reasonably expect to incur for the major elements of the ancillary provisions. We believe this to be the best available information regarding the costs of such provisions. As such, in this section, we limit our discussion to the misapprehensions that form the source of OSHA's underestimations.

Notably, the Hydraulic Fracturing Workbooks contain one important instance where we believe OSHA *overestimated* costs. The Associations disagree with OSHA that this rule imposes any additional costs for respiratory protection programs. We believe these programs are already being fully implemented throughout the hydraulic fracturing industry.

The comments submitted by the ACC RCS Panel discuss in detail how OSHA underestimated the costs that General Industry would likely incur to comply with the ancillary provisions. The Associations concur with those calculations and, where appropriate, incorporated them into the Hydraulic Fracturing Workbooks. OSHA's underestimation of ancillary costs for the hydraulic fracturing industry, however, is more egregious.

OSHA performed little analysis that was particular to the hydraulic fracturing industry in estimating the costs this industry would incur in complying with the proposed ancillary requirements. In general, OSHA estimated ancillary requirement costs for the hydraulic fracturing industry by estimating the number of hydraulic fracturing workers that would exceed various ancillary requirement trigger levels, and then multiplying this number of workers by a cost per worker figure derived from OSHA's ancillary requirements analysis for the remainder of General Industry.[296] This approach of transferring a "cost per worker" figure developed for the remainder of General Industry to the hydraulic fracturing industry is inappropriate for several reasons.

While a part of the General Industry category, the hydraulic fracturing industry is quite dissimilar to most other general industries in several important respects. Hydraulic fracturing companies deploy their workforce to some of the most remote regions in America and, then, within somewhere between a day and several weeks, redeploy them elsewhere.

Where a static industry may be expected to be located within reasonable proximity to infrastructure and services required to comply with the ancillary provisions, hydraulic fracturing operations typically are not. Members of the Associations have reported that hiring an industrial hygienist to conduct exposure monitoring at a hydraulic fracturing site has four to six times as much per day as OSHA has estimated would be required for a stationary industry within a reasonable distance to a metropolitan area.

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[296] Appendix A at A-61. OSHA devotes exactly one sentence in Appendix A to describing how the Agency estimated ancillary provisions costs for the hydraulic fracturing industry. "With the exception of respirator usage and other fracking –specific inputs as noted in ERG (2013), costs were estimated by applying the methods and estimates [*i.e.*, the per worker cost estimates] presented in Chapter 5 [*i.e.*, costs for the other General Industries] for program costs to the industrial profile [i.e., the number of hydraulic fracturing workers] and exposure profile data *[i.e.*, how many of them are exposed above various trigger levels] presented in this appendix for the hydraulic fracturing industry." (page A-61)

Similarly, medical surveillance costs in the hydraulic fracturing exceed those for other industries because the hydraulic fracturing work force is often a considerable distance away from the medical infrastructure needed for such surveillance. Medical surveillance is also considerably more expensive for the hydraulic fracturing industry because, as ERG extensively noted,[297] the rigor, schedule, and frequent travel required in hydraulic fracturing work results in turnover rates that other industries do not experience. Higher turnover rates will significantly increase the number of employees that require medical surveillance and training.

Further, as an industry that operates outdoors and on a transient basis, the hydraulic fracturing industry incurs ancillary requirement compliance costs that a static industry would not. For instance, for those industries with static emissions sources, regulated areas can be established once. In the hydraulic fracturing industry, such areas would need to be established at each new site, or an access control plan would need to be updated and communicated at each new site. OSHA did not account for the time associated with these reevaluations or updates. Perhaps more importantly, OSHA did not estimate any cost for hydraulic fracturing employers to provide workers with "… means to remove excessive silica dust from contaminated clothing … and provisions for the removal or cleaning of such clothing."[298] This proposed requirement will likely mean that hydraulic fracturing companies will need to provide multiple HEPA vacuum stations or air showers or something similar for workers exiting a regulated area. Such equipment would entail a considerable cost to purchase and then continually transport, unload, install, disassemble, and reinstall at site after site. For HEPA vacuuming to clean clothes (much less so for an air shower), substantial costs would also be incurred in terms of the lost value of worker time as they queue up and then vacuum after breaks and at lunch and end of shift. OSHA has estimated no such costs among the Agency's estimates for ancillary requirements for the hydraulic fracturing industry

