

# Asbestos — Mold

Hazardous Air Pollutant vs. Indoor Air Pollutant



Nature does not behave according to any laws.  
Laws are human inventions that approximately  
describe the observed regularities.

Renn Zaphiropoulos

We spend much of our time here at summer camp to avoid indoor water pollution (water intrusion, condensation, water vapor, and its symptom—mold).

This session is to help you avoid problems with asbestos as you solve indoor water pollution problems.

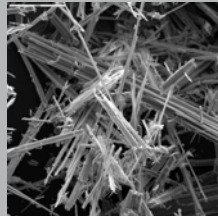
## What is Asbestos?

- Natural Mineral (Rock)





Asbestos deposits are found throughout the world. The primary commercial production sites are Canada, Russia, and South Africa.



Asbestos deposits throughout the US.

## What is Mold?

- Mold is a fungus
- Fungi are absorptive, filamentous or single celled, non-photosynthetic, eukaryotic organisms.
- Mold (mould) refers to microfungi having a downy, well-marked mycelium or spore mass.
- Mildew is a staining of materials caused by fungi or bacteria.

Source: EMSL Analytical, Inc.



This is not dog "do".  
They aren't shiitake mushrooms either.

## Fungi/Mold can be a beautiful thing



Photos compliments of Steve Axford

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## White House Mold



There are no good fungi/mold to grow indoors!

## Mold is Everywhere

- Outdoors
  - On leaves
  - On plants
  - In soil
- Indoors
  - On food
  - Food
  - On/near supply grilles
  - Refrigerator gaskets
  - Showers/tubs
  - Ice machines
- Biblical references to mold in homes
- Farmer & animal exposures from feed
- Mold is nature's recycler
- Fungi/Mold is one of the 5 kingdoms of life



Fungi/Mold About 1/3<sup>rd</sup> of earth's biomass

## Kingdoms of Life

- Monera (10,000 species) Unicellular & colonial
- Protista (250,000 species) Protozoans & algae
- Fungi (100,000 species) **MOLD**
- Plantae (250,000 species)
- Animalia (1,000,000 species)

## Asbestos/Mold Similarities

- ✦ Natural
- ✦ Pollutants
- ✦ On or in our building materials
- ✦ We don't want to breath or swallow them

## Asbestos Properties

- Heat Resistant
- Electrical Resistant
- Sound absorbing
- Tensile Strength
- Chemical Resistant
- Abundant world-wide
- Inexpensive to produce

A material that an engineer can love.

## Asbestos Applications

### Asbestos-cement products

- architectural panels and facings
- extruded products
- pipes and ducts
- pipe fittings and couplings
- sheets / corrugated
- sheets / flat - flexible
- sheets / flat - rigid
- shingles / roofing
- shingles / siding

### Papers and felts

- backing for sheet flooring (polymeric bonded)
- cooling tower papers (inorganic bonded and coated)
- electrical papers and tapes (resin saturated)
- laminated papers (resin bonded)
- pipe line felts (bitumen saturated)
- protective metal sheets (metal bonded and enamel coated)
- roofing felts (bitumen saturated)
- underlayment felt

### Packings and gaskets

- valve packings
- dynamic gaskets
- static gaskets

### Coatings and paints

- premixed underbody coating
- texturized paints
- sprayed plastic coatings (in resinous binder)

### Paper-boards

- thermal insulators
- electric insulators

### Friction materials

- brake linings (for road and railway vehicles)
- clutch facings
- friction materials for industrial use

## Asbestos Applications (continued)

### Textiles

- yarns
- packings
- fabrics
- belts
- sealing flanges
- casing
- protective clothing

### Miscellaneous

- compensators
- catalytic filters
- filters for industrial uses
- evaporators
- diaphragms for electrolysis
- fillers for acetylene cylinders
- bituminous compounds (various asphalt products)

### Tiles

- asphalt tile
- vinyl tile
- tile adhesives

### Adhesives

- various resin systems



### Vermiculite – some products contained asbestos



### Examples of Uses of Asbestos



Sprayed-on fireproofing material



Sheet vinyl containing asbestos

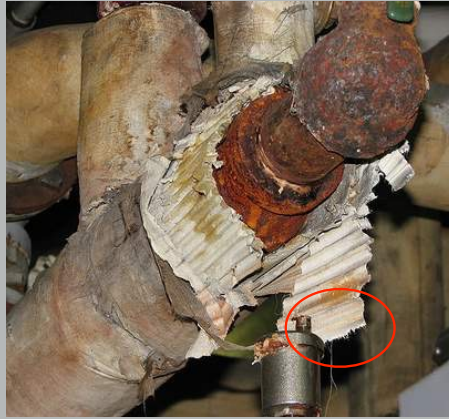


Plaster ceiling



Vinyl asbestos flooring

### Damaged asbestos pipe insulation



### Asbestos Mill Board



## Asbestos in gaskets and fabric



Asbestos fabric in HVAC system



## Asbestos Ceiling Tile



You can't tell by looking.

