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PUBLIC INTEREST COMMENT

Occupational Exposure to Respirable Crystalline Silica

Michael L. Marlow
Affiliated Scholar, Mercatus Center at George Mason University

Occupational Safety and Health Administration, Department of Labor

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INTRODUCTION

The Regulatory Studies Program of the Mercatus Center at George Mason University is dedicated to advancing knowledge about the effects of regulation on society. As part of its mission, the program conducts careful and independent analyses that employ contemporary economic scholarship to assess rulemaking proposals and their effects on the economic opportunities and the social well-being available to all members of American society.

This comment addresses the efficiency and efficacy of this proposed reconsideration from an economic point of view. Specifically, it examines how the relevant rule may be improved by more closely examining the societal goals the rule intends to achieve and whether this reconsideration will successfully achieve those goals. In many instances, regulations can be substantially improved by choosing more effective regulatory options or more carefully assessing the actual societal problem.

SUMMARY

Occupational Safety and Health Administration (OSHA) states that over 60 epidemiological studies (covering more than 30 occupational groups) clearly indicate that respirable crystalline silica[1] (hereafter cited in text as silica) is a human lung carcinogen. OSHA also cites studies that indicate that occupational exposure to silica causes other adverse respiratory effects, such as fatal nonmalignant silicosis and chronic obstructive pulmonary disease, and an elevated risk of end-stage renal disease.

1. Very small particles at least 100 times smaller than ordinary sand are created during work operations (e.g., cutting, sawing, grinding, drilling, and crushing) involving stone, rock, concrete, brick, block, mortar, and industrial sand. Exposures are common in brick, concrete, and pottery manufacturing operations, as well as during operations using industrial sand products, such as in foundries, sand blasting, and hydraulic fracturing (fracking) operations in the oil and gas industry.

For more information, contact:
Robin Bowen, (703) 993-8582, rbowen@mercatus.gmu.edu
Mercatus Center at George Mason University
3351 Fairfax Drive, 4th Floor, Arlington, VA 22201

OSHA estimates the excess lifetime risk[2] to workers exposed over a working life of 45 years at the current general industry permissible exposure limit[3] (PEL) is between 13 and 60 deaths per 1,000 workers. For exposure over a working life at existing construction and shipyard employment PELs (estimated to range between 250 and 500 μg/m³), estimated excess risk lies between 37 and 653 deaths per 1,000 workers. Reducing these PELs to the proposed PEL of 50 μg/m³ silica results in a substantial reduction of these risks, to a range estimated to be between 6 and 26 deaths per 1,000 workers. OSHA concludes that the evidence on the public health risk associated with exposure at current permissible PELs is of significant magnitude.

OSHA is proposing a PEL of 50 μg/m³ based on the argument that it will substantially reduce risks to an estimated range between 6 and 26 deaths from lung cancer per 1,000 workers. The current PEL is 100 μg/m³ for general industry and maritime and 250 μg/m³ for construction. The proposal would thus cut in half the amount of silica exposure allowed for general industry and maritime workers and reduce by 80 percent the exposure allowed for those in the construction industry. OSHA estimates that the proposed rule will save nearly 700 lives and prevent 1,600 new cases of silicosis per year once the full effects of the rule are realized. OSHA is also proposing an action level of 25 μg/m³ that triggers initial and periodic exposure monitoring only once the action level is reached or exceeded.[4] OSHA believes that many employers will be willing to lower silica exposure to equal to or below that 25 μg/m³ action level in order to avoid exposure monitoring.

Overall, OSHA has failed to make a sufficiently strong case for the regulation.

OSHA's analysis contains numerous flaws, inconsistencies, and sloppy arguments. An especially poorly conceived argument surrounds a claim that an "action level" of 25 μg/m³ creates significant incentive for employers to maintain workplaces that meet this level (one-half the proposed PEL of 50 μg/m³) and thus will make workplaces even safer. But OSHA's own analysis determined that a PEL of 25 μg/m³ would not be feasible (that is, engineering and work practices would not be sufficient to reduce silica exposures to a PEL of 25 μg/m³ or below) in most operations most of the time. OSHA even admits that it did not attempt to identify engineering controls or their costs to meet a PEL of 25 μg/m³ for this very reason. Surprisingly, OSHA still maintains many employers would have sufficient incentives to meet silica exposures of 25 μg/m³ despite OSHA's own conclusion of infeasibility.

