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Mr. Jackson Morrill
Director, American Chemistry Council Crystalline Silica Panel
700 2nd Street N.E.
10th Floor
Washington, D.C. 20002

      Re: Preliminary Letter Report of Environomics to the American Chemistry Council's Crystalline Silica Panel Regarding the Economic Impact of the Occupational Safety and Health Administration's Proposed Standard for Occupational Exposure to Respirable Crystalline Silica

Dear Mr. Morrill:

I am providing this preliminary letter report to the American Chemistry Council's Crystalline Silica Panel (Panel) regarding the economic impact of the Occupational Safety and Health Administration's (OSHA) Proposed Standard for Occupational Exposure to Respirable Crystalline Silica (Proposed Standard). The Panel is a group of companies and trade associations that produce, use, or encounter silica in their businesses. The Panel has asked my firm to provide an analysis of the economic feasibility of the Proposed Standard for the General Industry sector, as well as to prepare further economic analyses of the Proposed Standard, including a benefit-cost analysis. This letter is our preliminary report and provides a brief summary of the topics I intend to cover in my testimony on behalf of the Panel at the hearing on the Proposed Standard. I will provide a more complete report or reports on these analyses in advance of the hearing.

      My qualifications for analyzing the Proposed Standard. I am the President of Environomics, Inc., an economic consulting firm that provides analysis of the benefits, costs, economic feasibility, economic impacts, and cost-effectiveness of policies, programs, regulations and legislation involving the environment, energy, and occupational safety and health. I am an economist with more than 35 years of experience in supervising and performing analyses of complex regulatory and policy issues, including previous evaluations of the economic feasibility and economic impacts associated with an anticipated OSHA rulemaking to revise the Permissible Exposure Limit (PEL) for respirable crystalline silica (RCS) in the general industry, maritime, and construction sectors. My educational background and credentials are summarized in my CV, which I attach to this letter.

In addition to providing this preliminary report to the Panel, I am preparing detailed analyses of the costs and economic impacts of the proposed RCS standards for a coalition of representatives from the nation's construction sector and for the American Petroleum Institute. I have also worked extensively on previous and potential OSHA worker exposure standards, for hexavalent chromium, for beryllium, and for noise.

Background. The current occupational PEL for worker exposure to respirable crystalline silica in General Industry is essentially 100 ug/m^3 on an 8-hour time-weighted average basis. In the NPRM, OSHA has proposed to revise the PEL to cut this limit in half, to 50 ug/m^3. The proposed definition of respirable crystalline silica that requires measurement via a sampling device designed to meet the particle size collection efficiency specifications of the ISO/CEN protocol has the effect of further reducing the proposed PEL to the equivalent of about 40 ug/m^3 if compliance were to be assessed using current methods. Since OSHA published the NPRM, I have reviewed the record prepared by OSHA to evaluate the economic feasibility of the Proposed Standard for general industry. In performing this analysis, I have conducted my own review of OSHA's cost information, supervised the analytical work of my colleagues at Environomics, and worked closely with Jack Waggener and his colleagues at the URS Corporation (URS). I have also conducted my own preliminary assessment of the economic impacts likely to ensue from these costs. In addition to my economic analysis work for the Panel summarized in this initial letter report, I will conduct further analyses for the Panel to be provided for the record prior to the public hearing on the Proposed Standard.

Estimates of Costs to Comply with the Proposed Standard. In support of the Proposed Standard, OSHA has prepared an estimate of the cost of engineering controls that the Agency believes would be required across various sectors, including general industry, to comply with the proposed PEL of 50 ug/m^3. OSHA also has estimated the cost associated with the "ancillary requirements" that have been proposed to accompany the PEL, such as requirements for exposure monitoring, medical surveillance, regulated areas, training, and others.

In preparing its cost estimates, OSHA has excluded the costs that the agency submits would be required for general industry to reduce to the level of the proposed PEL (50 ug/m^3) the exposures of all workers who OSHA estimates are now exposed above the current PEL (100 ug/m^3). By OSHA's reckoning, the group whose costs are being excluded amounts to roughly 81,000 of the 122,500 or so workers currently exposed above 50 ug/m^3. Thus OSHA has included the costs of reducing the exposures of 41,500 workers in general industry who it estimates currently are exposed to RCS in the range of 50 to 100 ug/m^3. *But OSHA has excluded the costs of reducing the exposures of twice as many workers (81,000), whose RCS exposures are estimated to exceed 100 ug/m^3 and for whom the costs of achieving the proposed PEL of 50 ug/m^3 will be much greater.* The illogic of excluding engineering control costs for two-thirds of the workers exposed above 50 μg/m^3 is startling, particularly since these two-thirds of the workers are the ones having the highest RCS exposures that would be most costly to reduce sufficiently to achieve and maintain compliance with the proposed PEL.

OSHA asserts that the Agency's cost estimate represents the "additional" or incremental costs of achieving compliance with the Proposed Standard that are above and beyond the costs that

employers would have to incur to achieve full compliance with the existing silica PEL at 100 ug/m^3:

> The estimated costs for the proposed silica rule represent the additional costs necessary for employers to achieve full compliance. They do not include costs associated with current compliance that has already been achieved with regard to the new requirements or costs necessary to achieve compliance with existing silica requirements, to the extent that some employers may currently not be fully complying with applicable regulatory requirements. (Preliminary Economic Analysis, page V-2)

In fact, however, OSHA's approach does not even account for the so-called "additional costs necessary for employers to achieve full compliance" – because it assumes that employers who must reduce current exposures to a level of 100 μg/m^3 (and who presumably would do so using the least costly methods possible) will incur no additional or incremental costs to further reduce exposures from a level of 100 μg/m^3 to a level of 50 μg/m^3. Thus, rather than calculating the incremental cost of reducing exposures from a level of 100 μg/m^3 to a level of 50 μg/m^3, OSHA simply ignores them. As a result, the exposure reduction costs for the estimated 81,000 workers now exposed above 100 ug/m^3 are not taken into account by OSHA on either a full cost basis or an incremental cost basis. OSHA's description of its cost estimate as the "additional" or incremental cost to comply with the proposed new PEL of 50 ug/m^3 is, therefore, a misnomer for what can more properly be described as an estimate of the "partial engineering control costs" of the Proposed Standard, *i.e.*, an estimate that reflects the costs attributable to exposure reductions for the 41,500 general industry workers who currently are exposed between 50 and 100 μg/m^3 but that excludes the costs attributable to exposure reductions for the 81,000 general industry workers who currently are exposed above that level. According to OSHA, these partial costs for general industry sectors (excluding oil and gas development activities involving hydraulic fracturing)[1] to comply with the Proposed Standard would be approximately $132.5 million per year. 78 Fed. Reg. 56274, 56358 (Sept. 12, 2013) (Table VIII-8).

Mr. Jack Waggener and his colleagues at URS Corporation conducted a detailed, in-depth review of OSHA's compliance cost estimates for general industry (excluding hydraulic fracturing). That review identified a series of fundamental errors in OSHA's cost models for engineering controls and ancillary provisions that led OSHA to substantially underestimate the actual compliance costs that would be incurred in general industry under the Proposed Standard. URS developed its own cost model – with adjustments to address the various flaws and shortcomings in OSHA's model – and produced corrected cost estimates for 19 general industry sectors. URS

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[1] This figure does not include OSHA's estimated cost for the oil and gas industry to comply with the Proposed Standard when using hydraulic fracturing, which OSHA estimates at an additional $28.6 million per year. In the Agency's Preliminary Economic Analysis (PEA) supporting the Proposed Standard, OSHA addresses the hydraulic fracturing industry only in Appendix A, and does not include the hydraulic fracturing industry in any of the analyses or tables (showing, e.g., employment, exposures, costs) in the main body of the report. In my review of economic feasibility issues associated with the Proposed Standard for the Panel, I have limited this review to the general industry sectors addressed by OSHA in the main body of the PEA, that is to say, to the general industry sectors excluding hydraulic fracturing. I have performed work also for the American Petroleum Institute (API) regarding potential economic impacts of the Proposed Standard on the hydraulic fracturing industry, but that work is reflected almost exclusively in API's comments on the Proposed Standard, not in this letter report for the Panel.

prepared a report to the Panel that summarizes its analysis and details the revised estimates of the actual costs that would be imposed on general industry by the Proposed Standard. *See* URS Corporation, Critique of OSHA's Cost Models for the Proposed Crystalline Silica Standard and Explanation of the Modifications to Those Cost Models Made by URS Corporation (February 7, 2014) ("URS Feasibility Report").[2] As detailed in this Report, URS found:

- The actual estimated annualized cost for general industry to comply with the Proposed Standard would be more than $6.1 billion/year.

- Even following OSHA's approach of only considering the hypothetical partial or "incremental" cost, the annualized costs for general industry to comply with the Proposed Standard would be more than $ 4.7 billion/year.

