

# Summary of Our Conclusions

## Anticipated Compliance Costs and Economic Impacts under Potential New Regulation

Annualized Costs for Potential New Silica Regulation With PEL at 50 ug/m<sup>3</sup> and Ancillary Provisions (in millions of yr 2000 or 2009 \$/yr)

	General Industry & Maritime			Construction			TOTAL
	Engineering Controls	Shipbuilding	Ancillary Provisions	Engineering Controls	Respirators	Ancillary Provisions	
OSHA's SBREFA cost estimates from 2003	330.1	28.5	15.4	244.7	175.2	248.5	1,042.4
Corrections/adjustments to OSHA's estimates	+ 2,806.5	0	+ 27.7	+ 299.1	0	+ 200.7	+ 3,334.1
<b>Subtotal after adjustments -- total costs expressed in year 2000 dollars</b>	<b>3,136.6</b>	<b>28.5</b>	<b>43.1</b>	<b>543.8</b>	<b>175.2</b>	<b>449.2</b>	<b>4,376.5</b>
Adjust all cost estimates to convert from year 2000 dollars to year 2009 dollars.	+ 770.5	+ 7.0	+ 10.6	+ 133.6	+ 43.0	+ 110.4	+ 1,075.1
<b>TOTAL, in millions of 2009 dollars</b>	<b>3,907.1</b>	<b>35.5</b>	<b>53.7</b>	<b>677.3</b>	<b>218.3</b>	<b>559.6</b>	<b>5,451.5</b>

- \$5.5 billion/year in annualized compliance costs results in an estimated revenue loss for affected industries of \$1.1 billion/year.
- On an annual basis, a \$1.1 billion/year estimated loss in final demand for affected industries likely yields:
  - 17,354 lost jobs (or, more precisely, 17,354 lost person-years of employment) per year
  - \$3.1 billion in lost economic output (GDP) per year
  - These losses could be incurred each year the standard is in effect – so that over 10 years, there would be a loss of approximately 170,000 person-years of employment and \$30 billion of lost economic output.

## 2012 ANCILLARY PROVISION COSTS FOR UNIMIN; 20 INDUSTRIAL SAND PLANTS IN THE U.S.

DIRECT COSTS	
Ancillary Provision	Direct Costs
Medical Surveillance	\$245,000

Ancillary Provision	Direct Costs
Exposure Monitoring	\$38,000

INDIRECT COSTS					
Ancillary Provision	S&H supervisor hours per mobile van visit.	\$\$ per hour <sup>1</sup>	Cost per mobile van visit	Mobile van visits per year	Indirect Costs
Medical Surveillance	5	\$45	\$225	12	\$5,400

Ancillary Provision	S&H Supervisor hours per day of sampling.	\$\$ per hour <sup>1</sup>	Total cost per sample day	Approx. # of sampling days per year	Indirect Costs
Exposure Monitoring	4	\$45	\$180	300	\$54,000

Ancillary Provision	Indirect Costs	Direct Costs	Total Costs
Medical Surveillance	\$5,400	\$245,000	\$250,400
Exposure Monitoring	\$54,000	\$38,000	\$92,000

<b>Total Direct Costs</b>	<b>\$283,000</b>
<b>Total Indirect Costs</b>	<b>\$59,400</b>
<b>Total Costs</b>	<b>\$342,400</b>

<sup>1</sup> Based on average S&H supervisor pay (45/hour), which includes all benefits and payroll costs.

# Silicosis Prevention Resources

- <http://www.sand.org/Silica-Occupational-Health-Program>
- <http://www.msha.gov/alliances/formed/IG103.pdf>
- <http://www.cdc.gov/niosh/mining/works/coversheet1765.html>



NATIONAL  
INDUSTRIAL  
SAND  
ASSOCIATION

# OCCUPATIONAL HEALTH PROGRAM FOR EXPOSURE TO CRYSTALLINE SILICA IN THE INDUSTRIAL SAND INDUSTRY

***NATIONAL INDUSTRIAL SAND ASSOCIATION***

2011 Pennsylvania Avenue, NW • Suite 301 • Washington, DC 20006

# **A Practical Guide to an Occupational Health Program for Respirable Crystalline Silica**

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U.S. Department of Labor  
Elaine L. Chao  
Secretary