OSHA's argument that there is a market failure, in the form of imperfect information about the hazards of silica exposure, is also flawed. While OSHA has made a reasonable general theoretical case for regulation, it fails to develop what an optimal regulation might look like. OSHA does not provide adequate justification for the proposed regulation, in view of lack of compliance with existing regulations and expected benefits. OSHA largely ignores the problems of enforcement of the proposed standards. Many businesses are already out of compliance with the current, less stringent regulation that has been in place for roughly 40 years. OSHA's analysis assumes full compliance, which overstates health improvement to the degree to which proposed regulations will not be fully enforced, just as current regulations are inadequately enforced. Costs are also greatly underestimated since OSHA assumes that all firms are currently in compliance with the existing standard, so the only costs are those moving from the existing standard to the proposed one. The agency's reliance on vague rationales of correcting inequities is also very troubling. Finally, OSHA places too little weight on what might be the most cost effective solution to silica exposure: increased use of personal protective equipment. OSHA needs to consider a wider set of alternatives within a model of an optimal level

2. Excess lifetime risk is the additional risk of developing cancer due to exposure to a toxic substance incurred over the lifetime of an individual.
3. PEL is expressed in units of microgram(s) per cubic meter of air (μg/m3), calculated as an 8-hour time-weighted average.
4. Sampling at or above the action level triggers the requirements for periodic exposure assessments and would require employers to conduct additional assessments at least every six months until they fall under the action level for two consecutive monitoring assessments, taken at least seven days apart. OSHA has requested comment on whether an action level is appropriate for inclusion in the final rule.

of worker safety that realistically takes compliance into account and that can be quantitatively assessed through conventional benefit-cost analysis.

OSHA'S "IMPERFECT INFORMATION" ARGUMENT IS FLAWED

OSHA argues that, under suitable conditions, job markets can provide the optimal level of occupational risk. OSHA correctly states that employers and employees bargain over the conditions of employment, including salary and benefits, but also occupational health and safety risks. Optimality arises when the additional cost of safety for each employer just equals the avoided payout in risk premiums to workers. Employers must offer higher salaries (via risk premiums) to compensate for additional job risk. Higher wages for more hazardous work provides employers incentives to make workplaces safer by undertaking safety-related investments in equipment and training and/or safer work practices.

OSHA correctly argues that imperfect information hinders the efficient operation of job markets associated with workplace risk because workers unaware of job hazards do not seek, or receive, compensation for risks they bear, and as a result, employers face insufficient incentives to invest in safer working conditions. OSHA believes imperfect information is present at several levels: employers frequently lack knowledge about workplace hazards and how to reduce them; employers have limited incentives to identify risks their workers bear since it will raise salaries; workers are often unaware of workplace risks they are exposed to; and workers have difficulty understanding risk information they obtain.

OSHA then focuses on imperfect information on exposure and risk associated with silica. OSHA believes workers rarely understand connections between silica exposure and resultant disease due to relatively long latency periods. OSHA asserts that workers are unable to even ascertain their average silica exposure (the current silica rule does not require employers to conduct exposure monitoring), or have the ability to compare their risk with that of potential employers. OSHA also believes workers may not understand whether adequate engineering controls are being applied or that employer-provided respirators provide adequate protection.

OSHA offers little to no supporting evidence on the specifics of information problems directly associated with silica. Indirect evidence focuses on the argument that workers are unlikely to efficiently process even perfect information on occupational risk. Experimental studies and observed market behavior lead OSHA to suggest that individuals have considerable difficulty rationally processing information about low-probability, high-consequence events, such as occupational injuries, illnesses, and fatalities. For example, OSHA states that most individuals are unable to rationally act on risk information when presented in mathematical terms—a 0.0001 versus a 0.00001 versus a 0.000001 annual risk of death from occupational causes. While this argument is plausible, it is troubling that OSHA has not directed more effort toward the specific case of silica.

OSHA then rejects the view that improved risk information dissemination, either voluntarily or through regulation, is a viable alternative to its proposed regulation. OSHA argues that voluntary information programs do not insure that all workers receive risk information and that, given that most workers cannot efficiently process risk information, they will be unable to receive full risk compensation in the real world.

