

Atlantic Alliance 2006

Silica and Asbestos/Non-asbestos Issues

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Silica and Asbestos/Non-asbestos Issues

- Crystalline Silica
 - Introduction
 - Background and Health Effects
 - Current Regulations and Programs
 - Results of Efforts to Control Silica Exposure
 - Agency Focus on Lowering Exposure Limits
- Asbestos/Non-asbestos
 - Asbestos: Background and Health Issues
 - Nonasbestiform Minerals
 - Analytical Method Issues
- Hanson Approach to Occupational Health

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Respirable

Crystalline

SILICA

UPDATE: Silica

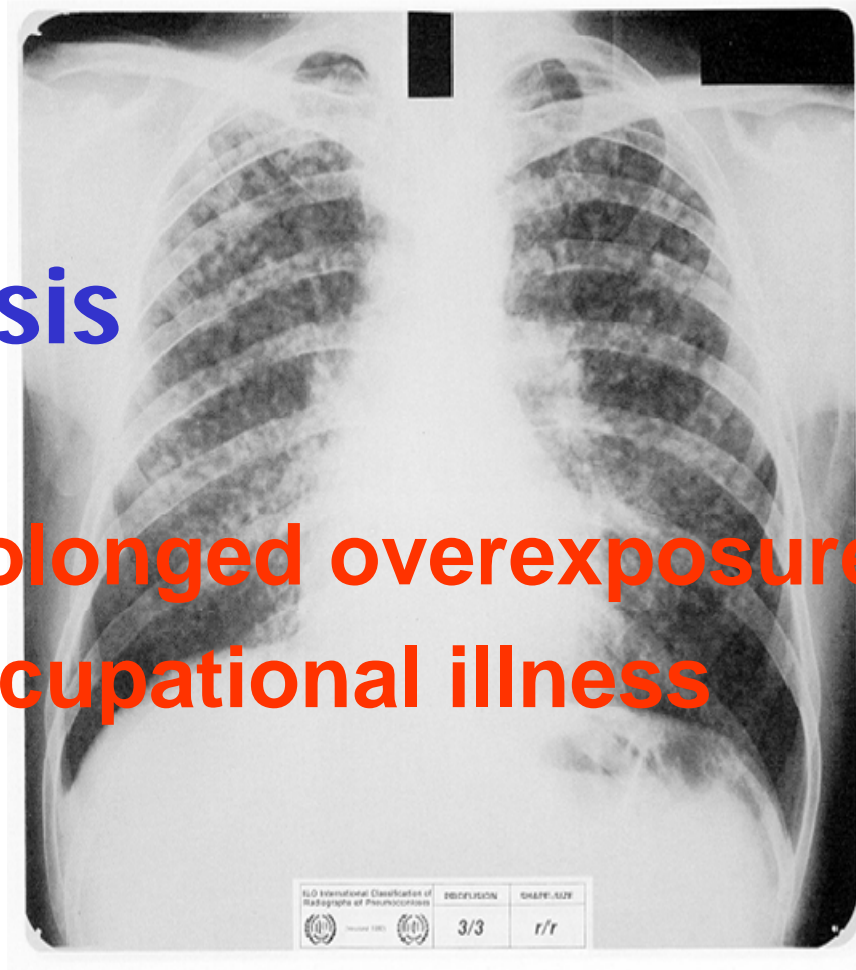
Silica: A Common Material

- Present in many minerals
 - Limestone
 - Granite
 - Sandstone
 - Shale
 - Slate
 - Sand
- Found everywhere
 - Beaches
 - Golf courses
 - Roads
 - Agriculture
- Exists in crystalline and amorphous forms

UPDATE: Silica

Silicosis

- Prolonged overexposure
- Occupational illness



UPDATE: Silica

Other Diseases Potentially Related to Crystalline Silica Exposure

- Increased Risk of Tuberculosis
- Other Associated Conditions
 - Autoimmune disorders
 - Kidney disease
- Chronic Obstructive Pulmonary Disease*
 - Bronchitis
 - Emphysema

* Smoking continues to be the main cause of COPD in the U.S.

