

NATIONAL STONE, SAND & GRAVEL ASSOCIATION



Natural building blocks for quality of life



NSSGA-MSHA Alliance

Core Principles of a Safety Program

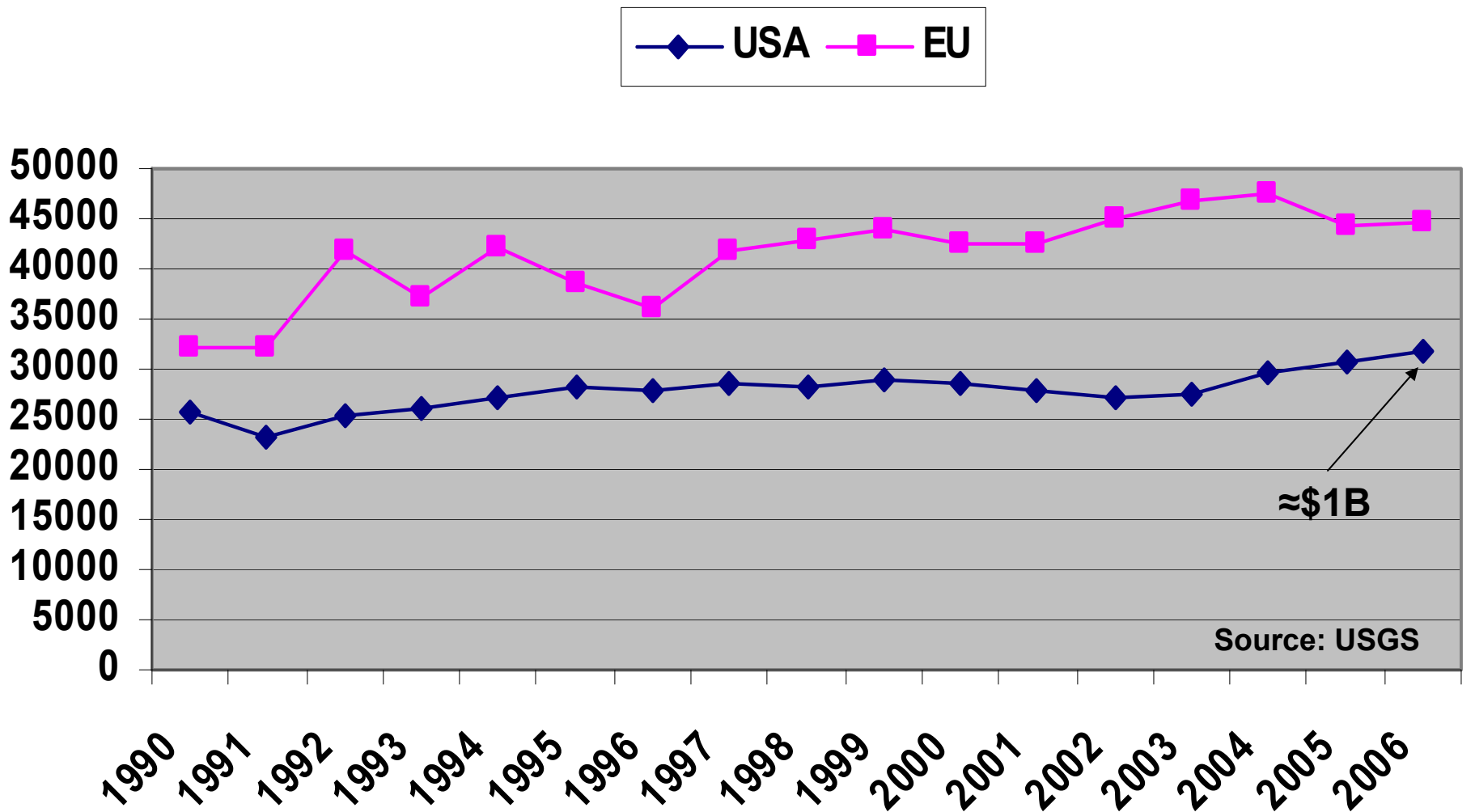
<http://www.msha.gov/alliances/formed/NSSGAAllianceCoreSafetyPrinciples.pdf>

67 pages long

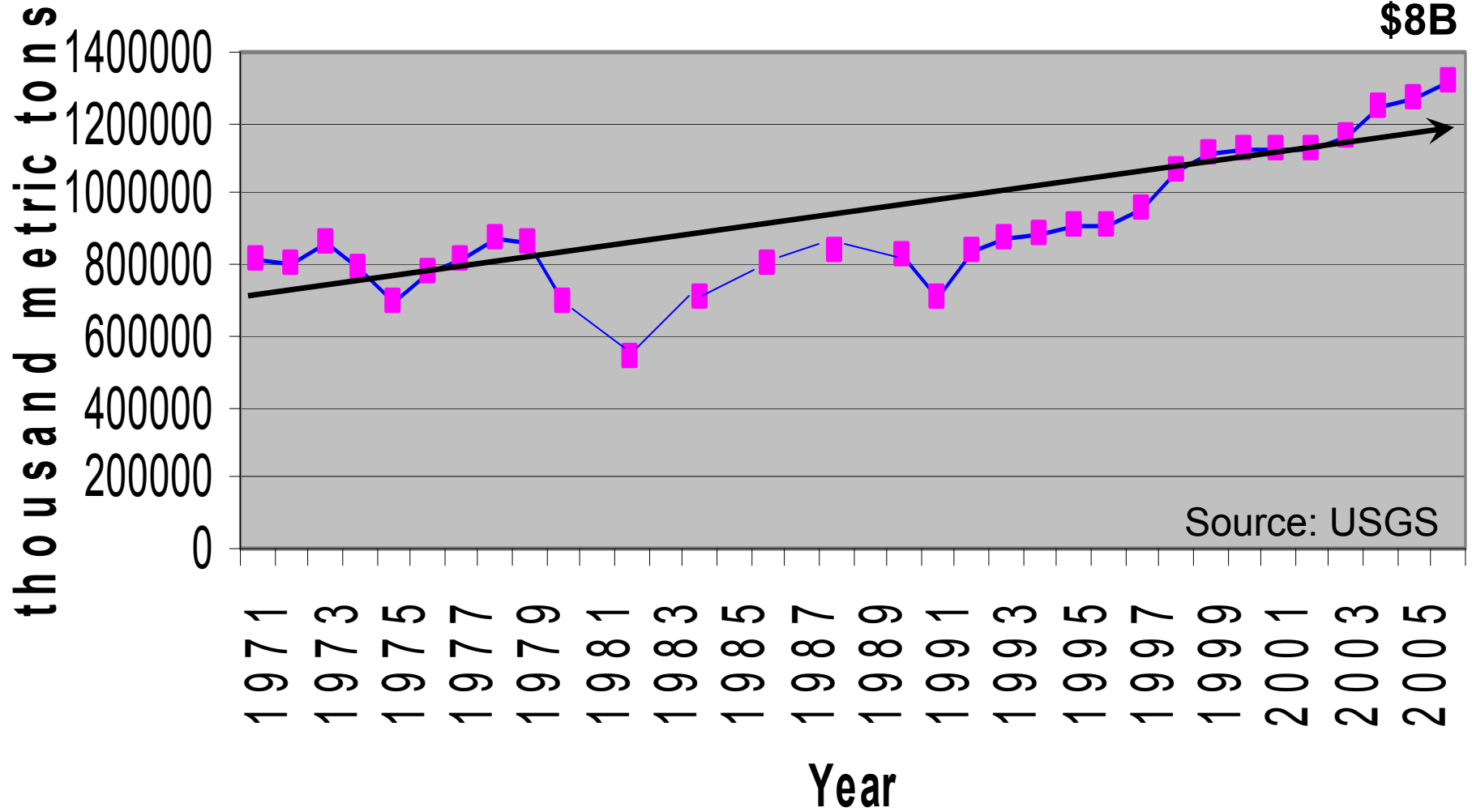
“The fundamental elements of a safety program that will help create an ideal culture in order to prevent accidents and injuries:” ...*(or illnesses)*

