Introduction - ASBESTOS

• WHAT IS IT?
• ASBESTOS is a fibrous material that occurs naturally in many parts of the world.

Black Lake Mine, Quebec, Canada
Asbestos is a generic term for a group of naturally occurring silicate minerals that are mined primarily in South Africa, Canada and the former Soviet Union.

Asbestos can appear in fibrous, crystal form and when crushed, separates into flexible fibers.

Asbestos is found at very low levels in the outdoor air in the USA.
3 Main Types of Asbestos

- CHrysotile – White Asbestos
- Serpentine in shape, curvy and flexible
- It accounts for over 90% of the asbestos used in the United States.
- Most common type found in asbestos containing materials (ACM) at the University.
3 Main Types of Asbestos

- **AMOSITE** – Brown Asbestos, amphibole in shape, straight and stiff
- **CROCIDOLITE** – Blue Asbestos, amphibole in shape, straight and stiff
- Three less common types: Tremolite, Actinolite and Anthophyllite
- All three are amphiboles.
- Amphiboles are considered somewhat more hazardous to health than chrysotile.
Characteristics of Asbestos

- Separate into smaller and smaller fiber bundles when disturbed or handled
- Fibers split like hairs, down the middle
- Stay in the air a long time
- Low levels are always found in the outdoor air
- No detectable odor or taste
- Resistant to heat, fire, bacteria and chemicals
- Great tensile strength and stiffness
- Excellent electrical and thermal insulator
- Very good noise insulator
- Resistant to the effects of friction
- Does not dissolve in water or evaporate
- Can be woven into cloth

Asbestos cloth
History of Asbestos

• These very characteristics made asbestos a “miracle fiber”.
• It has been used for various purposes by many different cultures, for more than 2000 years.
• It was named by the Ancient Greeks, its name meaning “inextinguishable”.
• The Romans used asbestos napkins and tablecloths.
History of Asbestos

• With the advent of the Industrial Revolution, asbestos use became widespread for insulating steam pipes, turbines, boilers, kilns, ovens and other high-temperature products.

• Asbestos was used as insulation in the U.S. as early as 1870.

Workers shoveling asbestos lagging onto a steam locomotive.
History of Asbestos

- Its real commercial use increased during the 1900’s and peaked in the period from World War II into the early 1970’s, when the health risks associated with asbestos could no longer be denied.
- Asbestos was used in the manufacture of more than 3000 products including textiles, building materials and brake linings.
- It is still used in many building/construction materials today.
History of Asbestos

- Only six categories of asbestos containing products have been banned by the federal government:
  - 1. Sprayed on surfacing, fireproofing, soundproofing, acoustical plaster in building materials
  - 2. Pipe insulation
  - 3. New uses
  - 4. Flooring felts
  - 5. Paper products used in building materials
  - 6. Joint Compound
Asbestos was even used in cigarette filters!
Health Risks of Asbestos

• The health hazards of asbestos were recorded as early as Roman times.
• Both the Greek geographer Strabo and the Roman naturalist Pliny the Elder observed the “sickness of the lungs” in the slaves that wove asbestos.
• At the turn of the twentieth century, researchers began to notice a large number of deaths and lung problems in asbestos mining towns and that asbestos workers were dying unnaturally young.
Health Risks of Asbestos

• The first diagnosis of *asbestosis*, fibrotic scarring of the lungs, was made in 1924.

• In the 1930’s, major medical journals began to publish articles that linked asbestos exposure to cancer.

• Documents reveal that manufacturers, using asbestos in their products, were aware of the health risks related to exposure to asbestos from the 1940’s and 1950’s, but chose to conceal this information from their employees.

Nellie Kershaw, the first identified asbestosis victim in 1924
Health Risks of Asbestos

• In the 1970’s, EPA and OSHA began to regulate asbestos.

• Today, workers are protected from exposure to asbestos as a result of strict regulations and enforcement. The University at Albany abides by these regulations.