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Natural building blocks for quality of life

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Potential Carcinogenic Effect of Silica

- IARC
 - 1987 Probable, 1996 Known
- NTP
 - 1992 Reasonably Anticipated, 2000 Known
- ACGIH
 - 1999 Suspect
- NIOSH
 - 1988 Potential
- OSHA/MSHA
 - Potential

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Regulation of Crystalline Silica

OSHA

- Occupational Safety and Health Administration
- Established in early 1970's.
- Permissible Exposure Limit
 - Dust Containing >1% Crystalline Silica
 - $10 \text{ mg/m}^3 / (\% \text{SiO}_2 + 2)$

MSHA

- Mine Safety and Health Administration
- Established in late 1970's.
- Permissible Exposure Limit
 - Same as OSHA

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Hazard Communication Program

- Ensure employees know
 - Hazards of silica overexposure
 - Measures for controlling exposure
 - How to protect themselves
- MSDS
 - Required by both OSHA and MSHA
- Labeling
 - Shipped products
 - In plant hazards

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Smoking Cessation Program

- Smoking responsible for 87% of lung cancers
- Smoking complicates diagnosis of lung diseases
- Smoking cessation provides health benefits to individuals

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Significant Reduction in Silicosis Mortality Rate

1968: 1157 deaths (8.91 deaths/million people)

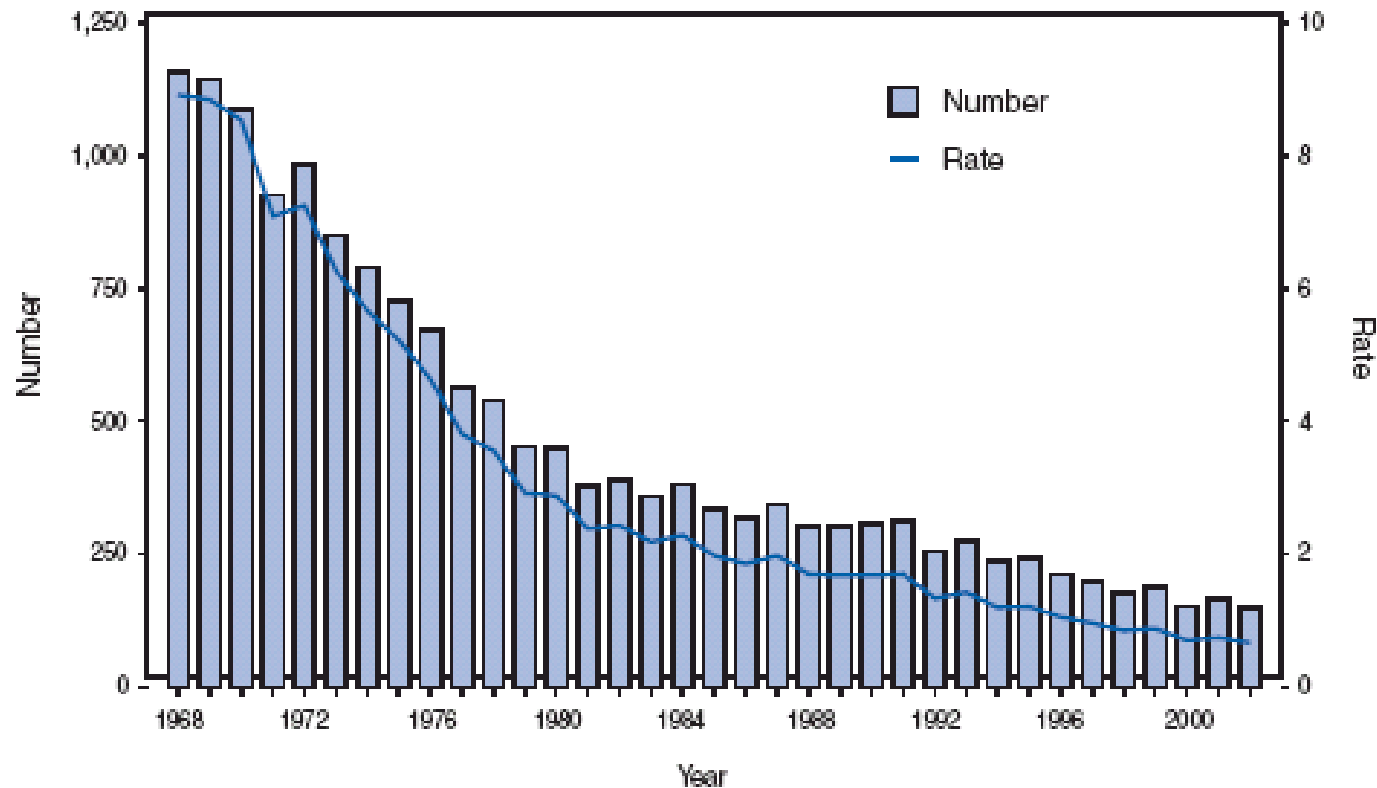
2002: 148 deaths (0.66 deaths/million people)