Finally, as the costs of the ancillary provisions necessarily increase based on the number of potentially impacted workers, we believe that OSHA underestimated ancillary compliance costs by underestimating hydraulic fracturing industry employment. As noted in our discussion of the industry profile and elsewhere, we believe the best evidence available suggests that there are more than 29,000 on-site workers in the hydraulic fracturing industry in the job categories that OSHA identifies as potentially exposed to RCS – not 16,960 such workers as suggested by OSHA. OSHA's approach to estimating ancillary requirement costs for the hydraulic fracturing industry also misses the costs that may result from substantial numbers of workers not employed by the hydraulic fracturing company being on the well pad and potentially exposed to RCS.

In the Hydraulic Fracturing Workbooks, the Associations have attempted to account for these and other errors that OSHA makes in estimating costs for the proposed ancillary requirements. We request that OSHA utilize this best available evidence in reassessing the costs the hydraulic fracturing industry will incur to comply with the ancillary provisions in the Proposed Rule.

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[297] ERG Report at 4-14.

[298] 78 Fed. Reg. at 56488.

c. Impact of the Proposed Rule's Estimated Compliance Costs on the Hydraulic Fracturing Industry

As we have stated in numerous instances, the Associations do not believe there is any cogent evidence that OSHA's "combination of controls" would be adequate to assure that a typical hydraulic fracturing company could comply with the proposed new PEL without substantial use of respirators. We thus refer to installation by the hydraulic fracturing industry of OSHA's "combination of controls" as representing an "attempt to comply" with the proposed PEL, and not as "achieving compliance" with the proposed PEL.

We have estimated the costs for the hydraulic fracturing industry of this "attempt to comply" in the two Hydraulic Fracturing Workbooks. The first workbook estimates the costs that a typical small hydraulic fracturing company will occur in attempting to comply in this manner across a year's worth of typical hydraulic fracturing projects typically conducted by such a company. The second workbook estimates the total national costs for the entire hydraulic fracturing industry to attempt to comply in this manner. Both workbooks estimate and sum the projected costs for:
(1) installing and operating the engineering controls in OSHA's "combination of controls;" and
(2) complying with the proposed ancillary requirements.

The following table shows the Associations' estimate for the annual cost to a small hydraulic fracturing firm of attempting to comply with the proposed regulation while performing the projects that such a firm will typically perform in a year.

Estimated Annual Costs for Small Hydraulic Fracturing Firm to Attempt to Comply With Proposed Regulation

Engineering controls		**Cost per Year**
Controls for sand movers		$27,205
Dust booths		$66,572
Water misting		$19,251
Dust suppression		$133,173
Conveyor skirting, covers, LEV		$19,638
	Subtotal	$265,838.49
Ancillary requirements		
Exposure assessment		$18,952
Respirators		$0
Medical Surveillance		$1,037
Regulated areas		$66,589
Training		$409
	Subtotal	$86,987
	Total Costs to Attempt to Comply	**$352,825.62**

Full details on the derivation of this cost estimate are provided in the Hydraulic Fracturing Workbook titled: "Total Costs and Revenues for Small Hydraulic Fracturing Entities."

Importantly, OSHA estimates that there are between 100 and 150 of these small companies, and that they constitute between 50% and 75% of all hydraulic fracturing companies. The following table adds the costs estimated for each of these 100-150 small entities to the estimated compliance costs for each of the larger tiers of companies OSHA identified, and therefore, calculates the total estimated cost of this Proposed Rule on the hydraulic fracturing industry.

