Asbestos Today Didn't we get rid of that stuff???

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Agenda

- 1. Background
- **2. Potential Health Effects**
- 3. Common Materials & Locations
- 4. Regulations



Asbestos Background



What is Asbestos?

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Asbestos is a silicate (mineral) that is strip mined. May 13, 2009 Lake Asbestos Mine in the Black Lake District of Thetford Mines (Quebec).

Asbestos background



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Asbestos is the name applied to six naturally occurring minerals found around the world. There are two categories:

<u>Serpentine</u>

- Chrysotile
 - Most common type in USA ~ 95%



Amphibole

- Amosite
- Crocidolite
- Tremolite
- Actinolite
- Anthophylite





Worldwide production circa 2018

- Russia ~ 1 million metric tons
- Kazakhstan ~ 201,400 tons
- China ~ 400,000 tons
- Brazil ~ 270,000 tons

Asbestos background continued



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Why were asbestos fibers added to thousands of materials over the last four to six thousand years?

- Asbestos fibers are virtually indestructible having a stronger tensile strength than steel while being very light weight. The peel vertically and get smaller. The longer the fiber the more useful it is in production.
 - The smaller the fiber the more dangerous of a health hazard it becomes. An asbestos fiber can become ~ 700 times smaller than a human hair.
- They are resistant to fire, electricity, chemicals and heat, so they are one of the best insulation materials we have. They can also be a sound barrier.
- They do not evaporate into air or dissolve in water, and they are not broken down over time.
- Because asbestos has so many useful properties, it has been used in over 3,000 different products.
 - Usually asbestos is/was mixed with other materials to create a better product.
 - Depending on the product the amount of asbestos can vary between 1% to >98%.

Asbestos Containing Materials



Many countries have banned asbestos containing building materials (ACBM). US asbestos mining industry peaked ~ 1973 ~ 803,000 tons. The federal government did not issue asbestos warnings for several years to come. The last US asbestos mine, The King City Asbestos Company in California, closed in 2002. The US has not completely banned asbestos, only certain asbestos products.

• In 2018, the US imported 750 tons of asbestos.

Canada was the largest exporter of asbestos containing materials (ACM) to the US. Canada's last asbestos mine was closed in 2011 and the country passed a nationwide ban on asbestos in 2018.

The EU banned asbestos in 2003.

The US chloralkali industry continues to import asbestos for use in chlorine production.

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The only way to actually know if a material contains asbestos is to take a sample (Asbestos Inspector) of the material to a certified lab for analysis. The most common techniques is polarized light microscopy (PLM). Asbestos is a polar material meaning using certain chemicals and light, the color of the asbestos fibers will change depending on the axis angle. Two microscopes are used in this method. The "bulk sample" is inspected under a stereoscope. Each homogeneous material is broken down by makeup. A piece of each suspect part is put on a slide with the chemicals and viewed for the color change with light microscopy. The analysist then looks at the original sample and "decides" how much of the material is asbestos by percentage.

Transmission Electron Microscopy (TEM) is another method.

Lab analysis



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Chrysotile Asbestos Fibers in Polarized Light



Asbestos containing materials are defined by percentage.

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Asbestos Potential Health Effects



Health Effects



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Normal Chest X-Ray

Asbestos fibers cannot be broken down by the body. Synergistic Effects – Smokers are 50 – 90 times more likely than a non-smoker to be diagnosed with an asbestos related disease.

Health Effects



Asbestos is thought of as primarily an inhalation hazard but some digestive conditions/diseases can occur.

Common conditions include:

- Pleural thickening
- Pleural plaques
- Pleural effusion

Common latency period (time between exposure and diagnosis) for these effects are between 5-10 years.

• Evidence suggests that cancers in the esophagus, larynx, oral cavity, stomach, colon and kidney may be caused by ingesting asbestos.

Doctors have documented asbestos related lung problems since the late 1800's. The asbestos industry covered up the negative medical research until 1964.

Asbestosis



Asbestosis is fibrotic scarring of the lungs. White blood cells attempt to attack the asbestos fibers but are ineffectual.

There is no effective treatment for asbestosis; the disease is usually disabling or fatal. The risk of asbestosis is minimal for those who do not work with asbestos; the disease is rarely caused by neighborhood or family exposure.



Common latency period is between 10 – 20 years.



Asbestos is a known carcinogen.

Lung cancer causes the largest number of deaths related to asbestos exposure. The incidence of lung cancer in people who are directly involved in the mining, milling, manufacturing and use of asbestos and its products is much higher than in the general population.

The most common symptoms of lung cancer are coughing and a change in breathing. Other symptoms include shortness of breath, persistent chest pains, hoarseness, and anemia.

The common latency period is $\sim 20 - 30$ years







Lung Cancer X-Ray



Asbestos fibers can become so small that once released into the air they can stay suspended for hours or even days increasing our chances of inhalation.

Mesothelioma



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Mesothelioma is a rare, aggressive form of cancer that most often develops in the thin membrane lining of the lungs, chest, abdomen, and (rarely) heart. About 200 cases are diagnosed each year in the United States. Virtually all cases of mesothelioma are linked with asbestos exposure.

Approximately 2 percent of all miners and textile workers who work with asbestos contract mesothelioma.



Mesothelioma





Asbestos Containing Building Materials



Asbestos I The magic mineral of the Middle Ages. Today, still a "magic" mineral, firegraat, rat-praat, and practically indestructible. When combined with partland cement it is manufactured into products which are especially important on the farm, because they provide permanent protection against fire, weather, and wear. Read this folder. Learn haw to put this magic mineral to work on your farm.