93 % decline in mortality rate

Deaths in early part of study before national exposure standards and industrial hygiene controls were implemented

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FIGURE 1. Number of silicosis deaths and age-adjusted mortality rate*, by year — National Occupational Respiratory Mortality System, United States, 1968–2002



* Per million persons aged ≥ 15 years.

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OSHA/MSHA Silica Sample Data

1990 - 1999

Industry	Number of Samples	GM (mg/m ³)	% > PEL
Metal mining	8,382	0.013	12.4
Miscellaneous nonmetallic mineral and stone products	391	0.041	30.2
Nonmetallic mining and quarrying, except fuel	99,529	0.008	7
Iron and steel foundries	1,766	0.047	29.3
Structural clay products	213	0.045	32.9
Blast furnaces, steelworks, rolling and finishing mills	44	0.011	2.3
Machinery, except electrical, n.e.c.	204	0.046	32.4
Construction	687	0.07	40.6
All other industries	2,562	0.026	19.9
TOTAL (excluding coal mining)	113,778	0.009	8.4
Coal mining	80,642	0.052	30.1

PEL - permissible exposure limit
GM - geometric mean
mg/m³ - milligrams per cubic meter

NIOSH 2002

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Occupational
Exposure Limits

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Current U.S. Exposure Limits and Guidelines

Agency	Exposure Limit	Averaging
OSHA	~ 0.1 mg/m ³	8-hour TWA
MSHA	~ 0.1 mg/m ³	8-hour TWA
Cal / OSHA	0.1 mg/m ³	8-hour TWA
NIOSH	0.05 mg/m ³	8-hour TWA
ACGIH	0.025 mg/m ³	8-hour TWA

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Proposed OSHA Regulation

- Published a draft proposed standard in Oct 2003.
- SBREFA review subsequently conducted.
- Awaiting publication of Risk Assessment.
- General Industry, Maritime and Construction versions.
- Listed three possible Exposure Limits:

PEL

0.1 mg/m³

0.075 mg/m³

0.05 mg/m³

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Proposed Cal/OSHA PEL Reduction

- Airborne Contaminants Advisory Committee (ACAC).
- Recommended reduction from 0.1 to 0.01 mg/m³
- Hearing in May 2005
 - controls not feasible
 - analytical methods not reliable at that level.
- Labor and Industry recommended enforcement of existing PEL.
- May be sent to Specific Substance Advisory Committee

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ACGIH TLV Reduction

- Reduced TLV from 0.05 to 0.025 mg/m³.
- ACGIH not consensus group; TLV determinations closed-door meetings.
- ACGIH currently being sued over TLV process.
- Crystalline Silica Panel of ACC submitted request to OSHA to suspend obligation to reference TLV on MSDS.
- NAM, other industry groups petitioned D.C Circuit Court to review OSHA Haz Com Standard re TLV reference.
- Legislation introduced in U.S. Congress to require guidelines referenced by OSHA to be product of a transparent development process.