There are several problems with OSHA's analysis of imperfect information. One is that its arguments are not based on direct evidence regarding silica information. Rather, OSHA calls upon the risk literature in general before broadly applying it to the specific case of silica. Risk information is undoubtedly imperfect and market participants are not always perfectly rational, but OSHA provides little evidence that the imperfect information problem associated with silica is so persuasive as to merit dismissal of the information dis-

semination alternative. OSHA needs to specifically study silica rather than simply assume that it fully fits their general theory of imperfect information on occupational risk. Arguments that workers operate under imperfect information and may not behave rationally even with perfect information do not clearly indicate which risks government regulators need to focus on. There are many risks that confront workers and OSHA has not made a clear case why silica is different from other risks that regulators do not attempt to modify.

OSHA's argument that workers are unable to ascertain their average silica exposure appears consistent with the fact that the current silica rule does not require employers to conduct exposure monitoring. But OSHA's reasoning is somewhat circular. How can we really know if workers can't effectively deal with improved information when current OSHA standards don't require monitoring? OSHA simply assumes that better risk monitoring will not improve information about risks. Thus OSHA does not entertain the possibility that workers would be in improved positions to extract higher wages for newly discovered risks they had been subjected to. Employers would also be given greater incentives to lower occupational risk to the extent that it is cheaper than paying higher compensation stemming from improved information on risk exposure. In effect, OSHA has held constant the "worker inability to ascertain risk exposure" assumption in its analysis because it assumes that better risk monitoring will not improve information about risks.

OSHA needs to specify what level of information would be optimal and how it differs from the current level. OSHA should also thoroughly analyze how information levels held by employers and employees today differ from the optimal level. Does the proposed PEL of 50 $\mu g/m^3$ clearly reduce risk to an optimal level? This is a critical issue, especially given OSHA's acknowledgement that significant risk remains at the proposed PEL of 50 $\mu g/m^3$.

Another problem with the agency's reasoning, which OSHA acknowledges, is that many firms have responded to the risks posed by exposure to silica by implementing control programs for their employees. OSHA also states that some existing control programs go beyond the requirements of the proposed rule, and information that OSHA has collected suggests that a significant percentage of all employees with silica present in the workplace are currently being protected against risks posed by silica. Economic incentives provided by private markets appear to be working effectively in these cases, according to OSHA. But OSHA also states that the effectiveness of private markets in protecting worker health and safety is far from universal. In particular, OSHA states that sampling data clearly indicate that "many" firms have not protected their workers from overexposure to silica.

OSHA needs to specify what "many" means. Specifically, what percentage of firms have not protected workers, and what percentages of workers are unprotected? OSHA also needs to explain what "many firms" protecting workers from risks posed by silica means in the overall picture of public health. It would also be useful to know if some employers or even entire industries are better at protecting workers from silica risks than others. Such information might be used to develop best practices that could lead to improved public health. It is also worth considering why some employers' existing control programs go beyond the requirements of the current proposed rule. Using OSHA's logic, does this suggest that these employers "over-protect" their workers? Alternatively, does it mean that OSHA's rule is not strict enough since they have decided to offer more protection than that offered by the proposed rule? These appear to be serious matters entirely left out of OSHA's analysis.

OSHA also neglects to place the information issue in the context of CDC reporting[5] of the rapid decline in silicosis[6] mortality during 1968–2002. During this period, the number of silicosis deaths decreased from

5. "Silicosis Mortality, Prevention, and Control — United States, 1968–2002," MMWR, 54(16): 401–405. April 29, 2005.
6. Silicosis is a preventable occupational lung disease caused by inhaling dust containing crystalline silica.

1,157 (8.91 per million persons aged >15 years) to 148 (0.66), corresponding to a 93 percent decline in the overall mortality rate. The CDC believes two main factors are responsible: OSHA's introduction of PELs in the early 1970s and falling employment in heavy industries (e.g., the mining industry went from 989,400 employees in 1980 to 512,200 in 2002) where silica exposures were especially prevalent. The possibility that information on health risks has expanded greatly over time is not entertained by OSHA, and OSHA may be overstating their case that workers are unaware of their risks to silica exposure. It is also possible that workers are being protected from exposure to silica by employers to a much greater degree than in the past.