In addition to contributing to URS' re-estimates of costs for most of the general industry sectors, I have independently re-estimated costs for the hydraulic fracturing industry and for the various construction industries affected by the Proposed Standard. Those analyses are being submitted separately to the docket, and I incorporate them here by reference. In both cases, like URS' evaluation of the general industry sector, I have found that OSHA substantially underestimated the anticipated cost of compliance. In Table 1 attached, I have summed the annualized compliance cost estimates for general industry, hydraulic fracturing, and construction that URS and Environomics have developed. The total annualized compliance cost for these three industry groups is estimated to exceed $8.6 billion per year, a figure more than twelve times the total costs that OSHA estimated in the PEA for the summed General Industry (including hydraulic fracturing), Maritime and Construction sectors. All three of the industry cost figures in Table 1 are estimated on a *full* cost basis, while OSHA's estimates were prepared by the Agency on a *partial* or *incremental* cost basis.[3]

      Economic feasibility analysis for general industry. For an occupational health standard to be economically feasible, OSHA must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry or force a material segment of the industry out of business. However, by using inaccurate data, inappropriate methods, and a series of incorrect assumptions in estimating the costs of the Proposed Standard, OSHA has substantially underestimated the cost for general industry to achieve and maintain compliance with the proposed PEL and ancillary requirements. As such, OSHA has not met the initial requirement in demonstrating economic feasibility – to construct a reasonable estimate of compliance costs. Indeed, by concluding that compliance costs for general industry would be only a fraction of URS's thorough and credible cost estimates, OSHA's cost analysis is patently unreasonable.

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[2] The URS Feasibility Report covers most general industry sectors, but has not addressed the cost to comply with the proposed PEL either in the oil and gas industry when using hydraulic fracturing or in a handful of other industry categories for which the available data were not deemed to be reliable as described in the Report. Hence, all references I make here to "general industry" likewise exclude those other industry categories, including the use of hydraulic fracturing.

[3] Other explanatory notes are provided with the Table. As noted, the cost estimates developed by URS and Environomics do not include compliance costs for the Maritime sector or for several General Industry sectors. Table 1 shows a line providing only OSHA's cost estimate for these sectors.

Beyond the issue of accurately estimating likely compliance costs, I have looked further at the reasonable likelihood that the revised general industry costs that URS has estimated would threaten the existence or competitive structure of the general industry sectors covered by the rule. As a rule of thumb, OSHA generally applies benchmarks that assume the competitive structure and long-term profitability of an industry will not be endangered as long as the annualized compliance costs for the industry are less than both 1% of annual revenues and 10% of annual profits. If, on the other hand, either of these thresholds is exceeded, OSHA considers that the proposed rule may not be economically feasible and that further analysis is needed.

In support of its Proposed Standard, OSHA compared its estimated costs of compliance for each general industry sector to a set of revenue and profits estimates for that industry in the period immediately before calendar year 2007. The revenue estimate that OSHA used for each industry was for the year 2006, while the profit rate that OSHA estimated for each industry reflected that industry's average profitability across the years 2000 through 2006. Based on its extremely low estimate of costs, OSHA concluded that the Proposed Standard was feasible, as none of the industry-by-industry comparisons of costs to revenues exceeded the 1% economic feasibility threshold that OSHA has generally used; nor did any of the comparisons of costs to profits exceed the 10% threshold.

As an initial test of economic feasibility, I have compared both URS' *full* annualized compliance cost estimate and its *incremental* (i.e., *partial*) annualized cost estimate for each general industry sector to comply with OSHA's Proposed Standard to the revenue and profits estimates for those industries that OSHA used in its analysis. I have compiled my results in tables attached to this letter report. *See* Table 2. These comparisons show that:

- Under either of the corrected cost estimates developed by URS – *i.e.,* either (1) the *full* estimated compliance costs, or (2) the *incremental* compliance costs – nearly all of the general industry sectors that would be affected by the Proposed Standard would exceed the OSHA economic feasibility thresholds.

- For six of the general industry sectors, the *full* annualized compliance costs are projected to equal or exceed all of the profit that OSHA estimated for that sector. Across all of the general industry sectors for which URS estimated compliance costs, these costs in total amount to 76.4 % of these industries' total profits, as OSHA estimates profits.

Based on these comparisons, it is my opinion that the Proposed Standard is not economically feasible for nearly all sectors in general industry. At the very least, OSHA must engage in an in-depth analysis of each affected industry sector and determine how the Proposed Standard may affect its economic viability and competitive structure. This is the case regardless of whether the corrected full cost estimate or the corrected incremental cost estimate is used to make the comparison, as the revenue and profits thresholds would be exceeded under either estimate. However, I wish to emphasize that in my opinion the appropriate economic feasibility analysis would look at the full costs for the affected industries to progress all the way from their current degree of compliance to full compliance with the Proposed Standard, instead of looking solely at the hypothetical partial or incremental cost to progress from assumed full compliance in general industry with the current PEL (which OSHA knows is not the case) to compliance with the

proposed new PEL. The reason not to consider only the incremental or partial costs, as OSHA has done, is because to do so would ignore the reality of the current situation. OSHA's incremental cost approach is an analytical fiction, not representing what will actually happen in the real world. If an affected industry cannot afford economically to get from where it is now to compliance with the Proposed Standard, then the industry will not be able to comply. If it is not feasible for an affected industry to get all the way from its current situation to full compliance with the Proposed Standard, the industry's existence or competitive structure will be seriously threatened. Economic feasibility does not turn on whether an industry could *theoretically* afford the increment from the current PEL to the proposed new PEL if its exposures were already at the level of the current PEL. Rather, from the standpoint of economic impact, the only question is whether industry can afford the rule or not.

Historic variability in prices and profits does not mean general industry could absorb the costs associated with the Proposed Standard. In reaching my conclusion, I recognize that OSHA presents data and conducts analyses aiming to show that most of the affected general industries have successfully weathered year-to-year changes in prices and profits that are as large as or larger in percentage terms than the impacts on profits and revenues expected from the regulation. OSHA presents this information in an attempt to support an argument that the Proposed Standard's impacts on revenues and profits can likely be endured by a particular industry without affecting that industry's long-term viability. In my view, this argument for the affordability of the regulation is not valid – for two reasons.

1. OSHA's lengthy presentation of information on the year-to-year changes in the producer prices charged by the general industries (Tables VI-2 and VI-3 in the PEA, pages VI-27 through VI-51) is irrelevant to OSHA's argument. The producer prices that OSHA shows in the Tables for an industry represent the year-to-year variation in prices that the industry receives for its products, not the year-to-year variation in costs that the industry may incur and may or may not be able to tolerate. If many industries were to show, for example, many years of large percentage increases in the producer prices they receive, this would mean only that there is some serious inflation in the markets these industries serve, or perhaps in the economy as a whole. If, alternatively, an industry were to see many years of widely fluctuating prices for the goods the industry produces, sometimes with large increases in prices and sometimes with large decreases, this would indicate only that this industry is selling into volatile markets, where the balance between demand and supply can tip significantly from year to year. Such might be the case for an industry that is selling mostly into an international market where the producer price is determined by a rapidly shifting balance between world supply and world demand. Again, the fact that the prices an industry receives vary widely from year to year or the alternative case where an industry's prices vary little from year to year implies nothing about whether the industry can or cannot tolerate some particular percentage increase in the industry's costs such as might ensue as a result of a new regulatory mandate.

2. OSHA's second presentation, this time showing year-to-year changes in the average profitability of different industries (Tables VI-4 and VI-5 in the PEA, pages VI-52 through VI-72), is at least on the surface, more relevant to OSHA's argument. OSHA demonstrates in this table that some of the affected industries have shown industry-wide

profit rates that have changed substantially from year to year over the seven years from 2000 through 2006. To pick an industry from OSHA's table at random, consider for example, concrete pipe manufacturing. The estimated profitability for this industry changed from 7.27% in 2000 (meaning that total industry pretax profits in 2000 were 7.27% of revenues in 2000) to 4.90% in 2001, a decrease of 32.6% in profitability in 2001 relative to what it was in 2000. From 2004 to 2005, however, this industry's profitability, as OSHA calculated it, increased from 5.95% to 10.78 %, a large increase of 81.2% in profitability from 2004 to 2005. Over the seven years from 2000 through 2006 that OSHA shows in the table, the concrete pipe industry's profit rate showed wide fluctuations; it increased year-over-year four times and decreased year-over-year three times. What are we to make of this? What does this information suggest, if anything, about whether the concrete pipe industry now, in 2014, is likely to be able to afford whatever compliance costs the Proposed Standard will impose on it? I believe that OSHA's information on historical changes in profitability for an industry suggests absolutely nothing about whether the industry will or will not be significantly adversely affected by the potential regulatory compliance costs. OSHA presents no information to indicate whether the concrete products industry was healthy or unhealthy in 2000 or 2006, no analysis to indicate whether profitability was increasing or decreasing overall over this period (the Agency presents information only to show that profitability was fluctuating over this period rather than steady), and no information to indicate whether any trend that might have been observed from 2000 through 2006 might or might not have continued between that period and the present.