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NSSGA Position

- Rigorous compliance with and enforcement of current PEL before reduction considered
- Implement medical surveillance program
- Meeting current PEL is believed to prevent silica-related disease
- Sound science **MUST** be the basis for establishing regulatory limits

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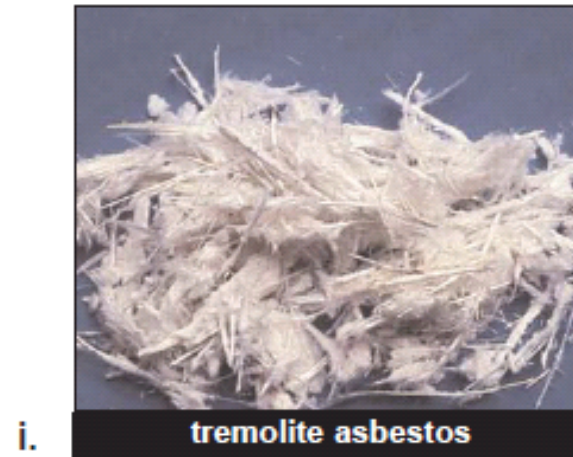
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ASBESTOS

UPDATE: Asbestos

ASBESTOS: ...variety of naturally occurring silicate minerals which have crystallized in the asbestiform habit causing them to be easily separated into long, thin, flexible, strong fibers when crushed or processed.



UPDATE: Asbestos

Health Hazards

- Long recognized as a severe health hazard
- Link between asbestos exposure and
 - Lung cancer
 - Mesothelioma
 - Other fibrogenic diseaseis well established and accepted.
- Highly regulated mineral

UPDATE: Asbestos

Current Issues

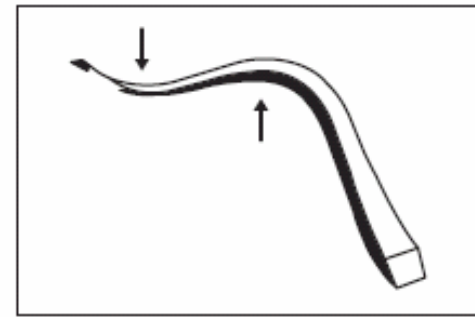
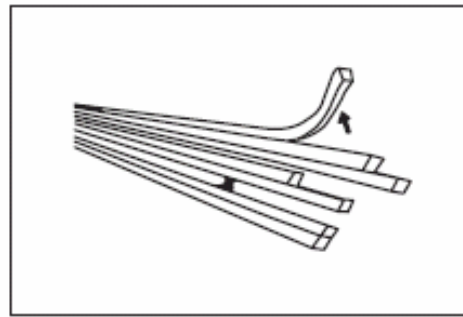
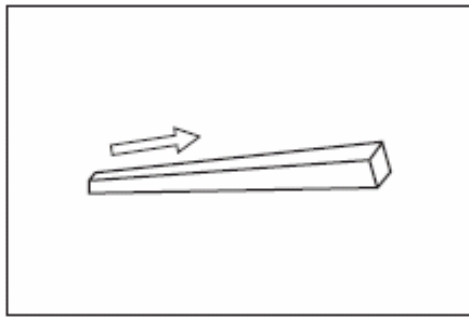
Current issues with “asbestos” are:

- What isn't asbestos
(and shouldn't be regulated as such)
- How do you identify what is asbestos
(and what isn't)