Silica Production

[Includes: INDUSTRIAL Sand and Gravel, Quartz Crystal, Tripoli and Special Silica (thousand metric tons)]



U.S. CONSTRUCTION S&G



Silicosis: Number of deaths, crude and age-adjusted death rates, U.S. residents age 15 and over, 1968–2004. (NIOSH)

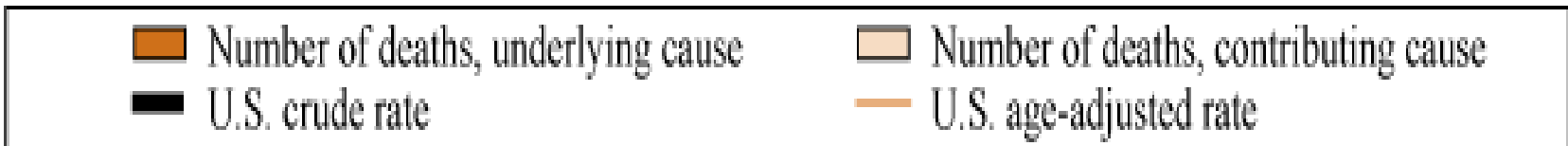
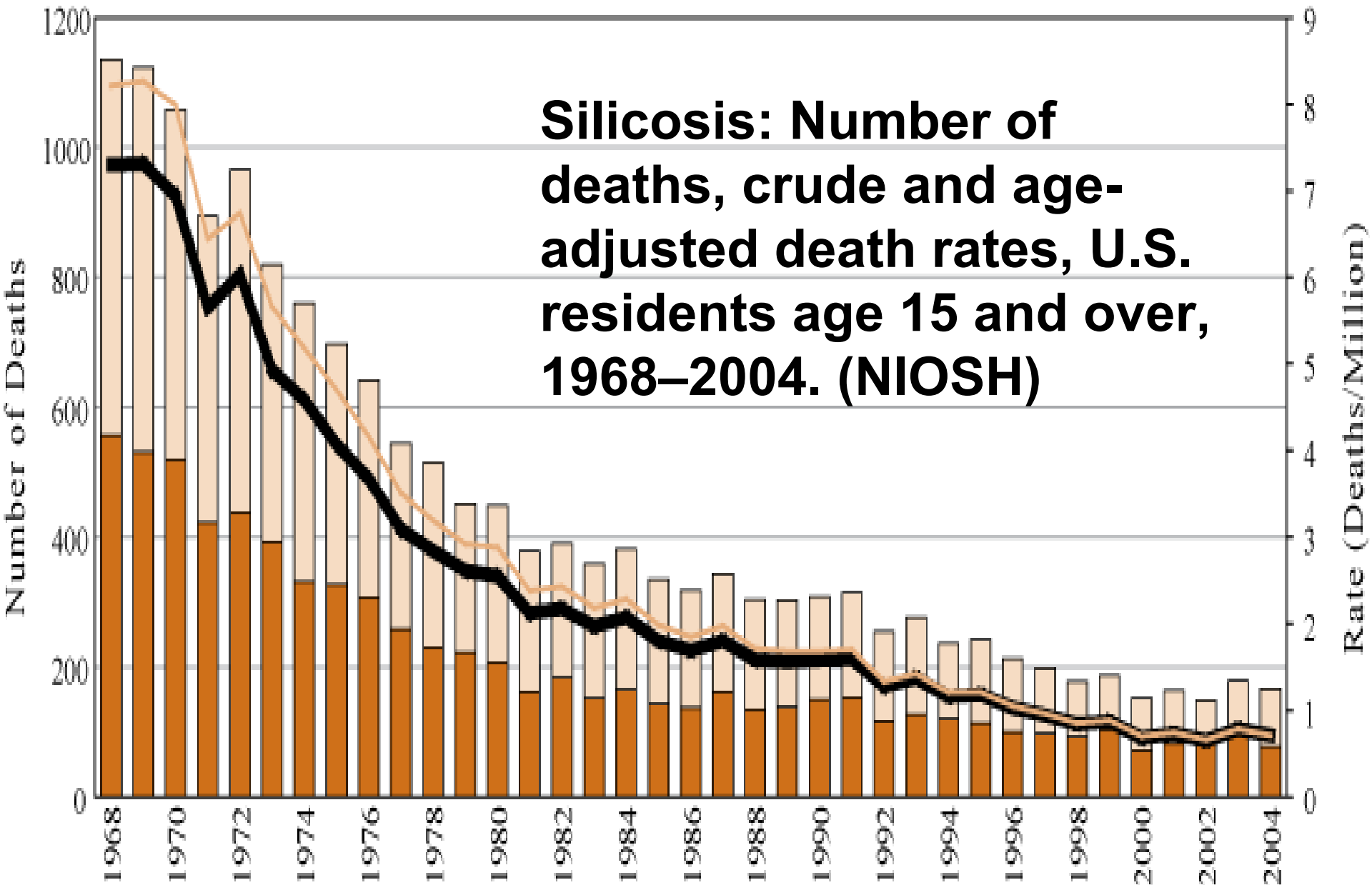
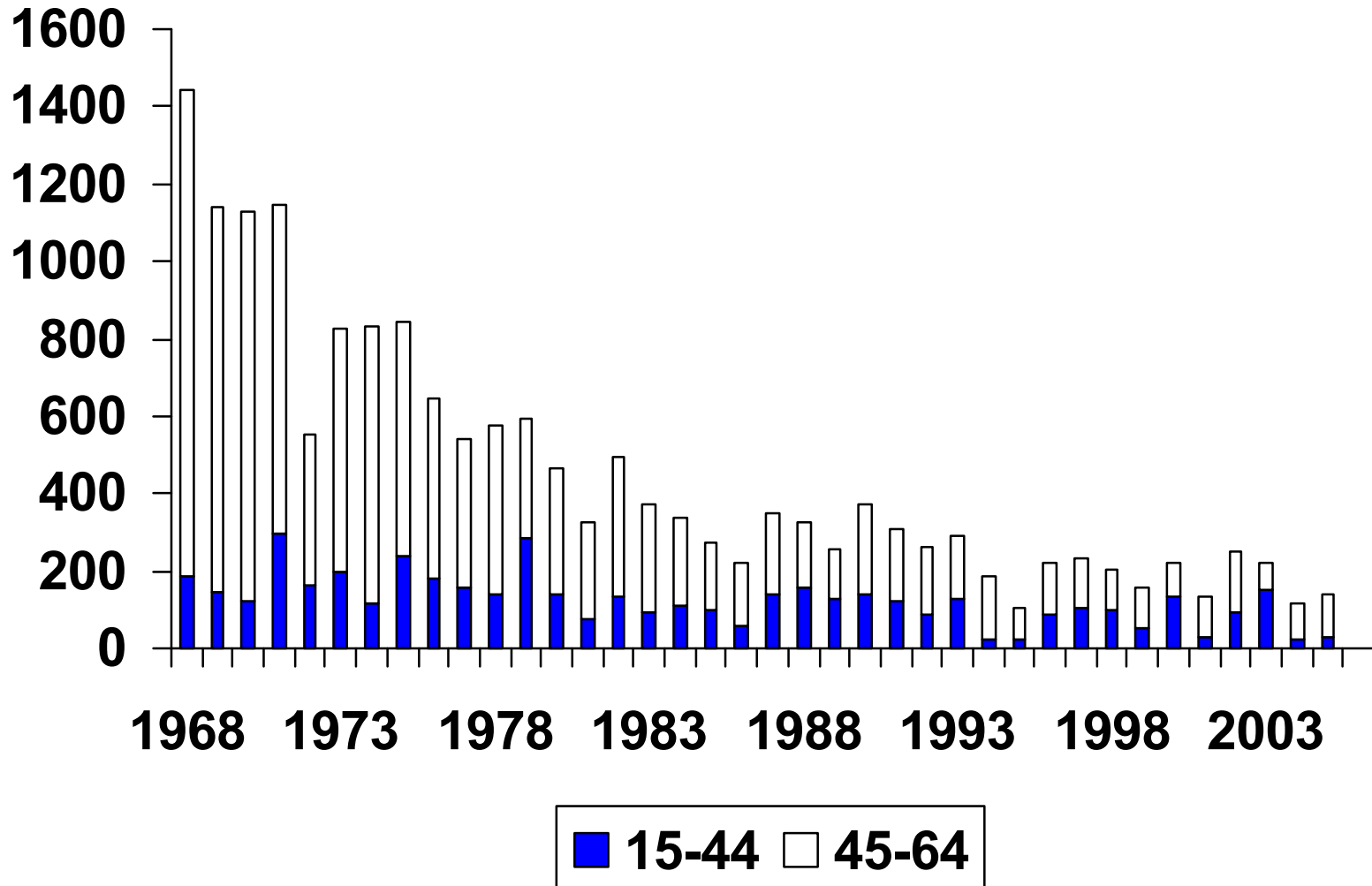
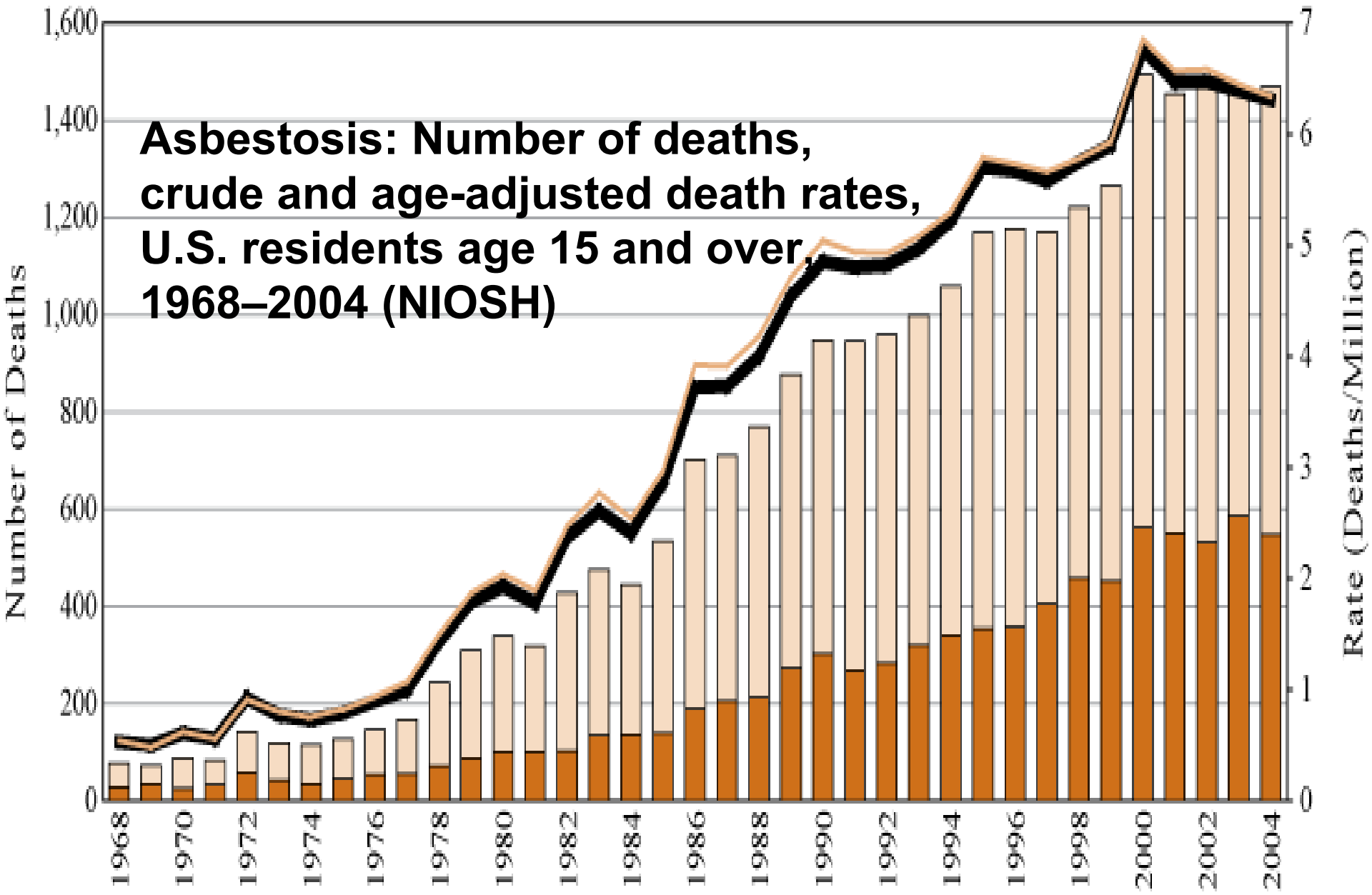