My point is that year-to-year fluctuations in an industry's profitability, or the lack of such fluctuations, are not particularly important to the industry's long-term economic health. What is important is the longer-term trend in profitability, notwithstanding whatever fluctuations occur. Industries can and do survive substantial year-to-year changes in profitability or costs while remaining healthy if the long-term trend is favorable. Firms in these industries will survive and continue despite occasional sharp declines in profitability or revenues or increases in costs if the firms' managements believe any negative changes to be temporary. These firms will remain in business if the long-term outlook for the industry is sufficiently bright to promise adequate profits and an adequate return on the investments needed to remain in business, despite short-term reversals. The analogy that OSHA attempts to draw between regulatory costs and these short-term reversals is inappropriate. Because OSHA has *annualized* the expected compliance costs for the regulation (i.e., it has converted the initial capital costs and ongoing O&M costs of compliance into an equivalent stream of annual costs, continuing each and every year, forever), the regulatory costs that OSHA is imposing result in *permanent*, not temporary, changes in industry costs, revenues and profits. It is wrong for OSHA to expect that the response of an industry to a permanent and continuing negative economic change such as the annualized compliance costs of the Proposed Rule will be the same as to one that is expected to be only temporary.

Estimating revenues and profits for the affected industries. As noted, a key step in assessing the economic feasibility of the Proposed Standard is to compare the compliance costs the standard will impose on an industry against measures of that industry's ability to bear these

costs. Although there are several other recommended ways to compare regulatory costs against an affected industry's ability to bear these costs (e.g., plant closure analysis), OSHA traditionally compares aggregated compliance costs for an industry or a segment of the industry (e.g., small entities in the industry) against the industry's or the segment's estimated revenues and profits. As I have discussed, OSHA has traditionally judged this comparison relative to two benchmarks – if costs exceed 1% of revenues or 10% of profits, there is an indication of possible economic infeasibility, and further analysis is warranted. The URS cost estimates demonstrate that OSHA has greatly underestimated costs – the numerator – in these comparisons. I believe that OSHA has also overestimated profits and perhaps also revenues, the denominators in these comparisons. OSHA's errors in both the numerator and the denominator combine to result in the Agency greatly underestimating the adverse economic impacts the Proposed Standard will have on the affected general industries.

OSHA estimates both revenues and profits for the affected industries using data from 7-14 years ago that are not representative of these industries' current economic condition and current ability to bear regulatory costs. OSHA estimates revenues for each industry for the year 2006, and presumes that these revenues represent current conditions. OSHA estimates profitability for each industry as the average for that industry across the years 2000 through 2006, and again presumes that these old data represent current conditions. This approach runs counter to guidance that the Office of Management and Budget provides to Federal agencies on best practices in the development of regulatory analyses. Specifically, OMB Circular A-4 states:

> "You need to measure the benefits and costs of a rule against a baseline. This baseline should be the best assessment of the way the world would look absent the proposed action. … It may be reasonable to forecast that the world absent the regulation will resemble the present."[4]

It is certainly not reasonable in 2014 for OSHA to adopt a baseline for analysis of costs and economic feasibility that presumes that the economic world absent the Proposed Silica Standard will look as it did in 2006 and prior years. OSHA must develop much more current revenue and profit estimates for the RCS regulatory analysis that reflect the affected industries' ability to bear costs as of the time in late 2016 or so when compliance is expected with whatever new standard is promulgated. Much has happened since 2006 that OSHA should reflect in an appropriate baseline for this analysis.

OSHA's more than seven year-old economic data do not consider the reduced profits and revenues suffered across the U.S. during the financial crisis and the worst economic recession in America since the Great Depression. Many of the regulated general industries produce largely construction materials and products (e.g., bricks, concrete, concrete block, pipe and other concrete products, cut stone, tile, porcelain-enameled or vitreous china fixtures and appliances, glass, asphalt paving and roofing materials, etc.), and these industries have suffered from both the economy-wide recession and the very sharp decline in construction demand for their products. The bursting of the housing bubble in 2007 caused a drastic decline in demand for residential building materials and products, while the heavy construction market continued

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[4] U.S. Office of Management and Budget. Circular A-4. September 17, 2003. Available at
http://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf

healthily for some time (bolstered by stimulus spending), but has since fallen off substantially with the fiscal difficulties affecting so many governments that are responsible for much of our nation's infrastructure-related construction spending. Construction spending peaked in 2006, reached its low point in 2010 and 2011, and by 2013 (in inflated dollars) had recovered to less than 80% of the 2006 level. OSHA's choice of 2006 as the year from which to obtain data to represent general industry's current ability to withstand regulatory costs is particularly inappropriate because, in addition to much having happened since then, 2006 was a record year for construction and an unusually good year for many of the other general industries that are less related to construction. For example, OSHA's tables in the PEA showing general industry profitability between 2000 and 2006 portray 2006 as the year with the highest profit rates for foundries, ship and boat building, and jewelry.

OSHA's use of revenue and profit information for calendar year 2006 and earlier years makes the Proposed Standard appear to be much more feasible economically than it really is. Apart from the fact that they are outdated, the data that OSHA has chosen to represent revenues and profits for the affected industries are inappropriate for other reasons. I will first discuss OSHA's choice of data to represent profits.

Flaws in OSHA's approach to estimating profitability. OSHA's choice of data with which to represent the profitability[5] of the general industry sectors that will be affected by the Proposed Standard is, in my view, inappropriate. I have already discussed the obvious defect in OSHA's approach insofar as the Agency's profitability information from 2000 – 2006 does not reflect the impact of the recession and the continuing construction downturn on affected general industries. Two additional important shortcomings in OSHA's approach to estimating profitability are:

- Choosing a source of information on profitability that provides data usually only for larger 4-digit NAICS industries instead of the finer detail that is needed on the 6-digit NAICS industries that will be affected by the Proposed Rule; and

- Choosing from this information source an inappropriate combination of data elements for measuring profitability that greatly overestimates an industry's true profitability.

CSB data do not provide sufficiently detailed information on profitability. OSHA estimates profitability for an industry by drawing information from a publication by the Internal Revenue Service in which a stratified random sample of corporate tax returns is drawn for each industry and then analyzed to develop a representative profile of the financial performance of corporations in the industry. The profile information is published in what is known as the *Corporation Source Book* (CSB). OSHA accessed the CSB for the years 2000 through 2006 in order to estimate profitability for the affected industries for those years. The CSB is now available for years through 2010, so OSHA's profitability information can now be updated with

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[5] I use the term "profitability" intentionally and mean to distinguish it from "profits". OSHA in fact estimates profitability as a step toward estimating profits, with the key step coming in estimating profitability. Profitability as OSHA implicitly defines it is a ratio or a percentage representing the relationship between an entity's profits and its revenues. An industry or an entity might be said to have pre-tax profitability of, say, 7%, if the industry earns pre-tax profits amounting to 7% of the revenues that it earns.

several additional years beyond 2006. The CSB, however, also has a major drawback as the source for profitability information for the industries that will be affected by the Proposed Standard insofar as it provides information mostly for 4-digit NAICS industries that are substantially larger than the 6-digit NAICS industries that OSHA has identified as affected by the Proposed Standard. For example, OSHA has identified eight 6-digit NAICS industries as affected by the Proposed Standard:

- Vitreous china plumbing fixtures and china/earthenware bathroom accessories manufacturing (NAICS 327111);

- Vitreous china, fine earthenware, and other pottery product manufacturing (NAICS 327112);

- Porcelain electrical supply manufacturing (NAICS 327113);

- Brick and structural clay manufacturing (NAICS 327121);

- Ceramic wall and floor tile manufacturing (NAICS 327122);

- Other structural clay product manufacturing (NAICS 327123);

- Clay refractory manufacturing (NAICS 327124); and

- Non-clay refractory manufacturing (NAICS 327125).

OSHA has further grouped the first three of these industries as an affected general industry "sector" ("Pottery"), the second three of these industries as another sector ("Structural Clay Products"), and the third two of these industries as a final sector ("Refractories"). However, the CSB provides only one set of financial information that aggregates all eight of these six-digit industries into a single four-digit industry, Clay Product and Refractory Manufacturing, NAICS 3271. Because these eight industries are grouped into a single amalgamation in the CSB, and OSHA has chosen to rely on the CSB for the Agency's information on profitability, the Agency has no ability to distinguish the profitability of one of these eight industries from another. OSHA assigns to each of these eight industries the same profitability, for example, 7.13% in 2005. I believe that their profitability likely differs significantly from one to another. These industries are rather different from each other: some sell commodity construction materials (e.g., bricks), some sell more highly engineered construction products (plumbing fixtures and bathroom accessories), some sell to manufacturing and other production industries (clay refractories), some sell higher-end goods directly to consumers (vitreous china and fine earthenware), some are "high-tech" (nonclay refractory products) while some are less so (bricks); some face strong foreign competition (ceramic wall and floor tile) and others face much less (bricks again); and so forth. In choosing to gather profitability information from the CSB that provides no detail by six-digit NAICS industry, OSHA loses the ability to reflect in the Agency's economic feasibility analysis some of the real differences in ability to bear regulatory compliance costs that exist among these industries.