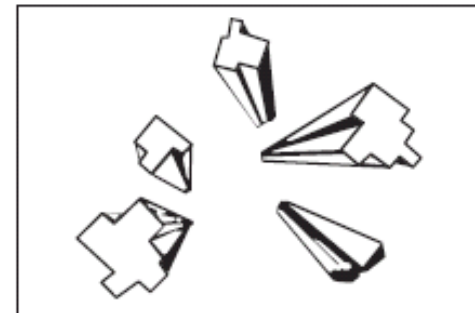
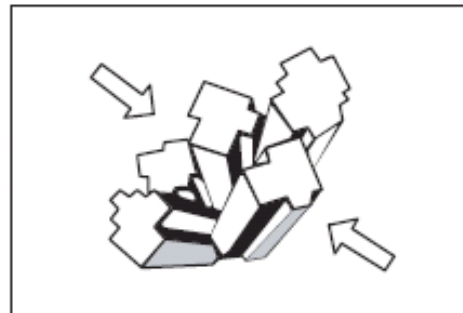
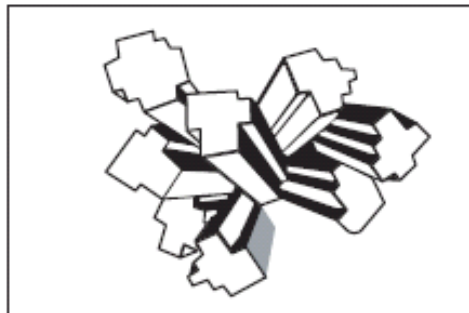
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Physical Characteristics

Asbestos



Non-Asbestiform Minerals



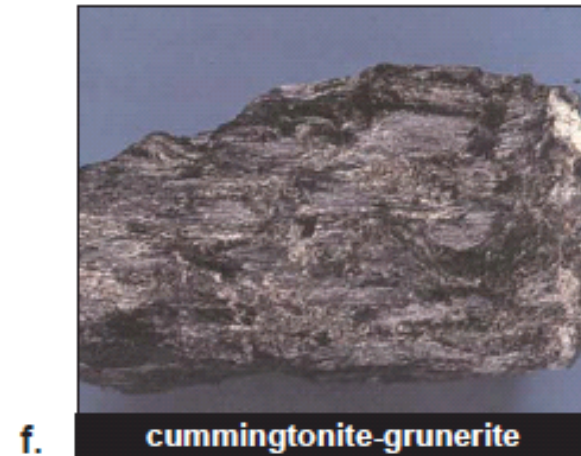
UPDATE: Asbestos

Amosite vs. Cummingtonite-grunerite

Asbestiform



Nonasbestiform



Identical chemical compositions: different habits

UPDATE: Asbestos

Tremolite asbestos vs. Tremolite

Asbestiform



i.

tremolite asbestos

Nonasbestiform



j.

tremolite

Identical chemical compositions: different habits

UPDATE: Asbestos

Analytical Methods

- Developed for use with commercial asbestos.
- Used for abatement projects (is it clean yet?).
- Commercial asbestos not “contaminated” with non-asbestiform minerals (cleavage fragments).
- Current methods are not good at differentiating between asbestiform and cleavage fragments.
- “Naturally occurring” asbestos contains both.

UPDATE: Asbestos

Why does it matter?

- No health studies to date have shown an association between non-asbestos minerals and asbestos-type health effects.
- In spite of the science, some in the regulatory community believe that non-asbestiform minerals should be regulated as asbestos.

UPDATE: Asbestos

Why does it matter?

- Non-asbestiform minerals are much more common than the asbestiform.
- Lack of acceptable methods for distinguishing between the two forms easily results in non-asbestiform minerals being falsely identified as asbestos.
- Regulation of and/or misidentification of non-asbestiform minerals as asbestos would significantly impact the mining of crushed stone, sand and gravel and the downstream users of these materials.