• In NYS, asbestos is regulated by the NYS Dept. of Labor, Code Rule 56 for asbestos abatement and by the NYS Dept. of Environmental Conservation for asbestos disposal.
FRIABLE

- An important term used in describing the condition of asbestos is the word “friable”. A material is considered friable, if it can be reduced to powder by hand pressure when dry. This term is important when looking at the health risks of asbestos.
Health Risks of Asbestos

- Asbestos fiber bundles can split with small, fine fibers breaking away.
- If asbestos is inhaled, the body is able to resist most of the large particles, but fine fibers, too small to see, can lodge deep in the lungs.
- This can cause asbestos-related diseases.
Asbestos-Related Diseases

- **Asbestosis** - Affects breathing, leading to disability, and can cause death.
- **Lung Cancer** - Usually leads to death.
- **Mesothelioma** - Cancer of the cells that make up the lining around the outside of the lungs and inside of the ribs (pleura), or around the abdominal organs (peritoneum), leads to death.

![X-ray of a lung with Mesothelioma](image)
Asbestos fibers may gain entry into the body through inhalation and ingestion.

The most common route is through inhalation.

Asbestos fibers have no odor and those that you may inhale are invisible to the eye.
Respiratory Defenses

- **Mouth and Nose** – Filter out large particles
- **Coated Bronchi** - Filter out smaller particles
- **Cilia** – Hairlike protrusions on cells lining the airways – Move particles to the back of the mouth and dirt and mucus out of the trachea
Respiratory Defenses

• The smallest particles, in this case asbestos fibers, get trapped in the alveoli in the lower respiratory system.

• Here the fibers may be attacked by the body’s large defensive cells, known as macrophages, which try to digest them but can’t as they are minerals.
EFFECTS OF ASBESTOS

• This then leads to fibrotic scarring, which in turn causes alveoli thickening. This reduces the lungs’ elasticity and capacity to exchange oxygen with the blood and remove carbon dioxide. This can lead to asbestosis.
Exposure to asbestos is not an automatic death sentence. Many factors determine health effects and how severe they will be.

**Factors include:**
- How many fibers entered the body
- How long the exposure
- If the material was inhaled or consumed in food or drink.

Fibers enter the body through the nose and mouth by inhalation or from drinking.

**Esophagus**
Cancer can develop from swallowing asbestos fibers.

**Pleural membrane**
When scar tissue forms in the pleural membrane, the tissue is unable to expand and contract. Breathing can become painful or impossible.

**Heart**
Blood flow to the lungs can be impaired and cause the heart to enlarge or fail.

**Larynx**

**Right lung**

**Left lung**

**Bronchia**

**Alveoli**

**Diaphragm**

**Stomach**

**Intestines**
Swallowed asbestos fibers build up and may cause cancer.

Asbestos fibers in the alveoli can cause cancer and prevent exchange of oxygen and carbon dioxide between the lungs and red blood cells.
ASBESTOS FIBERS

• Thought to be most harmful in sizes greater than 5 microns in length and less than 0.5 microns in diameter
• A micron is too small to see with the naked eye. There are 25,400 microns in an inch.
• Stay in the air a long time
• OSHA’s Permissible Exposure Limit (PEL) 8 hour workday/40 hour work week Time Weighted Average (TWA) 0.1 fiber per cubic centimeter (f/cc)
• MORE THAN 10,000 PEOPLE DIE EACH YEAR IN THE UNITED STATES OF ASBESTOS-RELATED DISEASES.

• THERE IS NO CURE AT PRESENT FOR ASBESTOS-RELATED DISEASES.

• THE DELAY BETWEEN EXPOSURE AND ONSET OF DISEASE IS APPROXIMATELY 15-60 YEARS CALLED A LATENCY PERIOD.

• ALL TYPES OF ASBESTOS CAN BE DANGEROUS, IF INHALED.

• THE MORE ASBESTOS FIBERS THAT ARE INHALED, THE GREATER THE RISK TO ONE’S HEALTH. *The Dose-Response Relationship*
The DOSE-RESPONSE RELATIONSHIP

Dose-Response Curve

100%

Response

Carcinogens

All other chemical agents

Dose
SMOKING AND LUNG CANCER

• The combination of asbestos exposure and smoking greatly increases the risk of developing lung cancer.