FIGURE. Years of potential life lost before age 65 years (YPLL) for decedents with silicosis as the underlying cause of death, by age at time of death and year — United States, 1968–2005 (NIOSH)



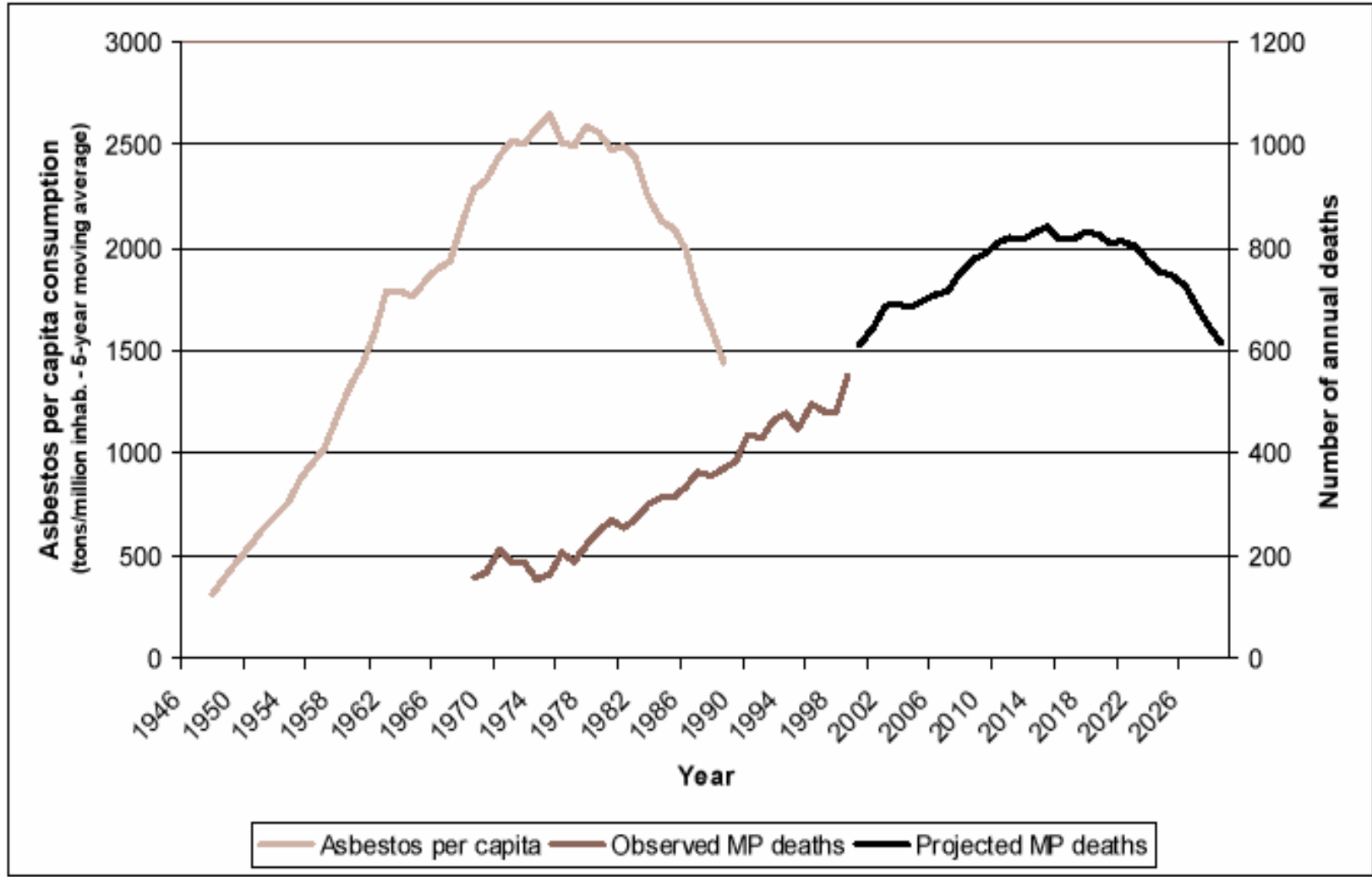
Asbestosis: Number of deaths, crude and age-adjusted death rates, U.S. residents age 15 and over, 1968–2004 (NIOSH)



Number of deaths, underlying cause
 Number of deaths, contributing cause
 U.S. crude rate
 U.S. age-adjusted rate