A different sort of problem arises when the six-digit affected industry constitutes only a small portion of a qualitatively very different and much larger four-digit industry for which the CSB provides data. The affected six-digit industry Asphalt Shingle and Coating Materials Manufacturing (NAICS 324122), for example, is assigned whatever profitability the CSB shows

for the more-than-100-times-larger four-digit industry that is dominated by petroleum refineries (Petroleum and Coal Products Manufacturing, NAICS 3241). In this instance, turning to the CSB for information on the profitability of an affected industry is little better than picking a random number. I see little reason why the profitability for asphalt shingle manufacturers should be the same as that for petroleum refiners.

OSHA's choice of the CSB as a source for profitability information thus results in both a missed opportunity to discriminate among affected industries as to their differing profitabilities (i.e., all eight pottery, structural clay and refractory affected industries get assigned the same profitability) and in some instances what is likely a gross misrepresentation of the affected industry's profitability (i.e., the asphalt shingle vs. petroleum refinery example). There are data sources that for many industries can provide better resolution regarding profitability than the CSB at the six-digit level, and OSHA should consider using them instead of or in addition to the CSB. OSHA has used some of these other data sources previously; I refer specifically to OSHA's use of the Risk Management Association's *Annual Statement Studies* for the profitability information included in the 2003 Preliminary Interim Regulatory Flexibility Analysis for the Proposed Standard. I also believe there can be substantial benefit to accessing profitability information in the profiling or benchmarking studies that several affected industry trade associations sponsor or assist in. I hope by the time of the public hearing on the Proposed Rule to be able to access some of these alternate, and in some important respects, more informative sources of profitability information than OSHA's chosen *Corporation Source Book*.

In using the CSB data, OSHA has selected data that misrepresent and overstate the profitability of the analyzed sectors. Perhaps my most important point about OSHA's use of the CSB for profitability information, though, is that OSHA has chosen a very poor measure of profitability from among those available in the CSB. The CSB, in essence, provides in any given year and for each industry several different sets of corporate tax returns from which information may be drawn, and several different data elements or variables from which an estimate of profitability may be constructed. OSHA has chosen to estimate profitability for an industry as follows:

1. From the set of sampled tax returns by corporations in the industry that show positive net income (in effect, positive pre-tax profits), OSHA pulls the information on total net income;

2. From a larger set of *all* sampled tax returns by corporations in the industry, whether the corporation shows positive net income (a pre-tax profit) or negative net income (a pre-tax loss), OSHA pulls the information on receipts (essentially equivalent to revenues);

3. OSHA then divides 1 by 2 and declares the result to be the industry's pre-tax profitability, to be used in the Agency's economic feasibility and economic impact calculations.

There are two major flaws in this approach. First, I can see no justification for estimating profitability in an industry *while excluding from the analysis all companies that lost money* in the

year in question. All of the companies/employers in an industry are going to be subject to the Proposed Standard whether or not they are profitable. The Proposed Standard does not include any sort of provision that excludes an employer from compliance if his company has lost money. OSHA cannot reasonably contend that the ability of an industry to bear compliance costs is represented by the economic strength of only the profitable businesses in the industry. On the contrary, it is the unprofitable or weaker portion of an affected industry that one would want to evaluate most carefully when assessing the potential adverse economic impacts of a proposed regulation. OSHA has not provided a rationale for excluding this portion of an industry from the assessment – and I am aware of none.

Secondly, OSHA has created a mismatched and internally inconsistent definition of profitability. OSHA has drawn the numerator (net income) of so-called profitability from one set of tax returns, and the denominator (receipts) from a different and larger set of tax returns. If OSHA in fact believes for some reason that profitability for an industry should be represented by the performance of only the healthier corporations in the industry that have made a profit, then the Agency should calculate this version of profitability by comparing the profits of the profitable corporations against the revenues or receipts for this very same set of corporations that have made a profit. OSHA should not include in the process of calculating this rather unusual "healthy corporation" notion of profitability the revenues of the companies that have not made a profit. Table 3 below makes this point clearly. The Table shows OSHA's calculation of profitability using as an example the relevant CSB data for 2006 for the affected 4-digit general industry sector that I discussed earlier, Pottery and Structural Clay Products (NAICS 3271).

Table 3. Example of OSHA's Inappropriate Use of CSB Data in Calculating Profitability –
NAICS 3271 – Pottery and Structural Clay Products for 2006

					(dollars in thousands)
	Returns	Receipts	Total Profits for Returns w/profits	Total Losses for Returns w/losses	Net Income (less deficit)
All returns (both those with and without positive net income)	2,057	$25,981,077	$1,480,001	$2,037,739	-$557,738
Only those returns with positive net income	1,307	$15,317,714	$1,480,001	$0	
Difference: only those returns with negative net income	750	$10,663,363	$0	$2,037,739	

Calculated Profitability:

OSHA	5.7%	(Profits from 2d line vs. Receipts from 1st line)
My approach	-2.1%	(Net Income [less deficit] from 1st line vs. Receipts from 1st line)

OSHA calculates profitability by reference to the highlighted cells in the table. OSHA divides the total profits earned by the 1,307 profitable pottery/structural clay corporations by the total receipts accrued by all 2,057 corporations whose tax returns were sampled. I believe this approach is inappropriate because, as I have said: 1) The profitability of an industry and its ability to bear regulatory costs should be judged with respect to the entire industry, not with respect solely to the profitable segment of the industry; and 2) In constructing a measure of profitability for an industry, one ought to draw the numerator of this measure from the same group of corporations as that from which one draws the denominator.

The result from OSHA's approach to defining profitability is that this industry looks reasonably healthy and perhaps able to bear some compliance costs; after all, this industry (by OSHA's calculation) is enjoying a reasonably robust pre-tax profit margin of 5.7% on revenues. Maybe

this industry could even incur a regulatory cost amounting to several percentage points of revenues without devastating impact simply by absorbing these costs and having profits decline a bit. OSHA might believe, after calculating profitability in this manner, that this industry could even incur a regulatory cost amounting to 2% of revenues, absorb 100% of this cost and not pass on any of it to customers, and still enjoy a 3.7% profit margin. Such a picture arising from OSHA's flawed interpretation of this industry's profitability would be entirely inaccurate. To the contrary, this industry (if judged only from the perspective of the 2006 profitability information that we have displayed here) has no profits and would be very unlikely to be able to accommodate any significant regulatory cost without severe economic repercussions.

I present this example in order to demonstrate the profoundly inaccurate conclusions regarding economic feasibility that could result from OSHA's badly inappropriate approach to estimating an industry's profitability.

Comparing compliance costs against more appropriately estimated profits. In order to make this point more generally than for this single example involving one year and only one group of affected industries, I have constructed a more appropriate set of profitability estimates for all of the general industries that will be affected by the Proposed Standard and for which credible compliance costs estimates (that is to say, the URS cost estimates) have been developed. I have then compared the estimated compliance costs for these affected industries against their profits – as OSHA does in testing to see whether costs exceed 10% of profits – using the more appropriate set of profitability estimates that I have developed.

I have developed a more appropriate set of profitability estimates for each affected industry than OSHA's by:

1. Drawing information regarding profitability of each industry from the IRS *Corporation Source Book*, as does OSHA, but for the years 2000 through 2010 instead of only 2000 through 2006 as OSHA does. I then average an industry's profitability across each of the years in the chosen period, as does OSHA for the Agency's chosen period, in order to create a multi-year average that is likely to represent an industry's long-term profitability better than data for any single year. My set of profitability estimates thus includes a more recent picture of profitability and a longer-term average than OSHA's set, though my information (which extends only through 2010 still does not reflect the construction slump persisting through the present and the likely diminished capability of these industries to bear compliance costs during the time when compliance with the Proposed Standard will be expected.