Mine Safety and Health Administration  
Assistant Secretary

Instruction Guide Series  
IG 103

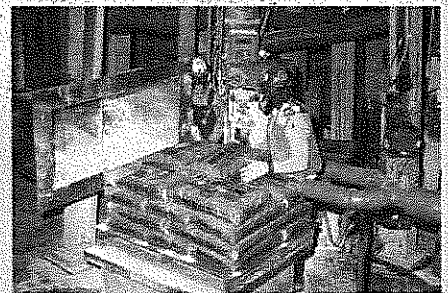
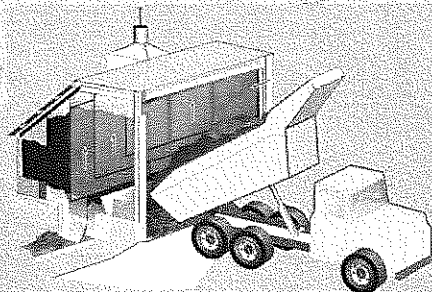
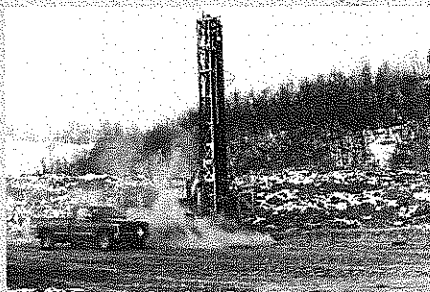
Jan 25, 2008

**A Joint Project of:**  
**The Industrial Minerals Association – North America**  
**and the**  
**Mine Safety and Health Administration**

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<http://www.msha.gov/alliances/alliances.htm>

**RI 9689**  
**REPORT OF INVESTIGATIONS/2012**

# Dust Control Handbook for Industrial Minerals Mining and Processing



Department of Health and Human Services  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health



**NIOSH**



## The Industrial Sand Worker Case-Control Study *An Evidence-Based Silica Health Effects Study*

NISA Meeting with OIRA  
March 18, 2013



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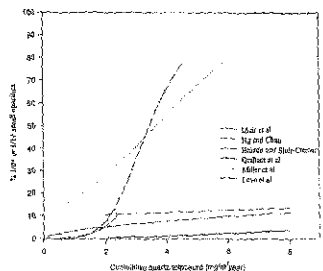
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## Disparate Exposure-Response Relationships for "Equal" Quartz Exposures



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## What's Been Missing Until Now? . . . Data

- NISA has commissioned a case-control radiological study of silicosis in industrial sand workers.
- The study is designed to illuminate the dose-response relationship between individual estimates of worker exposure to respirable crystalline silica (RCS) and changes characteristic of silicosis in periodic chest X-rays.



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### What's Been Missing Until Now? . . . Data

- The NISA study will rely on objective data rather than inference:
  - Greater than 50,000 personal samples for respirable crystalline silica, starting in the 1970s.
  - Full-shift samples.
  - All jobs, facilities, sampled:
    - Range of low to high exposures;
    - Large number of job codes ensure a wide range of exposures for analyses of exposure-response.



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### What's Been Missing Until Now? . . . Data

- The NISA study will rely on objective data rather than inference:
  - 1,670 existing/former employees with greater than 10 years service, multiple chest X-rays.
    - Comparatively good smoking histories.
  - Common data problems not present:
    - No conversion issue (mppcf → mg/m3);
    - XRD used consistently to determine quartz;
    - Limited confounding exposures.



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### Industrial Sand Worker Case-Control Study

- **Purpose** → assess exposure (cumulative and average RCS exposure) - response (chest X-ray changes consistent with silicosis) relationship.
  - Develop exposure-response curve, absolute risk estimates at cumulative and average doses.
  - Address adequacy of standards, e.g., OSHA PEL.
  - Improve on prior studies because of available data.
  - Improve on prior studies because of low exposures.
    - Avoids extrapolating high exposure outcomes.



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### Industrial Sand Worker Case-Control Study

#### – Outcome →

- Absolute risk of chest X-ray changes consistent with silicosis, for cumulative and average exposures.
- Relative risks of chest X-ray changes, for cumulative and average exposures.
- For cases, factors associated with progression.
- Creation of a exposure-response curve; evaluation of the risk of silicosis at different levels; for example, at an average exposure of 0.1 mg/m<sup>3</sup>, the risk is \_\_\_\_\_.
- Exposure-response estimates for risk and probability of progression will be compared to other published studies.



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### Industrial Sand Worker Case-Control Study

#### – Strengths →

- Actual exposure data >50,000.
  - Covering all facilities, jobs, for almost 40 years;
  - Gravimetric, for entire time;
  - XRD for quartz, for all samples with weight gain > 50 ug.
- Serial chest X-rays for all workers at facilities.
  - Average 12.75 per worker.
- Peer reviewed protocol, address methodological issues.



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