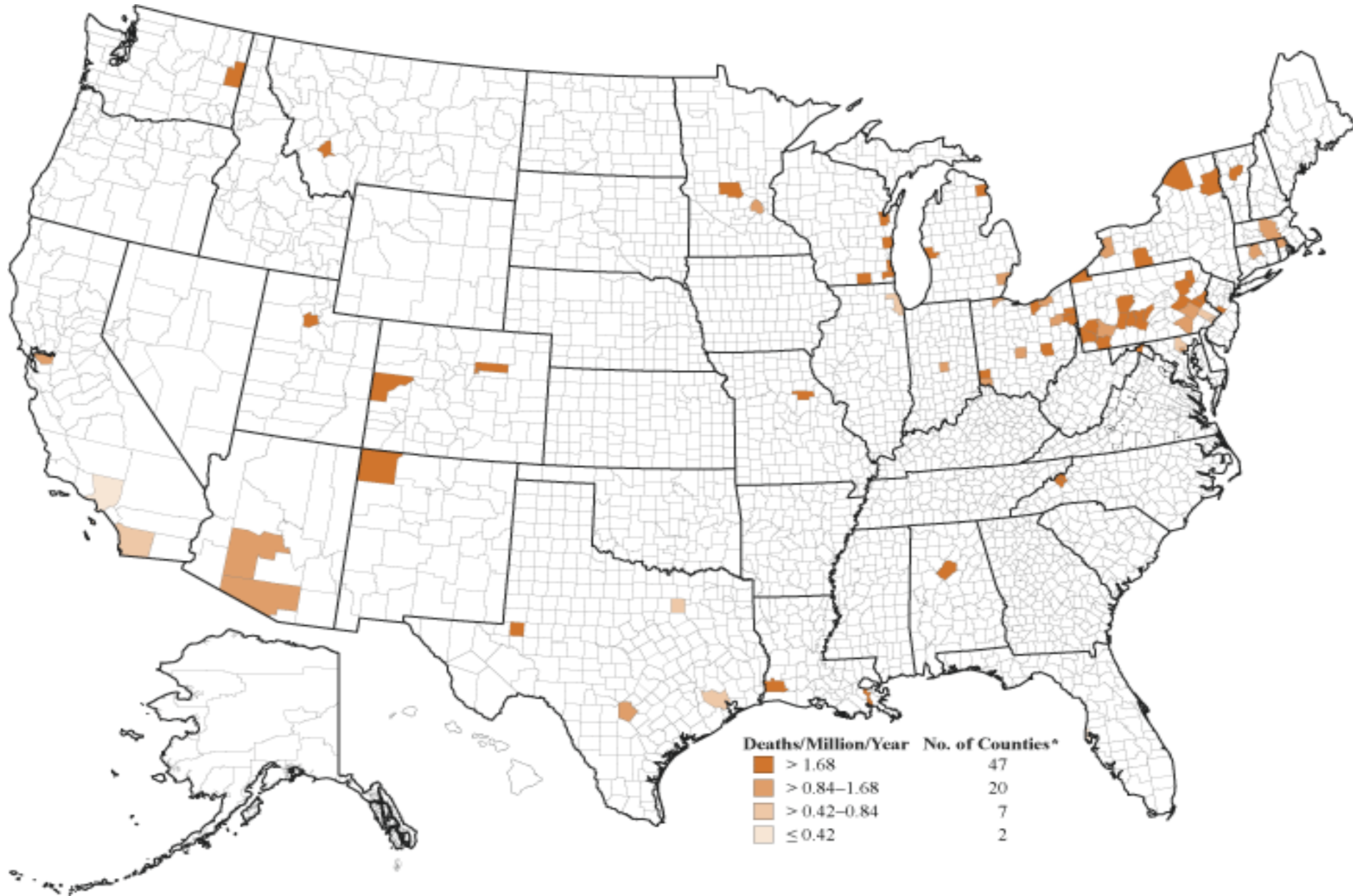
CONSUMPTION OF ASBESTOS AND SCENARIOS FOR CASES OF MESOTHELIOMA IN ITALY, Marinaccio; 2005, F. Paglietti; 2008)

Figure 2. Italian raw asbestos per capita consumption (five-year moving average - tons per 1,000,000 inhabitants), observed (1969-1999) and predicted (2000-2029) pleural mesothelioma deaths¹ (MP) among men aged 25-89 years old in Italy.



¹ Pleural mesothelioma deaths = pleural cancer deaths * 0.73.

Silicosis: Age-adjusted death rates by county, U.S. residents age 15 and over, 1995–2004 (NIOSH)



Commodities

HIGH SiO₂

- Sand & Gravel
- Granite
- Shale
- Slate
- Stone
- Sandstone
- Soapstone

LOW SiO₂

- Limestone
- Lime
- Marble
- Gypsum
- Trona
- Salt
- Potash

High Dust Jobs

(silica exposure risk)

Sandblasting-Abrasive Blasting

- Stone Cutting
- Bagging
- Cleanup & Labor Operations
- Mill Operators, incl. kilns, dryers, screens
- Crushing
- Drilling
- Load-Haul-Dumping, incl. heavy mobile equipment

Types of Silicosis

There is no overall effective treatment. Care is directed to relieving the respiratory symptoms, managing complications and preventing infections.

- **Chronic** – *relatively* low exposures with disease occurring in 10 or more years.
- **Accelerated** – *very* high exposures leading to disease developing in 5 to 10 years.
- **Acute** – *exceptionally* high exposures leading to disease within months to 4 to 5 years.