Estimated Total National Costs for Hydraulic Fracturing Industry
($ in millions per year)

Controls for sand movers	$62.2
Dust booths	$49.7
Water misting	$44.0
Dust suppression	$70.3
Conveyor skirting, covers, LEV	$39.4
Engineering Control Costs Subtotal	*$265.7*
Exposure assessment	$61.6
Respirators	$0.0
Medical Surveillance	$5.8
Regulated areas	$32.4
Training	$1.1
Ancillary Requirement Costs Subtotal	*$101.0*
Total Costs for All Hydraulic Fracturing Fleets	**$366.7**

2. The Costs to Comply With the Proposed Rule Threaten the Competitive Structure of the Hydraulic Fracturing Industry

The best available evidence clearly demonstrates that this Proposed Rule is not economically feasible for the small business segment of the hydraulic fracturing industry. In our discussion of the profile of the hydraulic fracturing industry, we utilized OSHA's bottom-up approach to estimating revenues for small businesses in the hydraulic fracturing industry by multiplying revenues per job or per fracture stage by an estimate of the number of days or stage completions per year.

Importantly, for the small entities that OSHA concludes "have sufficient capacity to handle only minor, low-pressure refracturing jobs on conventional oil and gas wells,"[299] we used OSHA's calculation that "$25,000 per stage was representative of the work on low-pressure, shallow, conventional wells."[300] Applying a relatively high utilization rate of 80% (97 jobs and

[299] Appendix A at A-8 to A-9.

[300] Appendix A at A-12.

292 days per year in the field), we calculated that small businesses in the hydraulic fracturing industry each earn an average annual revenue of $2,425,000.

In the economic feasibility section, we built a compliance cost estimate for the Proposed Rule that examined all the controls OSHA deemed necessary to meet the proposed PEL and provided best available evidence of the costs that small entities in the hydraulic fracturing industry would likely pay for controls and to implement the ancillary provisions. Using this rational and supported approach, we estimated annual compliance costs for each small hydraulic fracturing entity attempting to comply with the Proposed Rule to be $352,825.62. These compliance costs constitute more than 14.5% of revenues for small hydraulic fracturing entities.

This impact of the Proposed Rule on these firms' revenues far exceeds OSHA's "rule of thumb," under which compliance costs that exceed 1% of revenue are viewed by OSHA as a threat to the industry. Compliance costs in excess of 14.5% of revenues will be intolerable to a small company – or any company, for that matter – and they will likely not be able to continue to operate. 100 – 150 small firms will no longer be able to conduct the only type of hydraulic fracturing work they can perform – low-pressure refracturing jobs on existing wells – and they will exit the industry.

Not only are these reasonably anticipated compliance implications enormously consequential to the small entities that will bear them, they also critically impact the structure of the entire hydraulic fracturing industry. Small entities are not a marginal segment of the hydraulic fracturing industry. By OSHA and ERG's estimates, they constitute between 50% and 75% of the entire industry. There can be no doubt at all that a rule that, by OSHA's own measure, threatens the existence of 1/2 to 3/4 of companies in an industry – and 100% of all small entities -- is a threat to the "existence or competitive structure"[301] of the hydraulic fracturing industry. There is also no question that such an impact would be considered a "massive dislocation,"[302] or that it would markedly "increase concentration within the industry."[303]

3. The Costs to Comply With the Proposed Rule Also "Imperil the Long-Term Profitability" of the Hydraulic Fracturing Industry

As we stated in our discussion of the profile of the hydraulic fracturing industry, the Associations do not believe that OSHA provided a well-supported estimate of the profitability for the various sized businesses in the hydraulic fracturing industry. Nonetheless, even using OSHA's inappropriate estimate that all size segments of this industry earn profits at a rate equal to 10.31% of revenues, the compliance costs that we have estimated for the small business segment would amount to 141% of thusly calculated profits for small hydraulic fracturing entities. (Annual profits at 10.31% of annual revenues equal to $2,425,00 would result in annual

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[301] *AFL-CIO v. OSHA*, 965 F.2d at 982.

[302] *AFL-CIO v. OSHA*, 965 F.2d at 982 .

[303] *National Cottonseed Products Ass'n v. Brock*¸ 825 F.2d 482, 487 (D.C. Cir. 1987).

profits per small entity of $250,018. Compliance costs at $352,826/year would amount to 141% of these profits.) OSHA's threshold of concern for profits is only 10%.