2. Constructing a profitability estimate from data in the CSB by dividing "Net Income (less deficit)" (essentially net profits) for *all* corporations in an industry (not solely the profitable corporations) by the receipts for all these corporations. My estimate thus remedies two of the faults that I find in OSHA's estimate: i) estimating profitability inappropriately for an industry by considering only the profitable

companies; and ii) constructing an internally inconsistent measure of profitability by drawing the numerator and the denominator from different sets of firms.[6]

To accompany this letter report, I am providing for the record an Excel workbook that shows the "revised" estimates for profitability that I have developed and also, when these estimated profitabilities are applied to OSHA's estimates of revenues for the affected industries, the resulting estimates of profits. My estimate of "revised" profitability over the 11-year period from 2000 through 2010, on a weighted average basis across the affected industries, is 3.12% in contrast to OSHA's estimate for 2000 through 2006 of 5.68%. The more accurate approach to estimating profitability that I have applied results in estimated profits for the affected industries that are about 45% lower than OSHA estimates. The affected industries' ability to bear compliance costs would similarly be some 45% lower.

In Table 4, I compare for each affected industry the URS estimates of compliance costs and OSHA's (partial or incremental) estimates of compliance costs against revised estimates of profits for these industries as derived from my revised profitability estimates. URS's estimated compliance costs, whether estimated on a *full* cost or an *incremental* cost basis, far exceed the benchmark at 10% of revised profits for nearly every industry sector. URS' *full* costs exceed 100 % of revised profits for 10 of the 19 affected sectors. For one sector – Pottery – URS' projected compliance cost are more than 20 times the sector's average annual profits when estimated in this manner. It is clearly not economically feasible for nearly all of the affected general industries to bear compliance costs of this magnitude. Even using OSHA's much-too-low estimates of compliance costs for the Proposed Standard, annualized compliance costs exceed the benchmark at 10% of profits for three of the 19 industry sectors, as shown in Table 4.

As a final set of comparisons, I compare OSHA's estimate of each industry's compliance costs for the Proposed Standard, when computed on a "full cost" basis without subtracting out the portion of these costs that OSHA attributes to achieving compliance with the current PEL, against my estimate of revised profits for these industries. This comparison is shown in Table 5. Please note that OSHA's compliance cost estimates, whether full cost or incremental, do not account for the additional costs that would be incurred as a result of the proposed adoption of the ISO/CEN protocol for monitoring (making the proposed PEL equivalent to roughly 40 ug/m^3 if compliance monitoring were to remain governed by the currently applicable ACGIH procedures).

Table 5 shows that OSHA's estimated "full" costs exceed 10% of profits for seven of the nineteen affected industry sectors. Even OSHA's unreasonably low cost estimates to comply with the Proposed Standard would reach nearly 100% of profits for one sector, Structural Clay Products. Thus, the Proposed Standard appears not to be economically feasible, even when OSHA's grossly understated "full" cost estimates of compliance are used to make the comparison.

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[6] At this juncture, to provide a direct comparison to OSHA's analysis, I have continued to use the CSB data, despite the concerns I have with relying on the CSB data that is aggregated at the 4-digit NAICS level to represent the smaller 6-digit affected industries. If time permits, I intend to work further on my estimates of profitability and to provide the results in a further report to the Panel.

I am also providing for the record an Excel workbook that shows the various comparisons of costs against revenues and profits that I have presented in this letter report.

　　　　Flaws in OSHA's Revenue Estimates. OSHA estimates revenues for an affected industry for the year 2006 and uses this figure as the denominator in calculating the ratio of the industry's projected annualized compliance costs to the industry's annual revenues. However, no Federal Government statistical agency generates nationwide revenue information for industries on an annual basis. Such information is generated one year in every five, when the Economic Census is conducted; thus, nationwide revenue data exist for 2002, 2007, and 2012, though the information from the 2012 Economic Census is not yet available.[7] Consequently, OSHA estimated each affected industry's revenues in 2006 through an indirect process as follows:

- OSHA assumed that the ratio between an industry's revenues and its payroll would remain constant over time.

- Information on industries' payroll is available on an annual basis in the *Statistics of U.S. Businesses* (SUSB).

- In order to estimate an industry's revenues in the year 2006, OSHA calculated the ratio between that industry's revenues in the year 2002 (from the 2002 Economic Census) and the industry's payroll in that year, and applied this ratio – assuming constancy over time – to the industry's payroll in 2006 as reported in the SUSB for that year.

This approach, while promising in concept, is unacceptable in practice. The ratio between an industry's revenues (or receipts) and its payroll appears to change widely over time. Table 6 provides a comparison of revenues to payroll in 2007 (from the 2007 Economic Census and SUSB) to this same ratio in 2002 (from the 2002 Economic Census and SUSB) for many of the general industries that will be significantly affected by the Proposed Rule. For a few industries this ratio is relatively similar in 2007 to its value in 2002, but for many industries there was a substantial change, ranging up to a nearly 60% increase in this ratio for one of the foundry industries. In short, for many industries, OSHA is wrong in presuming that the ratio will remain constant over time and wrong, therefore, in its projection of industry revenues or receipts based on this approach for any year for which the Economic Census is not conducted.[8] I have not

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[7] Information from the 2012 Economic Census is scheduled for release beginning March, 2014. Information on the manufacturing industries comprising most of the general industries to be affected by the Proposed Standard is scheduled for release between June and December, 2014. *See* http://www.census.gov/econ/census/schedule.html.

[8] I observe parenthetically that the same substantial variability in the ratio of revenues to payroll for an industry exists also within a given year (in contrast to across years, which I have been discussing) when the ratio is calculated for different segments of the industry, for example for very small entities (< 20 employees) compared with small entities compared with large entities. It is not entirely clear to me how OSHA develops the revenue estimates by size of entity that the Agency uses for the Regulatory Flexibility Analysis (RFA). OSHA's methodology for the RFA appears to involve assuming that the ratio between revenues and payroll – or perhaps a related ratio between revenues and employment – is constant across segments or size tiers within an industry. If OSHA does indeed make this assumption, then the Agency will need to find a better approach for estimating both the distribution of revenues

studied this issue, but I surmise that the ratio between an industry's revenues and its payroll varies systematically across the business cycle, with the ratio increasing during good times and decreasing during difficult times. If so, the ratio between revenues and payroll will have declined substantially in the years after 2006, a likelihood that OSHA should consider when developing revenue estimates for the affected industries that better reflect these industries' current abilities to bear costs than the Agency's estimates for 2006.

I believe that OSHA should both develop more recent revenue estimates and find a more accurate way of estimating industry revenues in years for which the Economic Census has not been conducted. It may not be possible to meet both of these requirements. If so, OSHA may need to wait to conduct a revised economic feasibility/economic impact analysis for the Proposed Standard until the revenue information from the 2012 Economic Census is available. In any case, I expect that accurate information on affected industries' current revenues will be sufficiently different from the inaccurate and badly outdated information that OSHA has developed for 2006 that an updated economic feasibility/economic impact analysis for the Proposed Rule will look quite different from that in the current PEA. A Notice of Data Availability would perhaps be warranted so as to provide this important new data and analysis for public review.

Further economic analysis. Due to the limited time available to understand and evaluate OSHA's record, to generate data with which to test OSHA's assumptions (mostly via industry surveys), to re-estimate the likely costs of the regulation, and then to compare these re-estimated costs against measures of the affected industries' abilities to bear these costs, I have not completed all of the economic analyses I intend to do for Panel. For example, just as I have updated OSHA's profit data to better reflect the affected industries' current economic condition, I intend to compare the expected costs of the Proposed Standard to general industry revenue data that are more current than the 2006 data used by OSHA. I also intend to provide some analysis on additional economic issues relating to the Proposed Standard: i) OSHA's monetized benefits analysis and comparison of benefits against costs; ii) assessment of impacts on small entities; iii) employment impacts; and iv) analysis of the likely impacts of the Proposed Standard for construction on general industry, and *vice versa*. I intend to complete these economic analyses and will provide them to the Panel before the upcoming public hearing.

Sincerely,

Stuart L. Sessions
President, Environomics, Inc.

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by size tiers within an industry and the change in revenues from year to year for the entire industry. Payroll should not be assumed as an indicator for revenues in either case.