Exposure Limits

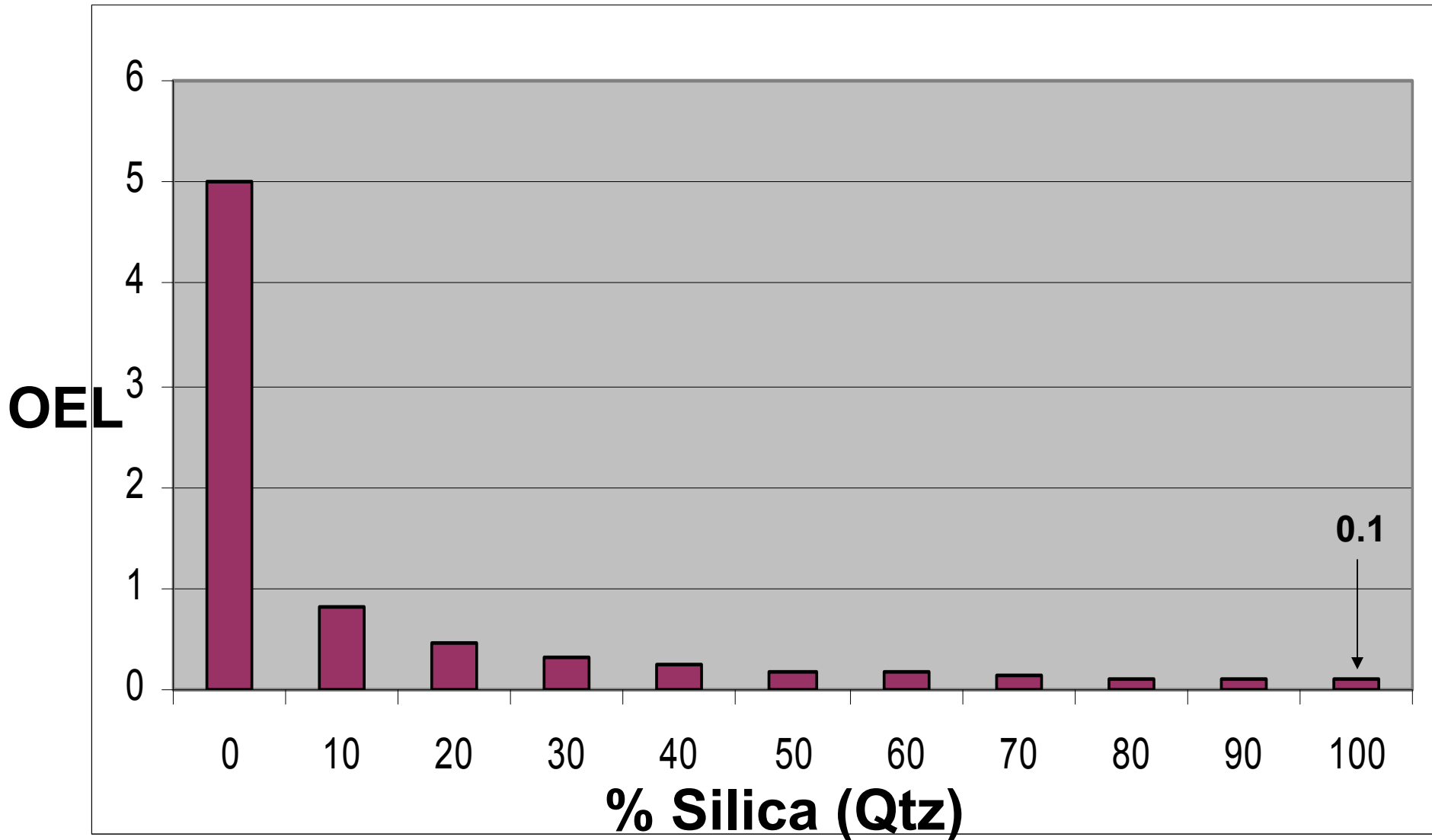
- 0.025 mg/m³ (respirable quartz fraction)
ACGIH (25 micrograms)
- 0.05 mg/m³ (respirable quartz fraction)
NIOSH (50 micrograms)
- MSHA MNM TLV formula: $10 / (\% \text{ resp. qtz} + 2)$ respirable **dust**.

$$\text{e.g., } 10/102 \approx 0.1 \text{ mg/m}^3$$

$$10/2 = 5.0 \text{ mg/m}^3$$

$$10/12 = 0.83 \text{ mg/m}^3$$

Occupational Exposure Limit-by Formula



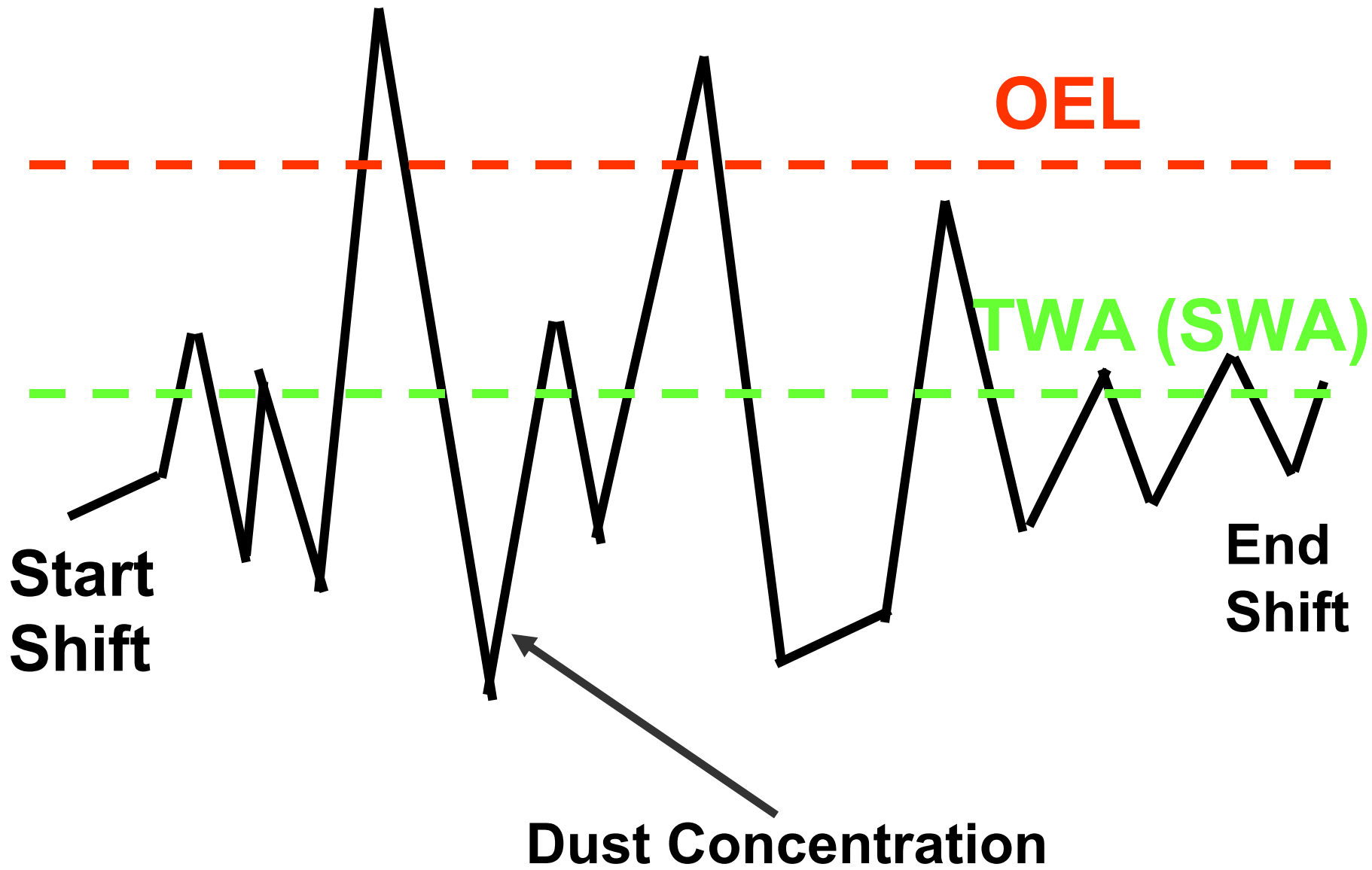
Occupational Exposure Limit (OEL) Comparison