Certainly, by any measure, the Proposed Rule would have a devastating impact on small entities. Because small entities encompass between 100 and 150 of the 200 entities in OSHA's profile of the hydraulic fracturing, the Proposed Rule would have a devastating impact on the hydraulic fracturing industry as a whole. Notably, it is precisely this type of impact that the Regulatory Flexibility Act and the SBREFA process are designed to avoid. OSHA's SBREFA engagement and analysis, however, predated the existence of most of the small entities in the hydraulic fracturing industry. While the Associations understand OSHA's urgent interest in finalizing an updated RCS standard, we believe that it omitted a critical step when it attempted to analyze the feasibility of its proposed rule on an industry in which so many of the participants are small businesses without first learning more about those small businesses and potential regulatory impacts through SBREFA proceedings or otherwise.

While these comments focus, we believe appropriately, on the impact the Proposed Rule would have on these 100 to 150 small entities, it is not altogether insignificant that, based on the best available evidence, the total cost of the Proposed Rule on the entire hydraulic fracturing industry would likely exceed $366,000,000. OSHA has not demonstrated the feasibility of this Proposed Rule based on substantial evidence, nor has it provided a reasonable assessment of the likely range of the costs to be imposed by its standard, and the likely effects of those costs on industry. The best available evidence conclusively demonstrates that this Proposed Rule is not economically feasible and that it threatens the existence of all small hydraulic fracturing businesses, and therefore, the competitive structure of the entire hydraulic fracturing industry.

D. Requested Changes & Clarifications to the Ancillary Provisions

As explained above, in addition to these comments, the Associations are a cosigner of ACC's broad industry comments on the Proposed Rule. Those ACC RCS Panel comments provide an in-depth discussion of the Proposed Rule's ancillary provisions which the Associations herein incorporate by reference. These additional comments on the ancillary provisions provide the Associations' specific requests for changes to, and clarification of, the ancillary provisions. To the extent that these comments conflict with those submitted by ACC, please consider these comments as representing the Associations' position.

As a threshold matter, the Associations do not believe that a significant risk exists for employees exposed at or below the current PEL of 100 $\mu g/m^3$ or that the proposed PEL of 50 $\mu g/m^3$ and action level of 25 $\mu g/m^3$ are justified or feasible. As such, the Associations strongly recommend that OSHA refrain from finalizing this rule as proposed until it has sufficient information on which to base a rulemaking and provides the opportunity for public comment on that new information. If OSHA were to persist in this rulemaking, however, at a minimum and among other changes (including more time for compliance), it should retain the current PEL of 100 $\mu g/m^3$ and establish an action level of 50 $\mu g/m^3$. Ancillary provisions would continue to be triggered if employees are exposed at or above this action level of 50 $\mu g/m^3$. Importantly, even though the Associations are recommending OSHA retain the PEL of 100 $\mu g/m^3$ and establish an action level of 50 $\mu g/m^3$, we support retaining the requirement that medical surveillance be triggered when employees are exposed above 50 $\mu g/m^3$ for 30 or more days per year.

As noted throughout these comments, employee health and safety is a foremost concern for the Associations and their members. We have objected to this Proposed Rule because, despite exceptional costs, the combination of controls described therein cannot be shown to accomplish compliance with the proposed PEL – not because our interest in employee health and safety is any less profound than OSHA's interest. As we have stated throughout these comments, members of the Associations are constantly working to develop and deploy more effective silica controls, but will always fully protect workers with respirators until other controls are proven. Importantly, members of the Associations want measures in place that ensure their workers are being protected effectively. Medical surveillance is an important practice for this purpose, and therefore, we support OSHA's proposal to require medical surveillance when employees are exposed above 50 $\mu g/m^3$ for 30 or more days per year.