• A person, who works with asbestos and also smokes, is likely to have a 90 times greater risk of contracting lung cancer.
Asbestos Containing Materials - ACM

- Materials commonly found to contain asbestos here at the University at Albany:
  - Floor Tiles and Mastic – 9” x 9”
  - Thermal Pipe Insulation (water, steam, and chilled water lines)
  - Glue Dabs (blackboards and baseboard)
  - Fire Doors

- Fireproofing
  - Transite Panels (fume hoods and partitions)
  - Tank Insulation
  - Acoustical Ceiling Spray (Resident Halls)
  - Roofing Felts
  - High Temperature Gaskets and Valve Packings
  - Window Glazing
  - Plus others
Asbestos Containing Materials

Fire Door

Acoustical Plaster in the Residence Halls
Asbestos Containing Materials

9” x 9” Floor Tiles and Mastic
Asbestos Containing Materials

Pipe Insulation – Muddled Joints in MER

Transite Panels in Fume Hoods
Mechanical Equipment Rooms

Danger

Asbestos
Cancer and Lung Disease Hazard
Authorized Personnel Only

Do not disturb any suspect materials including: thermal insulation on piping, fittings, valves, ducts, wall coverings, duct sealant or canvas connections.

Contact Environmental Health and Safety at 442-3495 if work in this room requires any materials to be disturbed.

Sign found on MERs on Campus
HOW CAN YOU TELL IF A MATERIAL CONTAINS ASBESTOS?

- You can only positively confirm a material contains asbestos through testing by a certified laboratory.
- You can take either a bulk sample or an air sample.
HOW CAN YOU TELL IF A MATERIAL CONTAINS ASBESTOS?

- You can consider a material asbestos containing from:
  - Previous knowledge
  - The material itself (9”x 9” floor tiles)
  - Previous testing results
  - Asking your supervisor
  - Asking the EH&S Office

BE SAFE - ASSUME THE WORST - ALWAYS ASK BEFORE DISTURBING THE MATERIAL.
WHEN IS ASBESTOS A RISK TO HEALTH?

- CONSIDER THE TYPE OF PRODUCT
- HOW WELL IS THE ASBESTOS BONDED INTO IT?
- IS IT LIKELY TO CONTAIN A SMALL OR LARGE AMOUNT OF ASBESTOS?

And, consider the condition;

- GOOD? E.G. SEALED, PAINTED.
- DAMAGED? FRIABLE? EXTENT OF DAMAGE
REMEMBER

• ASBESTOS CAN ONLY HARM YOU, IF IT CAN BECOME AIRBORNE.

• IF IT IS INTACT, FOR EXAMPLE, A FLOOR TILE OR A SEALED JOINT ON A PIPE, IT WILL NOT HURT YOU.
REPORTING SUSPECT MATERIALS

• IF YOU SEE SUSPECT, DAMAGED MATERIAL, IMMEDIATELY REPORT THIS TO YOUR SUPERVISOR.

• IN THE MEANTIME, DO NOT DISTURB THE MATERIAL AND KEEP OTHERS AWAY!

• ALWAYS ASK FIRST, BEFORE DISTURBING ANY SUSPECT MATERIAL!

DAMAGED PIPE INSULATION
The University at Albany has had two thorough inspections of its campuses for asbestos.

The Office of Environmental Health and Safety maintains these inspection records.

The EH&S Office also maintains the University’s asbestos removal license and the records for the University’s certified asbestos supervisors and handlers.

Inspector taking a bulk sample of pipe insulation to test for asbestos.
The Office of Environmental Health and Safety keeps all the testing results for both bulk and air samples taken here at the University.

We also keep records of any asbestos abatement projects done on the campuses and all asbestos waste disposal records.
ASBESTOS AWARENESS

• ANY QUESTIONS?
• Presented by the Office of Environmental Health and Safety in Chemistry B73
• 2008