

# 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**

---



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

Mine Safety and Health Administration  
Assistant Secretary

Instruction Guide Series  
IG 103

Jan 25, 2008

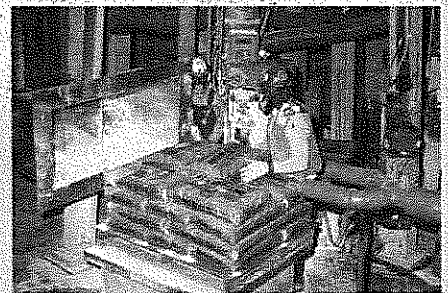
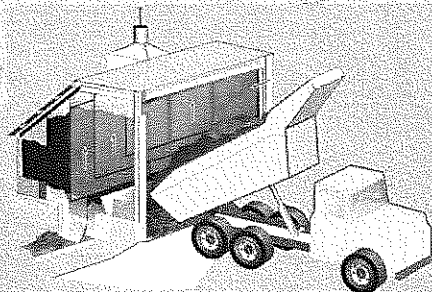
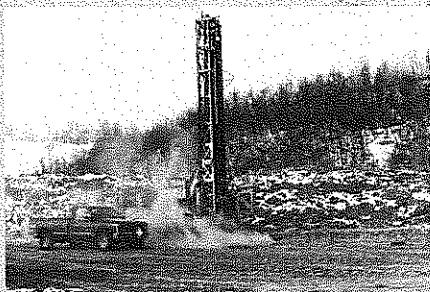
**A Joint Project of:**  
**The Industrial Minerals Association – North America**  
**and the**  
**Mine Safety and Health Administration**

This product was developed as part of the MSHA Alliance Program. It does not necessarily reflect the official views of MSHA. Use of the Alliance Program logo is reserved for MSHA and its active Alliance partners. The MSHA Alliance Program is to promote miner safety and health through voluntary partnerships, which provide training and education, outreach, technical assistance, and a national dialog on mine safety and health. For more information, contact MSHA  
<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



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

NISA Meeting with OIRA  
March 18, 2013



---

---

---

---

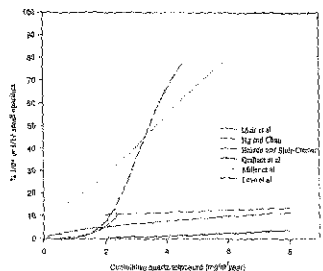
---

---

---

---

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



---

---

---

---

---

---

---

---

## 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.



---

---

---

---

---

---

---

---

### 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.



---

---

---

---

---

---

---

---

### 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.



---

---

---

---

---

---

---

---

### 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.



---

---

---

---

---

---

---

---



### 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.



---

---

---

---

---

---

---

---

### 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.



---

---

---

---

---

---

---

---