While the Associations would support changing the medical surveillance trigger from the PEL to the Action Level if those thresholds were set at 100 $\mu g/m^3$ and 50 $\mu g/m^3$ respectively, we do not support establishing a medical surveillance trigger any lower than 50 $\mu g/m^3$. As noted extensively in the ACC RCS Panel comments cosigned by the Associations, there is little evidence of health effects from low level exposures to RCS. Indeed, even in the Proposed Rule's justification for triggering surveillance based on the PEL, and not the action level, OSHA recognized that employees with lower silica exposures "will be a lower-risk of developing respirable crystalline silica-related disease . . ." [304] Similarly, ASTM also recommends the occupational exposure limit as the trigger for medical surveillance, but would only require surveillance for employees exposed above such limit for 120 or more days per year.[305]

Not only is medical surveillance unnecessary for lower exposed employees, it is extremely costly. OSHA identified medical surveillance as the second most expensive of the ancillary provisions.[306] As discussed above, OSHA's calculated medical surveillance costs are likely significant underestimates based on the increased costs inherent in an industry that often works in remote areas, and away from medical infrastructure. While members of the Associations are more than willing to incur costs for the protection of their workers, medical surveillance for lower exposed workers would not provide such benefits.

Exposure Monitoring – Members of the Associations understand and appreciate the need to conduct employee exposure monitoring to identify and appropriately protect potentially highly exposed workers. The Associations believe that the Proposed Rule seems to appropriately provide employers the flexibility to characterize the exposures of their employees without monitoring (and re-monitoring) each individual employee. As written, however, these compliance options could be more limited than OSHA presumably intended – particularly in the hydraulic fracturing industry.

Specifically, the "performance option" for periodic monitoring states that "[t]he employer shall assess the 8-hour TWA exposure for *each employee* on the basis of any combination of air

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[304] 78 Fed. Reg. at 56468.

[305] 78 Fed. Reg. at 56468.

[306] Appendix A at A-61.

monitoring data or objective data . . ."[307] Periodic monitoring, however, is only required "[i]f initial monitoring indicates that employee exposures are at or above the action level . . ."[308] To make this point clear, we recommend that OSHA change the language in the periodic monitoring requirement to read, "[t]he employer shall assess the 8-hour TWA exposure for *employees potentially exposed at or above the action level* on the basis of any combination of air monitoring data or objective data . . ."

Additionally, the Proposed Rule states that "[t]he employer shall conduct additional exposure assessments . . . 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."[309] The Associations agree that employers should not be able to rely on unrepresentative monitoring data when the exposure and emissions circumstances change, however, we are concerned that the language above could be read by an aggressive enforcement officer to require additional assessments at unworkably frequent intervals.

In the hydraulic fracturing industry, employers are constantly moving their employees and equipment from well site to well site in a particular area to conduct well stimulation work, including relocating personnel and equipment into other active regions of the U.S. Each well may have different footprints and surface limitations that require unique configurations of equipment. The size and complexity of the stimulation work may require use of different combinations of equipment and/or proppant. Employee schedules in the hydraulic fracturing industry are such that specific employees may not be paired with specific equipment or tasks. We are concerned that any of these changes, which can happen weekly (and often more frequently) in the hydraulic fracturing industry may be considered by an aggressive inspector to result in "new or additional exposures." Furthermore, to couple the dynamics of the hydraulic fracturing industry with proposed medical surveillance requirements would require tracking an employee on a daily basis to address the 30 day potential exposure; these employees can and often times work in multiple states on different fracturing crews during any 30-day period. With the extreme number of variables, the tracking challenges alone, not to mention consistency and accuracy, would be difficult and costly in the U.S. market.

We do not believe that OSHA intended this to be the case (certainly OSHA, did not account for this in its estimation of periodic monitoring costs). As such, we request that OSHA clarify that the obligation to conduct additional exposure assessments based on changed circumstances does not apply in the hydraulic fracturing industry or other industries that do not have static work environments.

Recordkeeping – Members of the Associations maintain sophisticated recordkeeping systems for their employees and, where appropriate, retain and assure access to, exposure monitoring and medical surveillance records in accordance with 29 C.F.R. §1910.1020. Accordingly, the Associations have no objection to the majority of the recordkeeping

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[307] 78 Fed. Reg. at 56487 (emphasis added).

[308] 78 Fed. Reg. at 56487.

[309] 78 Fed. Reg. at 56487.

requirements in the Proposed Rule. One aspect, however, is potentially problematic and, we believe, easily remedied.

