Benefit-Cost Analysis of OSHA's Proposed Crystalline Silica Standard for General Industry

Presentation for OIRA

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Conclusions from Our Re-Analysis of Benefits and Costs

Annualized Costs and Benefits of Proposed Silica Standard for General Industry and Maritime
(Excluding Hydraulic Fracturing)
(yr 2009 $ in millions/yr)

	Complete Compliance With Current Standard (incl. PEL of 100 ug/m^3)	Increment: Reduce PEL from 100 to 50 ug/m^3 + ancillary req'ts + switch to ISO/CEN	Total for Proposed Standard "Full" Costs & Benefits: PEL of 50 ug/m^3 + ancillary req'ts + ISO/CEN
Estimated Costs*	$1,408.6	$4,722.5	$6,131.1
Estimated Benefits**	$287.7	$71.7	$359.4
Ratio of Costs to Benefits	**4.9**	**65.9**	**17.1**
Net Benefits	**-$1,120.9**	**-$4,650.8**	**-$5,771.7**

* Estimated costs include only 19 General Industry sectors, excluding Maritime and 6 more sectors for which URS has not estimated costs (captive foundries, porcelain enameling, railroads, dental equipment, dental labs, refractory repair). URS believed that OSHA's estimates for the # of facilities in Maritime and the other 6 sectors were so inaccurate as to preclude estimating costs for them.

** Estimated benefits are for silica-exposed workers in all 25 General Industry sectors plus Maritime. Estimated benefits as shown above thus apply for a significantly larger universe of workers than is covered by the estimated costs.

- Net benefits are hugely negative whether estimated on either an "incremental" basis or "full" basis
- More than 80% of benefits will accrue when all employers comply completely with the current standard, while more than 77% of costs are due to the incremental/additional requirements of the proposed standard

Comparison of Our Methodology for Benefit-Cost Analysis With OSHA's – Some General Points

- We estimate costs and benefits for: 1) Existing standard; 2) Increment; 3) "Full" cost/benefit combination of the two. OSHA analyzes Increment only
- For costs, we use URS' estimates for the Panel (2/11/14 ACC Comments)
- For benefits, we: 1) Select the best among OSHA's exposure-response relationships; 2) Improve monetization
- We start our analysis with OSHA's baseline profile of worker exposures
- But we believe that much greater incremental exposure reductions will be needed to attain the proposed PEL than does OSHA. (This tends to increase our estimates for incremental costs and benefits relative to OSHA's)
- We address the proposed switch to ISO/CEN for both costs and benefits
- We prepared a Report and a large Excel workbook for our analysis

Compliance Costs Will Be Far Higher than OSHA Estimated -- $4.7 billion/yr vs. $147 million/yr

Estimated Incremental Compliance Costs for Proposed Standard

(in millions of 2009 $ per year, 7% discount rate)

	URS*	OSHA*
Engineering controls	$3,944.9	$101.1
Ancillary requirements	$777.5	$45.6
Total	$4,722.4	$146.7

* URS estimate is for 19 General Industry sectors (103,000 est. overexposed workers)
OSHA estimate is for 25 General Industry sectors + Maritime (122,000 est. overexposed)
Neither URS nor OSHA estimates include hydraulic fracturing

- OSHA overestimates what employers would do to comply with current standard, thus underestimating the increment required by the proposed standard
  - OSHA misses 2/3 of affected workers, 8/9 of needed exposure reductions
- OSHA estimates engineering control costs "per overexposed employee". URS approach of estimating costs on a facility basis is far better
  - <4 overexposed employees can be protected per application of a package of controls
  - OSHA undersizes many controls; unit costs are too low
  - OSHA misses increasing marginal costs at lower workplace concentrations
- OSHA fails to estimate additional costs due to switch to ISO/CEN
- Many problems in OSHA estimates for ancillary requirements. Omitting costs for professional cleaning of facilities, for example

OSHA Overestimates Likely Employer Actions to Meet Current PEL, Resulting in Large Underestimate of Incremental Exposure Reduction Needed for Proposed PEL