Table 1. Comparison of Industry Cost Estimates With OSHA's for Entire Proposed Rule:
General Industry, Hydraulic Fracturing, Construction

		Industry Cost Estimates			OSHA Cost Estimates		
	Source	Engineering Controls*	Ancillary Requirements	Total	Engineering Controls**	Ancillary Requirements	Total
General Industry (sectors with costs estimated by URS)	1	$5,353.6	$777.5	$6,131.1	$78.1	$36.5	$114.7
General Industry (sectors with costs not estimated by URS) + Maritime	2	---	---	---	$23.1	$9.1	$32.1
Hydraulic Fracturing	3	$265.7	$101.0	$366.7	$24.8	$3.7	$28.6
Construction	4	$1,124.0	$1,045.4	$2,169.4	$242.6	$268.6	$511.2
Total		**$6,743.3**	**$1,923.9**	**$8,667.2**	**$368.6**	**$317.8**	**$686.5**

Sources and notes:

1. URS. Includes 19 General Industry sectors
2. Includes Maritime plus 7 General Industry sectors not addressed by URS: captive foundries, porcelain enameling, railroads, dental equipment, dental laboratories, refractory repair
3. American Petroleum Institute (API). API notes these are estimated costs for OSHA's suggested combination of controls, which are not sufficient for compliance and not available
4. Construction Industry Safety Coalition

* Estimated on a full cost basis -- all costs to reach proposed PEL

** Estimated on an incremental cost basis -- costs to reduce exposures of workers now exposed between 50 and 100 ug/m^3 to below the proposed PEL

The URS cost estimates for engineering controls for General Industry assess the total cost of compliance, i.e., the cost to reduce worker exposure to respirable crystalline silica from actual current levels to the level of the proposed new PEL. By contrast, OSHA intended its engineering control cost estimates to represent the costs for General Industry employers to achieve the hypothetical increment between assumed full compliance with the current PEL and compliance with the new PEL. In the economic analysis, however, OSHA wrongly assumed that in order to achieve compliance with the existing PEL of 100 ug/m^3, employers would have to reduce the exposures of all workers exposed above 100 ug/m^3 to below the proposed PEL of 50 ug/m^3. The increment of progress for which OSHA then estimated costs and the increment shown here with ** was simply to reduce the exposure of all workers currently exposed between 50 and 100 ug/m^3 to below 50 ug/m^3.

The estimate of costs to comply in hydraulic fracturing operations reflects the estimated costs of the suite of controls that OSHA suggests for compliance with the proposed new PEL. For the reasons described in its comments, the American Petroleum Institute submits that most of these controls are neither proven effective nor available, and that the entire suite of suggested controls will not be sufficient to achieve compliance with the proposed PEL without continuing use of respirators.

Table 2. Comparison of URS Cost Estimates for General Industry Sectors Against Revenues and Profits Estimated by OSHA

Sector	Incremental* Annualized Costs; URS	Full Annualized Costs; URS	Total Revenues (OSHA)	Total Profits (OSHA)	Incremental* Costs (URS) as a Percentage of OSHA Revenues	Incremental* Costs (URS) as a Percentage of OSHA Profits	Full Costs (URS) as a Percentage of OSHA Revenues	Full Costs (URS) as a Percentage of OSHA Profits
Asphalt Paving Products	$ 4,008,427	$ 4,008,427	$ 9,470,196,512	$ 710,377,426	0.04%	0.56%	0.04%	0.56%
Asphalt Roofing Materials	$ 123,508,792	$ 180,630,531	$ 7,620,129,845	$ 571,600,412	1.62%	21.61%	2.37%	31.60%
Concrete Products	$ 801,504,337	$ 920,607,823	$ 22,177,440,849	$ 1,441,151,237	3.61%	55.62%	4.15%	63.88%
Costume Jewelry	$ 1,966,955	$ 2,257,117	$ 798,507,908	$ 46,277,885	0.25%	4.25%	0.28%	4.88%
Cut Stone	$ 137,122,639	$ 163,822,634	$ 3,728,122,309	$ 204,637,724	3.68%	67.01%	4.39%	80.05%
Fine Jewelry	$ 17,352,449	$ 19,930,151	$ 7,541,504,828	$ 437,071,306	0.23%	3.97%	0.26%	4.56%
Flat Glass	$ 16,272,230	$ 21,026,893	$ 3,637,200,414	$ 124,425,494	0.45%	13.08%	0.58%	16.90%
Iron Foundries	$ 935,023,093	$ 1,322,820,638	$ 10,367,425,350	$ 426,496,089	9.02%	219.23%	12.76%	310.16%
Mineral Processing	$ 115,617,934	$ 128,593,832	$ 2,344,857,302	$ 128,709,903	4.93%	89.83%	5.48%	99.91%
Mineral Wool	$ 72,498,833	$ 86,643,151	$ 6,095,416,156	$ 334,579,176	1.19%	21.67%	1.42%	25.90%
Nonferrous Sand Casting Foundries	$ 379,940,467	$ 515,620,777	$ 2,857,275,309	$ 117,542,852	13.30%	323.24%	18.05%	438.67%
Non-Sand Casting Foundries	$ 576,610,310	$ 799,794,670	$ 5,086,936,203	$ 209,266,845	11.34%	275.54%	15.72%	382.19%
Other Ferrous Sand Casting Foundries	$ 296,569,640	$ 416,113,102	$ 3,869,746,880	$ 159,194,000	7.66%	186.29%	10.75%	261.39%
Other Glass Products	$ 42,280,102	$ 57,584,479	$ 8,250,181,443	$ 282,231,603	0.51%	14.98%	0.70%	20.40%
Paint and Coatings	$ 22,838,960	$ 27,651,944	$ 8,544,188,637	$ 460,051,979	0.27%	4.96%	0.32%	6.01%
Pottery	$ 394,500,267	$ 522,980,143	$ 2,761,108,097	$ 121,900,502	14.29%	323.62%	18.94%	429.02%
Ready-Mix Concrete	$ 401,551,118	$ 413,044,815	$ 29,662,382,813	$ 1,969,015,202	1.35%	20.39%	1.39%	20.98%
Refractories	$ 68,734,993	$ 75,114,000	$ 2,561,000,461	$ 113,065,925	2.68%	60.79%	2.93%	66.43%
Structural Clay	$ 314,547,289	$ 452,835,685	$ 3,869,962,271	$ 170,855,441	8.13%	184.10%	11.70%	265.04%
TOTAL or WEIGHTED AVERAGE	**$4,722,448,833**	**$6,131,080,812**	**$141,243,583,589**	**$8,028,451,001**	**3.34%**	**58.82%**	**4.34%**	**76.37%**

*Incremental costs calculated by subtracting the engineering costs necessary to reach PEL=100 from the engineering costs necessary to reach PEL=50, and adding this increment to ancillary costs.

Highlighted in salmon: costs exceed OSHA benchmarks at 1% of revenues, 10% of profits

Table 4. Comparison of URS and OSHA Cost Estimates for General Industry Sectors Against Profits Estimated Two Ways

Sector	Full Annualized Costs; URS	Incremental* Annualized Costs; OSHA	Estimated Profitability, OSHA	Estimated Profitability, Revised**	Full Costs (URS) as a Percentage of OSHA Profits	Full Costs (URS) as a Percentage of Revised** Profits	Incremental* Costs (OSHA) as a Percentage of OSHA Profits	Incremental* Costs (OSHA) as a Percentage of Revised** Profits
Asphalt Paving Products	$ 4,008,427	$ 242,070	7.50%	7.12%	0.56%	0.59%	0.03%	0.04%
Asphalt Roofing Materials	$ 180,630,531	$ 3,157,257	7.50%	7.12%	31.60%	33.29%	0.55%	0.58%
Concrete Products	$ 920,607,823	$ 22,051,726	6.64%	2.18%	63.88%	190.24%	1.32%	4.56%
Costume Jewelry	$ 2,257,117	$ 236,821	5.80%	3.65%	4.88%	7.75%	0.51%	0.81%
Cut Stone	$ 163,822,634	$ 8,600,298	5.49%	2.00%	80.05%	219.99%	4.20%	11.55%
Fine Jewelry	$ 19,930,151	$ 1,881,231	5.80%	3.65%	4.56%	7.25%	0.43%	0.68%
Flat Glass	$ 21,026,893	$ 275,155	3.42%	2.30%	16.90%	25.15%	0.22%	0.33%
Iron Foundries	$ 1,322,820,638	$ 15,310,815	4.11%	3.57%	310.16%	357.01%	3.59%	4.13%
Mineral Processing	$ 128,593,832	$ 4,595,006	5.49%	2.00%	99.91%	274.55%	3.57%	9.81%
Mineral Wool	$ 86,643,151	$ 1,094,552	5.49%	2.00%	25.90%	71.16%	0.33%	0.90%
Nonferrous Sand Casting Foundries	$ 515,620,777	$ 5,315,122	4.11%	3.57%	438.67%	504.93%	4.52%	5.20%
Non-Sand Casting Foundries	$ 799,794,670	$ 8,812,338	4.11%	3.57%	382.19%	439.92%	4.21%	4.85%
Other Ferrous Sand Casting Foundries	$ 416,113,102	$ 4,596,837	4.11%	3.57%	261.39%	300.87%	2.89%	3.32%
Other Glass Products	$ 57,584,479	$ 1,841,594	3.42%	2.30%	20.40%	30.37%	0.65%	0.97%
Paint and Coatings	$ 27,651,944	$ 144,281	5.38%	4.19%	6.01%	7.72%	0.03%	0.04%
Pottery	$ 522,980,143	$ 6,008,962	4.41%	0.94%	429.02%	2004.83%	4.93%	23.04%
Ready-Mix Concrete	$ 413,044,815	$ 16,511,080	6.64%	2.18%	20.98%	63.82%	0.84%	2.55%
Refractories	$ 75,114,000	$ 1,090,454	4.41%	0.94%	66.43%	310.45%	0.96%	4.51%
Structural Clay	$ 452,835,685	$ 12,906,856	4.41%	0.94%	265.04%	1238.54%	7.55%	35.30%
TOTAL or WEIGHTED AVERAGE	**$6,131,080,812**	**$114,672,456**	**5.68%**	**3.12%**	**76.37%**	**139.15%**	**1.43%**	**2.60%**

*Incremental costs calculated as the cost to reduce to below the proposed new PEL the exposures of employees current exposed at between 50 and 100 ug/m3, and adding this increment to ancillary costs.