Finally, there is a fundamental flaw in the argument that defining the action level of 25 μg/m^3 creates significant incentives for employers to maintain workplaces that meet this level, which is one-half the proposed PEL of 50 μg/m^3. OSHA's own analysis determined that a PEL of 25 μg/m^3 would not be feasible (that is, engineering and work practices would not be sufficient to reduce and maintain silica exposures to a PEL of 25 μg/m^3 or below in most operations most of the time in the affected industries). This explains why OSHA did not attempt to identify engineering controls or their costs for affected industries to meet a PEL of 25 μg/m^3.[7] It remains unclear why employers would have sufficient incentives to meet silica exposures of 25 μg/m^3 (and thus make workplaces safer) rather than the proposed 50 μg/m^3 requirement, given OSHA's own conclusion of infeasibility.

EXTERNALITY JUSTIFICATION IS OVERSTATED

Negative externalities arise when there are divergences between private and social costs that undermine the efficient allocation of resources in markets. Negative externalities are believed by OSHA to exist in the job market (for chronic occupational diseases such as those associated with silica) because costs of injury and illness are often borne by parties other than individual employers or workers directly involved with occupational silica. Externalities are argued to stem from costs not covered by workers' compensation when injured workers and their families receive health care, rehabilitation, retraining, direct income maintenance, and life insurance benefits through social insurance and social welfare programs. The US medical care system is also argued to be heavily subsidized because medical costs of treating injured or ill workers from occupational silica exposure is partially paid for by the rest of society. OSHA concludes that an inefficiently high level of occupational risk exists to the extent that costs are not borne by employers or workers themselves, thus causing them to ignore such costs in their job market negotiations.

OSHA overstates the externality argument for regulation. While it is correct that subsidies provided by third parties diminish incentives of employers and their workers to be concerned about risks, silica exposure itself is not the source of the externality. Rather, the source stems from the nature of the workers' compensation and social insurance programs themselves that force third parties to pick up part of the costs associated from silica exposure. Flaws in those programs facilitate the passing of costs onto third parties. This is really a government failure problem. Medical costs are shifted away from the employer—who is no longer subject to tort liability or even full medical bills. The predictable result is badly misaligned incentives, and the fix for this problem is not to further distort incentives.

OSHA needs to explain why dismissing reform of workers' compensation and social insurance programs provides a convincing case that its proposed regulation is optimal. It remains unclear whether reforms that place greater responsibility onto employers and employees in dealing with the costs of silica-associated

7. For purposes of estimating the costs of going from a PEL of 50 μg/m^3 to a PEL of 25 μg/m^3, OSHA assumed that all workers exposed between 50 μg/m^3 and 25 μg/m^3 would have to wear respirators to achieve compliance with the 25 μg/m^3 PEL. OSHA then estimated the associated additional costs for respirators, exposure assessments, medical surveillance, and regulated areas (the latter three for ancillary requirements specified in the proposed rule).

health problems does not represent a more cost-effective solution. Why not reform the workers' compensation system (and our medical system) to shift the costs of occupational injury and disease from workers to employers in order to induce employers to improve working conditions or for workers to negotiate higher risk premiums?

OSHA "dodges" the true source of the externality through its extensive discussion of problems associated with reforming the various state workers' compensation programs that seek to limit occupational risks.[8] OSHA cites three reasons why the workers' compensation system falls short of adequately shifting to employers the costs of workplace injury and disease. These reasons are offered as evidence in support of the proposed regulation based on the argument that reform is impossible.

The first reason is that employers' workers' compensation insurance premiums typically fail to reflect actual occupational risk, thus creating incentives for employers to not efficiently reduce occupational risk. The second is that workers' compensation programs tend not to provide benefits for most work-related diseases—including those resulting from silica exposure, such as cancer, renal disease, and chronic obstructive pulmonary disease.[9] The third reason is that states have imposed significant limitations on payouts that OSHA argues are often less than 10 percent of economists' estimates of total disability costs or less than 2 percent of willingness-to-pay estimates of a lost (statistical) life.[10]

Again, OSHA focuses on problems with the workers' compensation system rather than the source of the externality that stems from forcing third parties to pick up much of the health care costs associated with occupational silica exposure. This (misguided) focus is also consistent with OSHA neglecting to "correct" the externality by modeling its optimal level. Economic theory demonstrates that efficient levels of externalities are characterized by equality of marginal social costs and marginal social benefits. OSHA has made no attempt to optimally deal with what it believes is an externality since it does not focus on remedying the third-party subsidy problem. Rather, OSHA merely attempts to reduce the externality by decreasing silica exposure, but it has not determined whether this reduction is consistent with an optimal level of silica exposure. Thus, whether the proposed regulation promotes an optimal level of externality remains an open question that OSHA does not attempt to resolve. Unfortunately, OSHA has not demonstrated that its proposed regulation optimally promotes public health.