| 8 hr TWA respirable dust conc. (mg/m ³) | % silica (XRD result) air filter. | respirable dust OEL by formula (mg/m ³) | 8 hr TWA respirable silica conc. (mg/m ³) | respirable silica OEL (mg/m ³) ** | respirable dust OEL by (MSHA) formula exceeded? | respirable silica OEL (0.1 mg/m ³) exceeded? |
|---|-----------------------------------|---|---|--|---|--|
| 0.9 | 10% | $10/(10+2)=.83$ | $(0.9 \times 0.1)=0.09$ | 0.1 (100 µg) | Yes (0.9>0.83) | No (0.09<0.1) |
| 0.9 | 20% | $10/(20+2)=.45$ | $(0.9 \times 0.2)=0.18$ | 0.1 | Yes (0.9>0.45) | Yes (0.18>0.1) |
| 1.8 | 5% | $10/(5+2)=1.43$ | $(1.8 \times 0.05)=.09$ | 0.1 | Yes (1.8>1.43) | No (0.09<0.1) |
| 9.0 * | 1% | $10/(1+2)=3.33$ | $(9.0 \times 0.01)=.09$ | 0.1 | Yes (9.0>3.33) | No (0.09<0.1) |

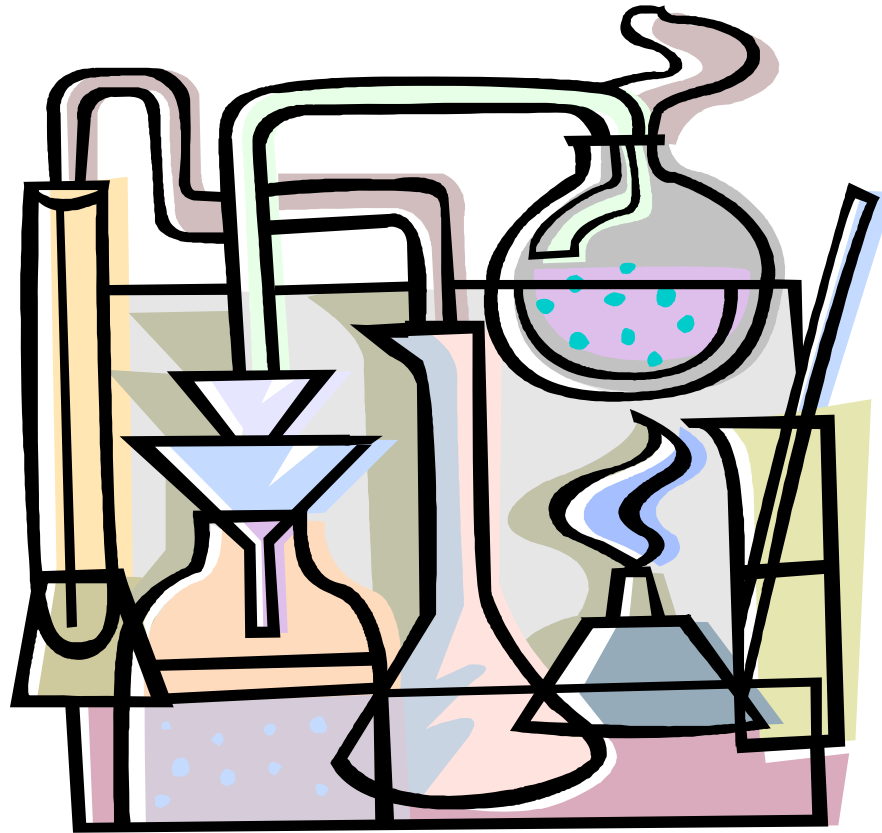
Interpreting Results

- Time Weighted Average (TWA) Based on Actual Sample Time.
- Shift Weighted Average (SWA) Based on 8 Hrs; Allows Comparison To OEL's-That Are Also Based On 8 Hrs.
- MSHA's compliance determination is ALWAYS Based on Shift Weighted Averaging a single full shift sample.