** "Revised" profits extend the averaging period for profits from 2000 - 2006 (OSHA) to 2000 - 2010 (revised) and calculate profitability for an industry across all corporations in that industry, not only those that were profitable in the year in question (as OSHA did)

Highlighted in salmon: costs exceed OSHA benchmarks at 1% of revenues, 10% of profits

Table 5. OSHA's Incremental and Full Costs Compared Against Revised Profits

Sector	Incremental* Annualized Costs; OSHA	Total*** Annualized Costs; OSHA	Estimated Profitability, OSHA	Estimated Profitability, Revised**	Incremental* Costs (OSHA) as a Percentage of Revised** Profits	Total*** Costs (OSHA) as a Percentage of Revised** Profits
Asphalt Paving Products	$ 242,070	$ 242,070	7.50%	7.12%	0.04%	0.04%
Asphalt Roofing Materials	$ 3,157,257	$ 5,351,406	7.50%	7.12%	0.58%	0.99%
Concrete Products	$ 22,051,726	$ 44,291,485	6.64%	2.18%	4.56%	9.15%
Costume Jewelry	$ 236,821	$ 324,269	5.80%	3.65%	0.81%	1.11%
Cut Stone	$ 8,600,298	$ 18,483,249	5.49%	2.00%	11.55%	24.82%
Fine Jewelry	$ 1,881,231	$ 2,666,039	5.80%	3.65%	0.68%	0.97%
Flat Glass	$ 275,155	$ 403,025	3.42%	2.30%	0.33%	0.48%
Iron Foundries	$ 15,310,815	$ 37,149,187	4.11%	3.57%	4.13%	10.03%
Mineral Processing	$ 4,595,006	$ 6,387,726	5.49%	2.00%	9.81%	13.64%
Mineral Wool	$ 1,094,552	$ 1,634,265	5.49%	2.00%	0.90%	1.34%
Nonferrous Sand Casting Foundries	$ 5,315,122	$ 12,828,527	4.11%	3.57%	5.20%	12.56%
Non-Sand Casting Foundries	$ 8,812,338	$ 21,345,289	4.11%	3.57%	4.85%	11.74%
Other Ferrous Sand Casting Foundries	$ 4,596,837	$ 11,133,277	4.11%	3.57%	3.32%	8.05%
Other Glass Products	$ 1,841,594	$ 2,787,248	3.42%	2.30%	0.97%	1.47%
Paint and Coatings	$ 144,281	$ 959,729	5.38%	4.19%	0.04%	0.27%
Pottery	$ 6,008,962	$ 12,120,460	4.41%	0.94%	23.04%	46.46%
Ready-Mix Concrete	$ 16,511,080	$ 20,262,241	6.64%	2.18%	2.55%	3.13%
Refractories	$ 1,090,454	$ 2,059,772	4.41%	0.94%	4.51%	8.51%
Structural Clay	$ 12,906,856	$ 34,939,980	4.41%	0.94%	35.30%	95.56%
TOTAL or WEIGHTED AVERAGE	**$114,672,456**	**$235,369,244**	**5.68%**	**3.12%**	**2.60%**	**5.34%**

*Incremental costs are calculated as the costs to reduce to below the proposed new PEL the exposures of employees current exposed at between 50 and 100 ug/m3, and adding this increment to ancillary costs.

** "Revised" profits extend the averaging period for profits from 2000 - 2006 (OSHA) to 2000 - 2010 (revised) and calculate profitability for an industry across all corporations in that industry, not only those that were profitable in the year in question (as OSHA did)

*** "Total" costs are the costs to reduce exposures from current levels to below the proposed new PEL

Highlighted in salmon: costs exceed OSHA benchmarks at 1% of revenues, 10% of profits

Table 6. Variability Over Time in the Ratio Between Revenues and Payroll

NAICS	Sector	Industry	2007 Estimated Receipts ($1,000)	2007 Payroll ($1,000)	2002 Estimated Receipts ($1,000)	2002 Payroll ($1,000)	2007 Ratio	2002 Ratio
324122	Asphalt Roofing Materials	Asphalt shingle and roofing materials	8,041,234	621,536	6,483,151	619,079	12.94	10.47
327111	Pottery	Vitreous china plumbing fixture and bathroom accessories manufacturing	931,172	207,982	1,148,874	294,734	4.48	3.90
327112	Pottery	Vitreous china, fine earthenware, and other pottery product manufacturing	862,385	230,106	1,392,246	419,199	3.75	3.32
327113	Pottery	Porcelain electrical supply manufacturing	1,028,574	280,765	1,132,510	320,808	3.66	3.53
327121	Structural Clay	Brick and structural clay tile manufacturing	2,069,483	454,505	1,853,104	434,375	4.55	4.27
327122	Structural Clay	Ceramic wall and floor tile manufacturing	1,118,222	224,378	1,002,517	204,633	4.98	4.90
327123	Structural Clay	Other structural clay product manufacturing	226,320	61,677	200,500	54,973	3.67	3.65
327320	Ready-Mix Concrete	Ready-mix concrete manufacturing	34,433,411	4,577,319	21,598,968	3,735,056	7.52	5.78
327331	Concrete Products	Concrete block and brick manufacturing	5,925,722	959,511	4,095,163	780,697	6.18	5.25
327332	Concrete Products	Concrete pipe manufacturing	3,549,395	597,904	2,426,994	506,273	5.94	4.79
327390	Concrete Products	Other concrete product manufacturing	11,777,181	2,599,849	8,575,184	2,122,222	4.53	4.04
327991	Cut Stone	Cut stone and stone product manufacturing	3,897,843	1,101,449	2,107,037	636,813	3.54	3.31
327993	Mineral Wool	Mineral wool manufacturing	6,077,904	907,151	4,812,495	797,165	6.70	6.04
327999	Concrete Products	All other miscellaneous nonmetallic mineral product manufacturing	3,261,403	438,697	2,446,535	415,321	7.43	5.89
331511	Iron Foundries	Iron foundries	12,621,385	2,608,512	10,227,560	2,905,993	4.84	3.52
331512	Non-Sand Casting Foundries	Steel investment foundries	3,077,085	690,680	2,096,197	600,919	4.46	3.49
331513	Other Ferrous Sand Casting Foun	Steel foundries (except investment)	4,861,110	809,736	3,043,311	662,808	6.00	4.59
331524	Nonferrous Sand Casting Foundri	Aluminum foundries (except die-casting)	4,112,109	978,995	3,702,998	985,649	4.20	3.76
331524	Non-Sand Casting Foundries	Aluminum foundries (except die-casting)	4,112,109	978,995	3,702,998	985,649	4.20	3.76
331525	Nonferrous Sand Casting Foundri	Copper foundries (except die-casting)	1,326,307	243,203	730,913	213,874	5.45	3.42
331525	Non-Sand Casting Foundries	Copper foundries (except die-casting)	1,326,307	243,203	730,913	213,874	5.45	3.42
331528	Nonferrous Sand Casting Foundri	Other nonferrous foundries (except die-casting)	1,269,280	238,998	876,796	233,201	5.31	3.76
331528	Non-Sand Casting Foundries	Other nonferrous foundries (except die-casting)	1,269,280	238,998	876,796	233,201	5.31	3.76

STUART L. SESSIONS

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SUMMARY OF EXPERIENCE

Stuart Sessions is an economist with nearly 40 years of experience in analysis of policies and regulations affecting the environment, energy and occupational health and safety. He has a particular interest in practical ways of applying quantitative analytical methods to improve governments' decisions on issues in these areas. As the name of his company implies, Mr. Sessions believes that environmental (and health and safety) and economic goals can be mutually supportive and achieved together. Approximately 2/3 of Mr. Sessions' experience has been as a consultant to governments and industry; 1/3 has been as an analyst and manager with the U.S. Federal government.

As a consultant, he has employed a wide range of analytical techniques (e.g., benefit-cost analysis, risk analysis, financial analysis, economic impact assessment, benefits estimation, statistics and econometrics, institutional analysis, computer simulation, life cycle analysis, cost estimation) in performing over 200 assignments for diverse clients. He has consulted extensively for government officials in the U.S. and abroad on improving their procedures for evaluating environmental policy measures. He has supported numerous companies and industry groups in analysis and advocacy pursuing more cost-effective environmental, health and safety regulations. He has directed preparation of the large Regulatory Impact Analyses (RIAs) for many major regulations issued by the U.S. Environmental Protection Agency (EPA) as well as many smaller studies addressing various aspects of other environmental policies and regulations. Through this work he has become quite familiar with the analytical and decision-support requirements applicable to U.S. Federal regulations, including Executive Orders 13563 (Obama) and 12866 (Clinton), other Executive Office Circulars and Bulletins, the Regulatory Flexibility Act/Small Business Regulatory and Enforcement Fairness Act, the Paperwork Reduction Act, and more.