Hanson's approach
to an

**Occupational
Health
Program**





Hanson Industrial Hygiene

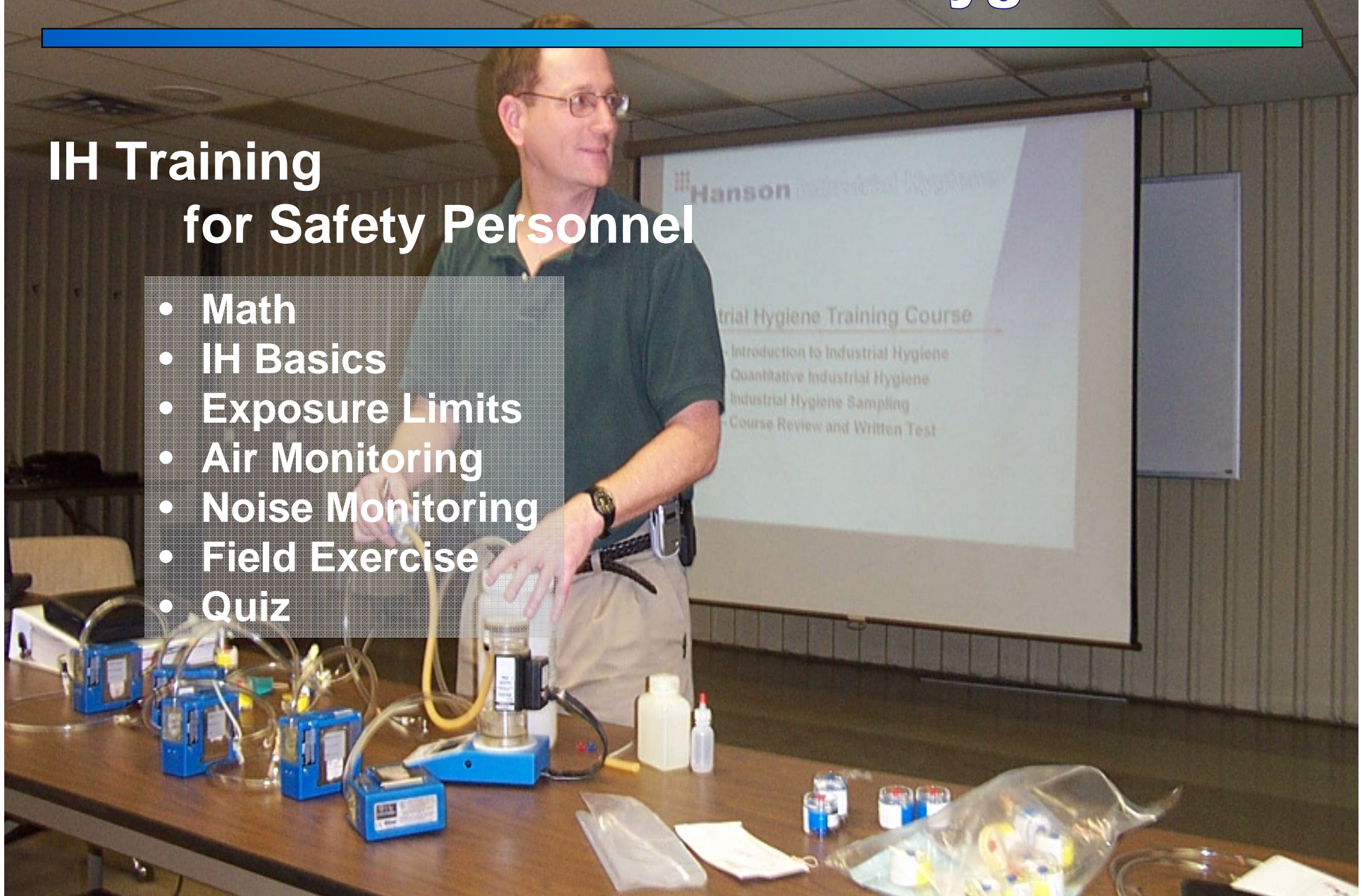
IH Training for Safety Personnel

- Math
- IH Basics
- Exposure Limits
- Air Monitoring
- Noise Monitoring
- Field Exercise
- Quiz