MARKET INEQUITIES/INJUSTICES RATIONALE IS FAR TOO VAGUE

OSHA correctly argues that an efficient market arises when it is impossible to reallocate resources in a way that makes one party better off without making at least one other party worse off. However, OSHA then observes that market transactions do not take place in a vacuum but rather occur in a societal environment

8. OSHA also dismisses the use of the tort system as an alternative to regulation that is severely limited because of the "exclusive remedy" provisions in workers' compensation statutes; because of the various legal and practical difficulties in seeking recovery from responsible third parties, particularly in cases of occupational disease such as those caused by on-the-job silica exposure; and because of the substantial costs associated with a tort action.

9. Several related factors account for this and include: most occupational diseases have multiple causes and are indistinguishable from ordinary diseases of life, thus making it difficult for workers' compensation to trace the cause of these diseases to the workplace; many occupational diseases have a long latency period, which tends to obscure the actual cause of the disease or the place of employment where exposure occurred; workers (as well as medical personnel) often do not realize that a disease is work-related and, therefore, fail to file a workers' compensation claim; and most states have filing restrictions, such as a statute of limitations of ten years or less, that may preclude claims with a long latency period, and many states have a minimum time period of exposure before a disease can be attributed to an occupational cause.

10. These include the following: caps on wage replacement based on the average wage in the state rather than the injured workers' actual wage; restrictions on which medical care services are compensated and on the amount of compensation; no compensation for non-pecuniary losses, such as pain and suffering or impairment unrelated to earning power; either no or limited cost-of-living increases; restricted permanent, partial, and total disability benefits, either by specifying a maximum number of weeks for which benefits can be paid or by imposing an absolute ceiling on dollar payouts; and a low absolute ceiling on death benefits.

with a preexisting distribution of wealth and a specified set of legal rights and constraints. OSHA then claims that the efficient allocation of resources will vary depending on these societal conditions. OSHA goes as far as to state, "If the initial endowment of wealth is distributed in an unjust or socially undesirable manner, the resulting market outcome, even if Pareto-efficient, will, in all likelihood, not be socially optimal."

OSHA furthers this discussion by arguing that some individual actions are circumscribed by rights and duties or other social purposes that take precedence over market considerations. According to OSHA, market transactions in such circumstances may be legally forbidden or socially unacceptable on ethical grounds, even if there are willing parties to the transactions. OSHA provides examples that include that one's right to vote cannot be sold to another person, and the prison time a convicted criminal receives cannot be served by another person in exchange for a fee. OSHA also states that, in the context of job markets, individuals cannot sell themselves into slavery, and small children cannot work in factories. OSHA concludes that these points suggest that, because of important rights and duties or other social purposes, government intervention may sometimes improve the workings of the unfettered job market.

OSHA appears to be making vague assertions about fairness or justice to justify its incomplete analysis. That is, OSHA simply argues that, regardless of whether exposure to silica is at the efficient level, it is unjust or socially undesirable to have workers exposed to silica, so the regulation is justified on ethical grounds regardless of the effects on efficiency. There are many problems with this argument: (1) OSHA does not explain what theory of justice it is using; (2) OSHA does not say what, if any, level of exposure is consistent with its notion of justice or fairness (though its unexplained theory seems to imply that exposure must be zero), and (3) OSHA appears to justify its lack of solid evidence supporting the proposed regulation (on efficiency grounds) because its (unexplained) theory of justice still shows that the proposed regulation is the "just" regulation.