Group of Workers in Terms of Current/Baseline Exposure (ug/m^3)	# Workers in General Industry	OSHA's Assumed Single Representative Exposure Levels (ug/m^3)			OSHA's Estimated Incremental Exposure Reduction due to Rule Index Measure: [(2 - 3) x # of workers/1,000]	
		1. Now	2. After comply w/current PEL	3. After comply w/proposed PEL	In PEA, w/bad assumption re 2	If better assumption re 2
Group A: Exposed at ≥ 100	80,731	125 (?)	50 / 100	50	0	4,037
Group B: Exposed between 50 - 100	41,741	62.5	62.5	50	522	522
Group C: Exposed between 25 - 50	53,329	?	? (unchanged)	? (unchanged)	0	0
Group D: Exposed between 0 - 25	119,085	?	? (unchanged)	? (unchanged)	0	0
Total	294,886				522	4,558

OSHA assumes employers would comply w/current PEL of 100 ug/m^3 by reducing overexposed employees to below the proposed PEL of 50 ug/m^3

If OSHA were to assume instead that employers would comply w/current PEL of 100 ug/m^3 by reducing overexposed employees only to below the current PEL of 100 ug/m^3

- The two rightmost columns show an index measure for the amount of exposure reduction: sum of (# of workers) x (ug/m^3 of exposure reduction)/1,000
- OSHA wrongly estimates no engineering control costs for 2/3 of the workers currently exposed above 50 µg/m^3 and ignores nearly 90% of the exposure reductions that will be required incrementally by the proposed standard
- But OSHA does appear to estimate incremental benefits for these 81,000 employees wrongly excluded from the cost analysis. How can there be benefits but no costs?

We Estimate Much Larger Exposure Reductions (With Implications for Both Benefits and Costs)

Group of Workers in Terms of Current/Baseline Exposure (ug/m^3)	# Workers in General Industry	**Our** Assumed Representative Exposure Levels (ug/m^3)			Estimated Exposure Reductions from Compliance with Current and Then Proposed PELs [*same index measure as above*]	
		1. Now	2. After comply w/current PEL	3. After comply w/proposed PEL	Full Compliance w/Current PEL	Increment w/Proposed PEL
Group A1: Exposed at ≥ 250	48,956	434	50	25	18,816	1,224
Group A2: Exposed between 100 - 250	31,775	150	50	25	3,178	794
Group B: Exposed between 50 - 100	41,741	75	some at 60, some at 75	25	188	1,899
Group C: Exposed between 25 - 50	53,329	37.5	some at 30, some at 37.5	between 24 and 37.5	120	244
Group D: Exposed between 0 - 25	119,085	12.5	some at 10, some at 12.5	between 8 and 12.5	89	181
Total	294,886				22,391	4,342

Based on averages of OSHA's exposure data for Groups A1 and A2, and midpoints of range for other Groups

Assuming that average exposure must be reduced to half the PEL in order for individual exposures only rarely to exceed the PEL

Assumes some "collateral" exposure reductions. Controls installed at facilities to reduce exposures for overexposed workers will collaterally reduce exposures also for some workers who were not overexposed

- OSHA estimated 522 units of exposure reduction would be needed to meet incremental requirements of proposed rule. (Should have been > 4,558 units)
- We estimate 22,391 units would be needed to comply with existing standard, plus 4,342 units additionally for proposed PEL. (Plus 986 more units for ISO/CEN)

Comparison of Our Methodology for Benefit-Cost Analysis With OSHA's – Estimating Benefits

- The Panel's risk consultants did not find that workers face a significant risk of any of the alleged health effects if exposures are maintained at or below the current General Industry PEL. Nevertheless, in estimating benefits:
  - For 3 of OSHA's 5 health effects (lung cancer mortality, silicosis morbidity, silicosis mortality) we use the best of OSHA's chosen exposure-response functions and assume no threshold above the proposed PEL
  - For the remaining two health effects (mortality from ESRD and from NMRD other than silicosis) we assume no causal association with silica exposure
- Purpose of benefit-cost analysis is different from that for significant risk determination
  - We select among OSHA's exposure-response functions based on plausibility at current very low levels of cumulative silica exposure
  - We use actual data about worker tenure rather than assume 45-yr working life
- We sharply revise OSHA's valuation estimates for morbidity benefits
- We avoid OSHA's approach for deriving a point estimate at midpoint of a range where high end of range is inappropriate and far higher than low end

Impact on OSHA's Incremental Benefit and Cost Estimates if the Agency were to Correct Some of the Errors We Identify