Before beginning consulting, Mr. Sessions for five years was a senior manager with the Office of Policy Analysis at the U.S. EPA. Here he was generally responsible for directing analyses of the costs and benefits of potential EPA regulations affecting air and water pollution and hazardous wastes. Among other activities, he managed studies of the economic impacts of EPA regulations on individual manufacturing facilities, on communities, on key industries, and on the U.S. economy as a whole.

Mr. Sessions also worked previously on environmental, energy and natural resource issues for the U.S. Federal government at the White House (for President Jimmy Carter) and at the Office of Management and Budget (OMB).

Mr. Sessions' undergraduate and graduate degrees are in economics and environmental policy. He has taught applied statistics, econometrics and policy analysis at the graduate level.

Stuart Sessions is now the President of Environomics, Inc.. Environomics is a small consulting firm in the Washington, D.C. metropolitan area that specializes in applying systematic analytical techniques to assist governments and industry in improving environmental regulatory and policy decisions.

STUART L. SESSIONS

EDUCATION

M.P.P. Master of Public Policy (concentration in environmental economics)
Kennedy School of Government, Harvard University (1974)

Graduate study in natural resource planning (concentration in policy and institutions)
School of Natural Resources, University of Michigan (1970 - 1971)

B.A. Economics, magna cum laude, Amherst College (1970)

PROFESSIONAL HISTORY

1991 - now   **Vice President and now President, Environomics Inc.**   Direct consulting projects for government and industry clients on policy and regulatory issues involving the environment and occupational health.

1985 - 1991   **Vice President, Sobotka & Co.** Directed analytical consulting projects for government clients on environmental and energy policy issues.

1983 - 1985   **Acting Director, Regulatory Policy Division, U.S. EPA.**   Reviewed all potential EPA regulations affecting air, water and wastes; directed policy studies; conducted program evaluations; analyzed policy alternatives.

1982 - 1985   **Chief, Water Economics Branch, U.S. EPA.** Directed economic analyses of water pollution programs, regulations and legislation.

1980 - 1982   **Chief, Industrial Analysis Branch, U.S. EPA, and Chief, Energy Facilities Branch, U.S. EPA.**   Analyzed the financial effect of EPA regulations on major plants, industries and communities and on the economy as a whole.

1979 - 1980   **Special Assistant, the White House.**   Developed and sought enactment of Carter Administration proposals for energy legislation.

1975 - 1979   **Staff Analyst, U.S. Office of Management and Budget.** Reviewed and evaluated budget and policy issues for natural resource and park programs of the U.S. Department of the Interior.

1974 - 1975   **Instructor: applied statistics, econometrics and policy analysis, Kennedy School of Government, Harvard University.**

REFERENCES, LIST OF AWARDS, LIST OF PUBLICATIONS, COPIES OF PUBLICATIONS

Available on request. Commendations for outstanding performance have been received at all career stages, including testimonials from consulting clients, silver and bronze medals from EPA, OMB Professional Achievement Award, and academic fellowships and awards.

**SELECTED CONSULTING ASSIGNMENTS
INVOLVING ANALYSIS OF ENVIRONMENTAL AND OCCUPATIONAL SAFETY/HEALTH
REGULATIONS, POLICIES AND PROGRAM ISSUES**

Review of major U.S. air pollution regulations. Under contracts with leading industry trade associations (e.g., National Association of Manufacturers, U.S. Chamber of Commerce, American Petroleum Institute) and law firms, provided analysis, drafted comments, and supported industry advocacy on many of the most important recent air pollution regulations. These included revisions to the National Ambient Air Quality Standards (NAAQS) for Ozone and for Particulate Matter (potentially the two most costly U.S. environmental regulations ever), and numerous industry-specific rules prescribing standards for new sources (NSPS rules) and for toxic air pollutants from existing sources (MACT rules).

Work on standards for worker exposure to toxic chemicals and noise. Have supported and continue to support a variety of industries in economic and risk analysis and advocacy regarding the Occupational Safety and Health Administration's (OSHA's) worker exposure regulations for: crystalline silica, hexavalent chromium, beryllium, and noise. Developed detailed critiques of OSHA's economic analyses supporting these rules, re-estimated the potential costs and health benefits from the rules, and conducted detailed analyses to document the economic and competitive impacts if the proposed rules were to be finalized. Supported industry with extensive oral and written testimony, including testifying as an industry witness in two Congressional oversight hearings and one OSHA administrative hearing. Performed further work on several State occupational health standards. Supported the construction industry in review and comment on regulations involving crystalline silica and noise.

Regulatory Impact Analyses (RIAs) for major water regulations. Over six years, led the contractor support for EPA in developing the RIAs for five significant water regulations: TMDLs, sanitary sewer overflows, changes to the NPDES permit rules, and two drinking water standards. The work involved estimating the likely costs to sources and governments to comply with these regulations, the economic impacts on the regulated industry and communities, and the benefits (monetized to the extent possible) of the water quality improvements that would result.

Review and comment on proposed "effluent guideline" water pollution control regulations, economic assistance on various NPDES permit matters. Assisted in evaluating proposed rules, developing industry positions, supporting various appeals by dischargers and preparing economics-related comments on proposed regulations for clients in at least seven different industries: airport deicing, construction and development, meat and poultry processing, iron and steel, metal products and machinery (metal finishing and printed circuit boards) and industrial laundries. Co-authored the chapter on effluent guidelines in Resources for the Future's critique of EPA's practices in regulatory impact analysis titled Economic Analyses at EPA.

Economic analysis on environmental issues affecting real estate property values and markets. Currently performing a contract with the National Association of Realtors to provide quick response analytical assistance regarding U.S. Federal environmental and energy initiatives that may affect residential or commercial real estate markets. Performed a series of projects for investors, banks and property owners evaluating the impact of different environmental impairments (soil contamination, asbestos, proximity to hazardous waste sites, radon, lead paint) on property values. For one of the largest U.S. banks, developed a statistical modeling approach to evaluate the impact of environmental and other risks on the value of the bank's portfolio of real estate loans.

STUART L. SESSIONS

Support for EPA development of drinking water regulations. Co-directed a large 5-year contract to support EPA's drinking water office in regulatory development. Work focused on potential regulations addressing coliform bacteria, lead, perchlorate, and contamination of drinking water distribution systems generally. Also developed methods for valuing the health benefits of drinking water regulations that protect children or other sensitive populations. Developed improvements to a methodology for estimating the economic value of avoided morbidity from acute illnesses. Developed a guide for the office on how to address uncertainty in regulatory analyses.

Economic incentives as an alternative to traditional "command and control" regulation. Have performed a long series of projects, mostly for EPA, to devise or evaluate economic incentive approaches for achieving environmental goals. Authored the first comprehensive review of the U.S. experience in water trading, and supported the development of EPA's water trading guidance. Directed several studies of water trading in specific watersheds, and a very large study estimating the potential cost savings from nationwide implementation of point-point and point-nonpoint water trading. Developed EPA's international training course on use of economic incentives for environmental protection. Performed early studies on the potential use of economic incentives in attaining the ambient air quality standard for ozone. Have supported a major industry for fourteen years in their successful implementation of a voluntary industry environmental stewardship program as an alternative to threatened Federal wastewater regulation.

Economic analysis on issues affecting water and wastewater utilities. Assisted EPA and the State of Pennsylvania in a pilot project to encourage adoption by utilities of innovative approaches to capital asset management and infrastructure renewal. Performed an independent review for EPA of the Agency's guidance on financial capability assessment for combined sewer overflow projects. Directed several studies for EPA estimating the likely costs to industrial dischargers and water utilities of compliance with potential regulations and policies (e.g., blending policy, NPDES permit rules, water quality-based effluent requirements). For a large wastewater utility, provided expert witness testimony and economic analysis assistance to support the utility's request for revision of the State's water quality standards and thereby avoid the need for a billion dollar investment. Assessed the likely impacts of water efficiency/water conservation programs on utility economics.

Analysis of environmental regulatory issues affecting the U.S. cement industry. Have provided support involving economic and risk analysis, comments on proposed regulations, and advocacy for most of the environmental regulations potentially affecting the cement industry over the past fifteen years. Regulatory issues on which Mr. Sessions has worked on behalf of the industry include: definition of solid waste, comparable fuels exclusion, cement MACT and NSPS, air emissions standards for hazardous waste combustors, use of non-traditional fuels, and cement kiln dust.