Hanson Industrial Hygiene

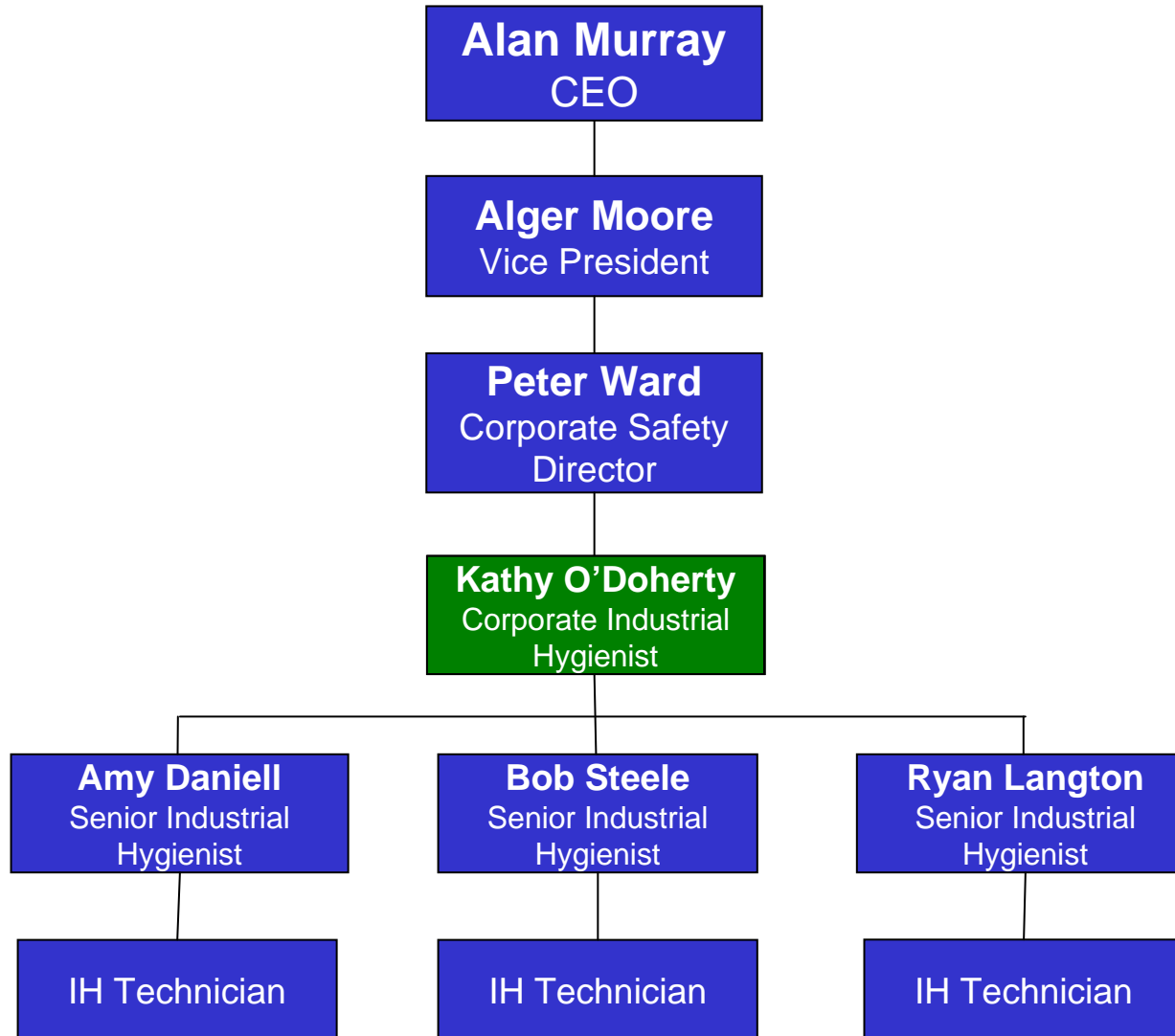
Industrial Hygiene Training Course

Introduction to Industrial Hygiene
Quantitative Industrial Hygiene
Industrial Hygiene Sampling
Course Review and Written Test





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Sound

Regulations