Suggested Change	Multiply OSHA Cost Estimate by*	Multiply OSHA Benefit Estimate by**
OSHA's cost estimate: $147 million/year		
Don't overestimate exposure reductions resulting from employer actions taken to comply with the current PEL	> 5	
Include costs for the switch to ISO/CEN	1.7	
Estimate costs on facility basis, not "per employee"	1.3	
Estimate costs for ancillary provisions more accurately	1.3	
Other	2	
Approximate Total for Costs	30	
OSHA's monetized midpoint benefit estimate: $1.2 billion/year		
#1. Assume there is no relationship between silica exposure and NMRD (other than silicosis) and ESRD		0.67
#2. Replace OSHA's wide range for the value of morbidity per case ($62 thousand to $5.1 million) for all avoided illnesses with the OSHA contractor's estimate for an avoided case of silicosis ($317,000)		0.46
#3. Lung cancer: replace OSHA's wide range of risk estimates with the point estimate from the single best exposure-response function; replace OSHA's wide range of morbidity values with a single estimate from EPA		0.86
#1 + #2 + #3. All of the above changes simultaneously.		0.10

* Individual changes to cost estimates are independent and can be multiplied together for total
** Individual changes to benefit estimates can't be multiplied to get total due to math involving ranges

Costs of Proposed Standard (Either Full or Incremental) Exceed 1% of Revenues or 10% of Profits for 15 of 19 General Industry Sectors

Sector	Full Annualized Costs; URS	Full Costs (URS) as a Percentage of Revenues	Full Costs (URS) as a Percentage of Profits
Asphalt Paving Products	$ 4,008,427	0.04%	0.59%
Asphalt Roofing Materials	$ 180,630,531	2.37%	33.29%
Concrete Products	$ 920,607,823	4.15%	190.24%
Costume Jewelry	$ 2,257,117	0.28%	7.75%
Cut Stone	$ 163,822,634	4.39%	219.99%
Fine Jewelry	$ 19,930,151	0.26%	7.25%
Flat Glass	$ 21,026,893	0.58%	25.15%
Iron Foundries	$ 1,322,820,638	12.76%	357.01%
Mineral Processing	$ 128,593,832	5.48%	274.55%
Mineral Wool	$ 86,643,151	1.42%	71.16%
Nonferrous Sand Casting Foundries	$ 515,620,777	18.05%	504.93%
Non-Sand Casting Foundries	$ 799,794,670	15.72%	439.92%
Other Ferrous Sand Casting Foundries	$ 416,113,102	10.75%	300.87%
Other Glass Products	$ 57,584,479	0.70%	30.37%
Paint and Coatings	$ 27,651,944	0.32%	7.72%
Pottery	$ 522,980,143	18.94%	2004.83%
Ready-Mix Concrete	$ 413,044,815	1.39%	63.82%
Refractories	$ 75,114,000	2.93%	310.45%
Structural Clay	$ 452,835,685	11.70%	1238.54%
TOTAL or WEIGHTED AVERAGE	**$ 6,131,080,812**	**4.34%**	**139.15%**

Better methodology is needed for OSHA's economic feasibility screening analysis:

- Costs hugely underestimated. Should judge economic feasibility based on "full" costs, not incremental
- Should use most recent data on sector revenues (2012 Economic Census)
- Should assess profitability of an industry across all firms in the industry, not only the profitable ones
- Should use combination of unbiased information on profitability at 3- and 4-digit NAICS level (CSB) and more detailed information at 6-digit level (preferably Bizminer)

Conclusions Regarding the Benefit-Cost Analysis and Economic Feasibility of the Proposed Standard in General Industry

- Incremental compliance costs will be far higher than OSHA estimated -- $4.7 billion/yr vs. $147 million/yr
- Our benefit-cost analysis reaches opposite conclusions from OSHA's:
  - Net benefits of proposed standard will be hugely negative
  - Vast majority of benefits will accrue from complete compliance with current standard/PEL; vast majority of costs will accrue from incremental requirements of proposed standard
  - OSHA badly overestimates monetized benefits: major problems in both risk estimates and monetization
- Compliance costs will exceed 1% of revenues for 13 of 19 General Industry sectors, will exceed 10% of profits for 15 of 19 sectors, and will exceed 100% of profits for 10 of them
- Proposed standard will result in significant loss of employment
- OSHA fails in estimating impacts on small businesses (SBREFA)