The Proposed Rule seems to require that employee exposure monitoring results include the employee's social security number.[310] While we understand the need to definitively link the monitoring data with the individual employee and to track employees throughout their careers, many members of the Associations do not include social security numbers in employee monitoring data files due to data security and identity theft concerns.

In lieu of social security numbers, many members of the Associations utilize unique employee identification numbers in employee monitoring records. Importantly, these employee identification numbers are equally capable of uniquely identifying employees and, in fact, can be tied back to social security numbers that are retained in a more secure centralized human resources record system. As such, these unique employee identification numbers allow employees to be conclusively identified while appropriately limiting the number of access points to employee's personal information that could be misappropriated.

Members of the Associations have a duty to securely maintain the personal information it requests from its employees. We do not see any reason justification for the Proposed Rule to expand upon the general recordkeeping requirements in 29 C.F.R. §1910.1020. We understand the need to ensure monitoring records remain linked to employees throughout their careers, but we think this can, and is, effectively accomplished through use of unique employee identification numbers that can be tied to more securely filed social security numbers. Accordingly, we request that OSHA change the proposed rule to allow employers to utilize in employee exposure monitoring records unique employee identification numbers that can be used to track employees and which can be tied to more securely-filed social security numbers.

III. CONCLUSION

As explained throughout these comments and the ACC RCS Panel comments in which API joined, the Proposed Rule is not supported by substantial evidence. Further, many of the policy determinations that OSHA proposed based on this inadequate record are arbitrary and capricious. While, as explained in ACC's comments, these failures to meet OSH Act requirements pervade the entire rulemaking, they are most pronounced and most deficient within OSHA's rushed analysis of the hydraulic fracturing industry.

OSHA has not shown that silica exposures associated with a PEL of 100 $\mu g/m^3$ present a significant risk of material health impairment or that reducing the PEL to 50 $\mu g/m^3$ would substantially reduce any such risk that might exist. Nor has OSHA made a supportable showing that the proposed PEL of 50 $\mu g/m^3$ would be economically feasible across the range of industry sectors to which it would apply or that RCS exposures at a level of 50 $\mu g/m^3$ and below can be reliably measured with an acceptable degree of accuracy and precision in real-world samples containing interfering matrices.

[310] 78 Fed. Reg. at 56490.

OSHA has not properly characterized the hydraulic fracturing industry or the extent and severity of RCS emissions therein. Far from demonstrating a substantial evidentiary basis for the proposed action, OSHA's technological and economic feasibility analysis for the hydraulic fracturing industry is undermined by its own rulemaking docket and the conclusions of the contractors and experts on whom it most relies.

The Proposed Rule is inconsistent with the OSH Act, OSHA regulations thereunder, and the substantial body of case law for OSHA health standards. If finalized, this Proposed Rule would create profound detrimental economic consequences as companies – large and small – struggle to implement control technologies that are not commercially available, not effective, cannot be used in conjunction, and, in some cases, do not exist. Notwithstanding the costs on businesses and the effects on the competitive structure of the industry stemming therefrom, respirators will still be required to control exposures to the proposed PEL.

As such, the Associations strongly recommend that OSHA refrain from finalizing this rule as proposed until it has sufficient information on which to base a rulemaking and provides the opportunity for public comment on that new information. If OSHA were to persist in this rulemaking, however, at a minimum, OSHA should: (1) retain the current PEL of 100 $\mu g/m^3$; (2) establish an Action Level of 50 $\mu g/m^3$; (3) delay the engineering control requirements of the rule by at least two years; (4) cause all ancillary provisions to be triggered only when employees are exposed at or above the Action Level of 50 $\mu g/m^3$, and in the case of medical surveillance, above the Action Level of 50 $\mu g/m^3$ for 30 days or more per year; (5) clarify the applicability of the performance option for periodic monitoring; and, (6) allow companies to use employee identification numbers in lieu of social security numbers in exposure monitoring files.

The Associations and their members appreciate the opportunity to provide these comments and we value our shared commitment to worker health and safety. We look forward to an opportunity to discuss these issues will OSHA further.

Sincerely,

American Petroleum Institute

Independent Petroleum Association of America