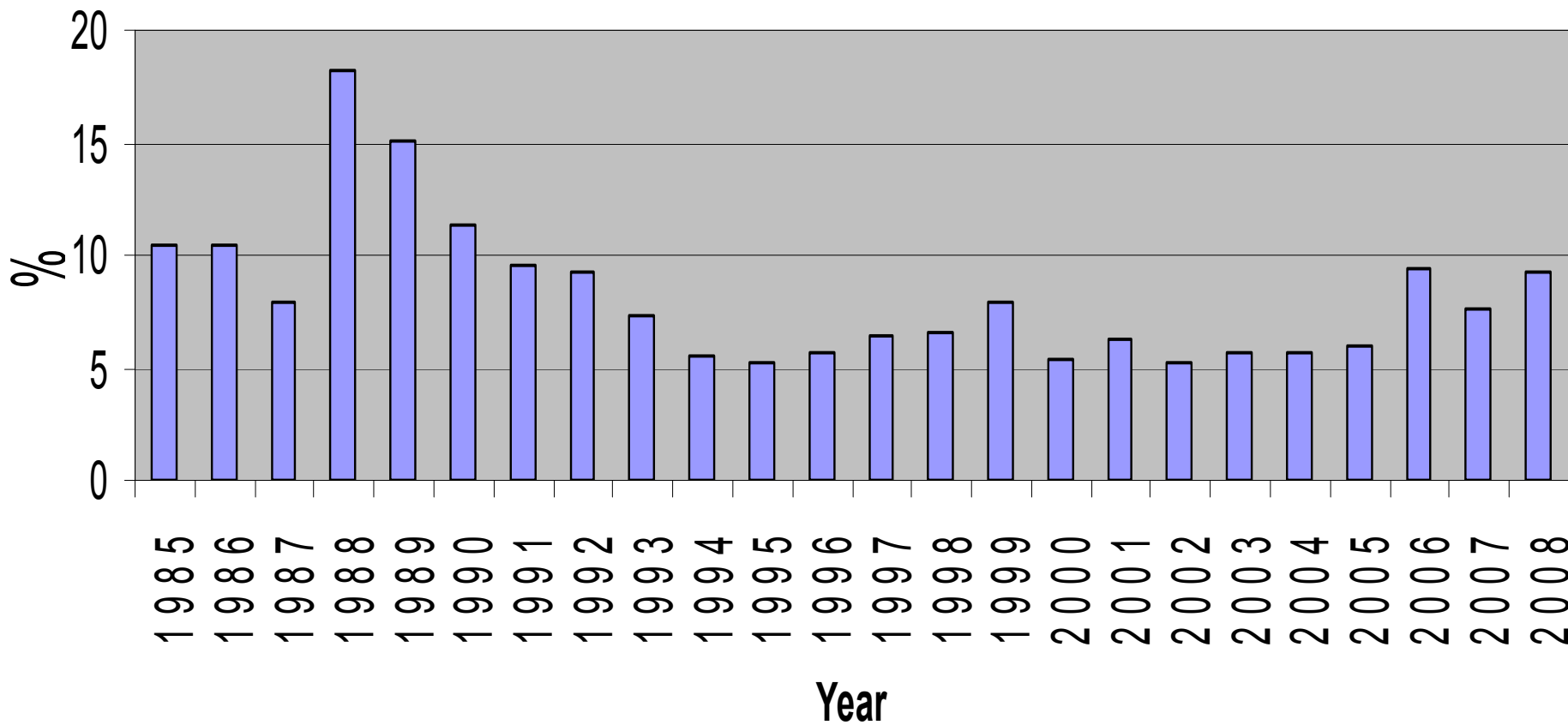
Note: Commercial Labs Report Results As TWA, NOT SWA.



Compare TWA Respirable Dust or Respirable Silica Mass Concentration to the Applicable OEL



Percent (%) of Total Metal & Nonmetal Mine Respirable (silica) Dust Samples over OEL





TIPS:



- **Sample a miner's entire work shift.**
- **It can be more difficult to achieve compliance for a longer than 8 hour shift.**
- **The closer to a 8 hour shift the more directly comparable the TWA result is to the established 8 hour OEL.**
- **The more samples you take the more reliable the average is to the actual and comparable to the 8 hr OEL.**

Noise & Dust Monitoring Course

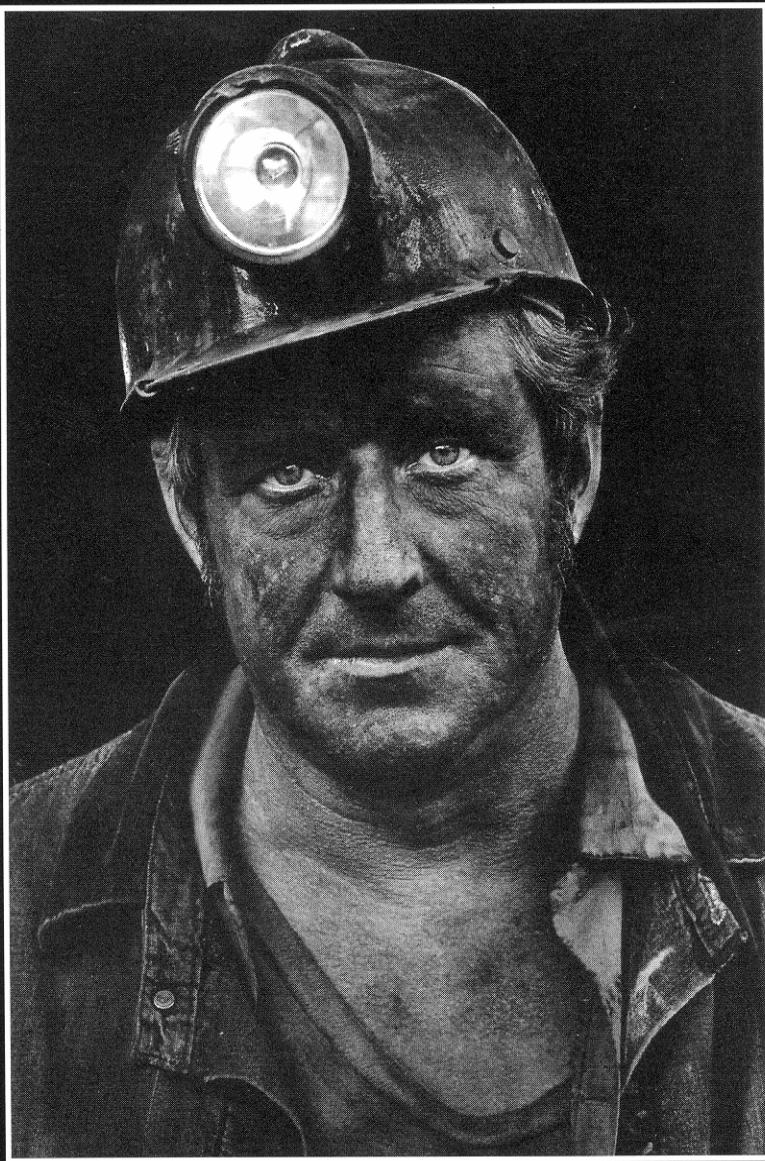


National Stone, Sand,
& Gravel Association



U.S. Department of Labor
Mine Safety and Health Administration

*In Conjunction with
State Aggregates Associations*



The Quiet Sickness

(AIHA, Earl Dotter Book of Photographs)

The Federal Mine Safety & Health Act of 1977

...the first priority
and concern of all
in the coal or the
mining industry
must be the health
and safety of its
most precious
resource –
the miner.

In Memoriam of Henry Dixon