The EPA identifies ACBM into three categories for building inspection purposes:

- 1. Surfacing Materials
 - a. Spray or trowel applied
- 2. Thermal System Insulation (TSI)
 - a. ACM applied to pipes, fittings, boilers, breeching, tanks, ducts, etc., to prevent heat loss or gain.
- 3. Miscellaneous
 - a. Everything else: floor tile, mastic/adhesives, drywall/joint compound, ceiling tile, concrete & mortar, cementitious ACM (Transite), HVAC vibration dampeners, acetylene compressed gas cylinders once upon a time in Kent Micronite cigarette filters (1952-1956), automotive parts, gaskets, fire blankets, gloves, chemical counter tops, fake snow for Christmas decorations, etc...



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Since it has been used for over 1,000 years in over 3,000 products, it is much easier to say what we have not found asbestos in:

- Wood
- Metal
- Glass

Asbestos products banned in the US:

 Paper products, flooring felt, "Friable" asbestos pipe and block insulation, sprayed on coatings containing >1% asbestos, wall/joint compound, fire place decorations, filters for pharmaceutical manufacturing, and new uses of asbestos after August 24, 1989 (but that was overturned 2 years later due to political lobbying). April 2019 ban...

Materials and Locations





Materials and Locations

























Asbestos Regulations



Regulations



Congress listed asbestos as a toxic substance and passed the Clean Air Act of 1970, which identified asbestos as an air pollutant. The EPA would be established in 1971.

- Asbestos civil litigation began in the 1960's.
- 1977&1990 amendments established permissible exposure limits.

Toxic Substance Control Act (TSCA) 1976 gave the EPA the authority to designate how chemicals are developed, manufactured, distributed stored and disposed of.

Federal Hazardous Substances Act (first legislated in 1960) was amended to specifically identify ACM in everyday use.

Asbestos Information Act 1988 was to raise public awareness of asbestos dangers.

Safe Drinking water Act also included asbestos.

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Regulations EPA continued



Asbestos Hazard Emergency Response Act (AHERA) 1990

- Public, private, non-profit schools K-12th grade. Declared asbestos a national emergency. It began protecting schools and created the Model Accreditation Plan (MAP). This established the asbestos disciplines we have today:
 - Asbestos Inspector, Management Planner, Project Designer, Supervisor and Worker. O&M & Asbestos Awareness...
- Defined ACM as >1% by weight; Friable: ACM when dry may be crumbled, pulverized or reduced to powder by hand pressure; established an abatement clearance level of 0.01f/cc.

Asbestos School Hazard Abatement Reauthorization Act (ASHARA) 1990

 Reauthorized funds granted in 1984 to clean-up schools. Expanded the accreditation requirements to cover asbestos abatement projects in all public and commercial buildings in



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0.01 f/cc (PCM) is the AHERA clearance level What does that mean???

Let's assume we breath 10 liters of air per minute. (That's a lot of air but it makes the math easy.) There are 1,000 cubic centimeters in a liter of air.

How many fibers could we inhale?

I wasn't told there would be math!



How many fibers could we inhale?

10 l/m X 60 min/hour X 8 hours/day = 4,800 l/8 hr 1,000 cc/l X 4,800 l = 4,800,000 cc of air 4,800,000 X 0.01 f/cc = **48,000 fibers/day**

That is a lot of fibers...

Regulations EPA continued



Worker Protection Rule in 2000 extended worker protection requirements to state and local government employees not covered by OSHA. Most states had a version of this.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

• Established work practices to be followed during demolition and renovation activities for all structures, installation and buildings (excludes residential buildings with 4 or fewer dwellings). Requires state notifications before demolition and renovation. The DNR handles this in Wisconsin.

CERCLA Hazardous Substances and Reportable Quantities designated asbestos as a hazardous substance in the Superfund regulations.

Regulations Occupational Safety & Health Administration (OSHA)



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Construction Industry 29 CFR 1926.1101 Asbestos Standard General Industry 29 CFR 1910.1001 Asbestos Standard

- Established Permissible Exposure Limits (PEL)
 - Time weighted average (TWA) of 0.1f/cc/8 hours
 - Short term excursion limit (STEL) of 1f/cc/30 minutes
 - There are no "clearance" levels defined...
- Classes of Work (Construction Industry) and training
 - Class I Removal of TSI & surfacing ACM/PACM
 - EPA MAP 40 hour supervisor 32 hour Worker
 - Class II Removal of miscellaneous materials
 - Class III Operations and Maintenance (16 Hour) SSSD
 - Class IV Asbestos Awareness (2 Hour)

OSHA continued

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- OSHA doesn't use the term "Friable" they use "Intact" or non-friable for condition.
- Regulated areas must be demarcated when Class I, II, or III and adjacent area exceed or could exceed the PELs. Access is by "Authorized Persons" only. This maybe in a containment or during glove bagging operations. "Competent Persons" conduct the abatement.
- Initial air monitoring and Negative Initial Exposure Assessments (NIEA) required. Air sampling is conducted by an Asbestos Supervisor or CIH.
- Engineering controls, work practices and prohibitions are defined. Multi employer worksite rules.

We don't have time to cover all of the regulations here.

Work Methods & Avoiding Exposure



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- Know where asbestos is or is likely to be. If you don't know if a material is asbestos containing, assume it is positive.
- DO NOT DISTURB IT
 - NEVER: Dry sweep, use compressed air, create dust, drill, hammer, cut, saw, break, damage, move or disturb ACM/PACM.
- Safe work methods
 - Use wet methods with a surfactant (soap) for clean-up, use HEPA vacuums dedicated to asbestos use, clean-up damaged materials as soon as possible and dispose of it properly.
- If you have asbestos in your building create an Operations
 & Maintenance Plan for your facility and employees.

Remember that asbestos does not have to be removed. Abatement can include: enclosure, encapsulation, encasement, repair and of course removal.