OSHA appears to be arguing that the market in occupational risk is at times *too* efficient, because the proposed regulation reduces efficiency as it improves equity or social justice. OSHA needs to be explicit in spelling out the argument for regulation it is attempting to justify here. Otherwise, how OSHA reached the conclusion that the proposed regulation represents a more efficient outcome for society remains unclear.[11] If the regulation is, in fact, not more efficient than the current regulation, OSHA needs to clearly spell out the gainers and losers and the underlying trade-off the agency believes is justified. As it stands, OSHA provides less than a compelling argument that prevailing market inequities/injustices exist and that the proposed regulation optimally mitigates them, or in any way justifies its incomplete study of the efficiency aspects of the proposed regulation.

ENFORCEMENT PROBLEMS ARE MOSTLY IGNORED

OSHA argues that its 40-year-old PELs for silica are outdated, inconsistent between industries, and do not adequately protect worker health. Current PEL regulations are 100 $\mu g/m^3$ for general industry and 250 $\mu g/m^3$ for construction. However, the National Institute for Occupational Safety and Health (NIOSH) has reported that as much as 40 percent of OSHA-collected silica samples exceeded the current PEL in the construction industry.[12] In other words, OSHA's track record on enforcement is far from perfect.[13]

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11. A Pareto-superior move in this context means that no parties lose and at least one party gains from the proposed regulation.
12. National Institute for Occupational Safety and Health, *Work-Related Lung Disease Surveillance Report 2002* (Cincinnati, OH: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2003-111, May 2003), 74.
13. This is not a new problem; see, for example, Michael L. Marlow, "The Economics of Enforcement: The Case of OSHA," *Journal of Economics and Business* 34 (1982): 165–71.

OSHA's own analysis acknowledges an extensive array of significant noncompliance existing today. For example, consider the following percentages of workers exposed in excess of 250 μg/m^3:[14]

- 2.9% for millers using portable or mobile machines
- 25% for masonry cutters using stationary saws
- 15.4% for masonry cutters using portable saws
- 33% for workers using jackhammers and other impact drills
- 3.7% for underground construction workers
- 9% workers in the concrete products industry
- 8% for workers in the cut stone industry
- 0% for workers in the dental equipment and supplies industry
- 17% for workers in the glass industry
- 12.5% for workers in the landscape contracting industry
- 0% for workers in the mineral processing industry
- 11% for workers in the paint and coatings industry
- 8.8% for workers in the pottery industry
- 7.1% for workers in the railroads industry
- 9.5% for workers in the ready-mix concrete industry
- 43% for workers in shipyards
- 8.3% for workers in the structural clay industry
- 32.2% for abrasive blaster workers
- 0% for drywall finishers
- 0% for heavy equipment operators
- 7.1% for hole drillers using hand-held drills
- 33% for workers using jackhammers and other impact drills

OSHA needs to explain how the proposed PEL of 50 μg/m^3 will be enforced, given that current less-stringent regulation has not been fully enforced.

14. All samples are personal breathing zone (PBZ) results for durations of 360 minutes or more and represent 8-hour time-weighted average (TWA) exposures with the assumption that exposure continued at the same level during any unsampled portion of the shift.

Unfortunately, OSHA simply assumes the compliance problem away, as conveyed in the following passage:

> the Agency believes it should assume 100% compliance for purposes of estimating the costs and benefits of the new rules, and it would be inconsistent to assume less than full compliance with the existing OSHA rules. Reliance on costs that assume full compliance with both the current and proposed OSHA rules makes it easier to compare the two regulatory schemes. Finally, assuming full compliance with the existing rules is in keeping with standard OSHA practice in measuring the incremental effects of a proposed rule when there is an existing rule in effect that firms are legally obligated to comply with and that is being enforced.[15]

OSHA's simplifying assumption makes for simplistic analysis, and it yields greatly exaggerated estimates of benefits that critically undermine OSHA's case for the proposed regulation. Costs are also greatly underestimated since OSHA assumes that all firms are currently in compliance with the existing standard, so the only costs considered are those moving from the existing standard to the proposed one. Benefit-cost analysis is thus distorted by OSHA as it inflates benefits and deflates costs of its proposed regulation.

OSHA should perhaps prioritize its enforcement efforts, or adjust its regulatory umbrella, based on which industries pose the greatest risks to workers. Considering just silica as a human lung carcinogen, OSHA believes that the strongest evidence for carcinogenicity comes from studies in five industry sectors (diatomaceous earth, pottery, granite, industrial sand, and coal mining). OSHA should determine if all industries should be subjected to the same regulations, unless it plans on not expending much enforcement effort in those industries posing the least risks to workers. In any case, OSHA's neglect of compliance (and enforcement) issues calls the accuracy of its analysis into question.

Noncompliance with less-stringent existing PELs also calls into question why OSHA fails to explain how improved enforcement of the existing rule is not superior to the proposed regulation's more stringent PEL. OSHA apparently does not believe it is necessary to examine this comparison because OSHA believes it is appropriate to assume perfect compliance, thus benefits stemming from the proposed regulation will greatly outmatch the existing regulation under perfect compliance. But this is an invalid comparison as long as neither is likely to be fully enforced. Failures to appropriately consider enforcement and compliance issues represent very large flaws in OSHA's analysis and require immediate correction.

WHY IS PERSONAL PROTECTION EQUIPMENT A LAST RESORT?

The proposed rule includes provisions for measuring the amount of silica workers are exposed to, limits on workers' access to areas where silica exposures are high, medical exams for workers with high silica exposures, and training for workers about silica-related hazards and how to limit exposure. The standard would make controlling silica dust the primary method to reduce employee exposure. Rules about personal protective equipment (PPE) are included, but OSHA requires that PPE would be a last resort to reduce exposure. Rather, OSHA argues that lowering silica exposure can generally be done through dust control measures such as wetting work areas to keep the dust from getting into the air, enclosing a work area (process isolation), or using a vacuum to collect dust at the point where it's created before workers can inhale it.

It remains unclear why PPE does not receive more attention since at first glance this would appear to be a cost-effective method of limiting silica exposure, especially given that the proposed regulation

15. Occupational Safety and Health Administration, US Department of Labor, *Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis*, Supporting document for the Notice of Proposed Rulemaking for Occupational Exposure to Crystalline Silica, Silica PEA Chapter VII, 2013, 2n2.

does not eliminate silica exposure. Rather, it mandates that workers be exposed to no more than 50 μg/m^3 per work day. The underlying argument seems to be that workers may not wear PPE or that such equipment might not be maintained at proper levels. But the same can be true about whether employers will fully comply with the new regulation, which is highly doubtful given the above evidence on current compliance with existing, less stringent PELs. It is also doubtful given OSHA's neglect of the compliance/enforcement issues, as discussed above.

The proposed regulation is a stereotypical example of a one-size-fits-all, command-and-control regulation unlikely to be the best solution for the wide variety of workers OSHA is attempting to help. Placing lowest priority on PPE may fail to account for the fact that employers, employees, and the industries they work in are highly diverse. Some employers and their employees might find PPE to be at least a good supplemental device, if not more effective and cheaper than the proposed regulation that attempts to dissuade PPE use. Those employers could be found in violation of the proposed regulation unless they seek out waivers. The proposed regulation is consistent with OSHA's underlying belief that employers and employees cannot be counted on to be efficient or rational when it comes to occupational risk and all workers should be subjected to identical regulation.

CONCLUSION

OSHA has failed to make a strong and compelling case that it knows best how to protect workers from silica exposure. It has not developed what an optimal regulation might look like, overstated market failure arguments for regulation, ignored compliance issues, and greatly overestimated benefits while underestimating costs associated with the proposed regulation. OSHA needs to consider a wider set of alternatives within a model of optimal worker safety that realistically takes compliance into account and that can be quantitatively assessed through conventional benefit-cost analysis.

OSHA has failed to conduct a comprehensive assessment of the benefits and costs of its proposed regulations, thus providing little confidence that it has identified the most efficient or effective option to improve public health. OSHA is required by OMB guidelines[16] to analyze options that are not currently legal so as to inform the president and Congress that there are more efficient ways of solving a particular social problem than was envisioned by Congress. This is because Congress does not perform an economic impact analysis prior to passing laws. If a more efficient option can be identified, the laws can and should be changed to reflect that option. OSHA had the chance to provide lawmakers and the workers they seek to protect with analysis that could determine optimal outcomes for health and employment; instead, OSHA came up with an unsupported and unrealistic "just" level of silica exposure that threatens to be both onerous and unenforceable.

16. Office of Management and Budget, *Circular A-4* (Sept. 17, 2003): 17.