### Asbestos in joint compound and plaster



Joint compound (or mud)



Plaster (can be hard or soft)

### Asbestos shingles and siding



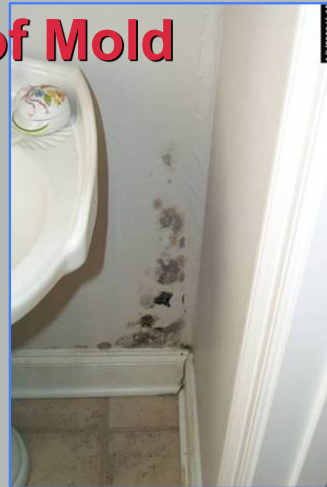
## Glazing compound



## Examples of Mold



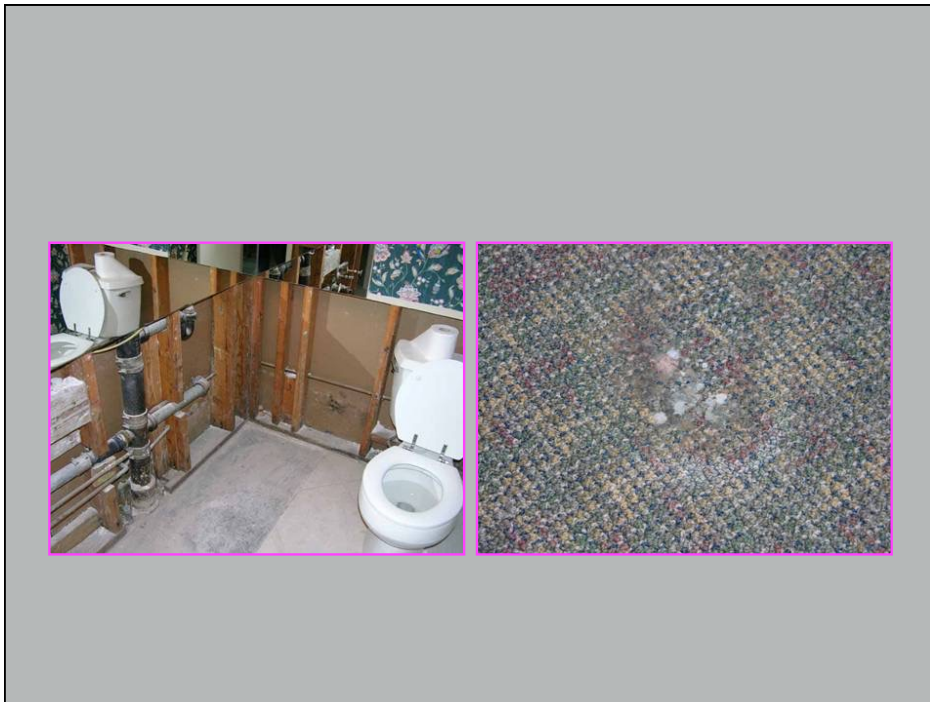
Pink splotches or measles on wall coverings



Mold feeding on sheetrock paper









There are no good fungi to grow indoors.

## Asbestos

- First known use: 2,500 B.C. pottery and hut insulation
  - Greeks spun and used in cloth
  - Used for wicks in sacred lamps
  - Pottery
- Charlemagne (European Emperor – Middle Ages- Around 800 AD) - had a tablecloth woven from asbestos. He would bet his dinner guests that they couldn't burn it.
- 1971 Asbestos listed as a hazardous air pollutant



## EPA – NESHAP

### National Emissions Standards for Hazardous Air Pollutants (NESHAPS)

- NESHAPS is designed to prevent "visible emissions" of asbestos when buildings are renovated or demolished.
- This law applies to state and local government, private businesses, etc.

## EPA – NESHAP

- Inspection Requirement Before Disturbance (Renovation/Demolition)
  - Accredited Inspector
- Trained Person On Site
  - Similar to OSHA Competent Person; Must be Trained on NESHAP Requirements
- Notify EPA 10 days in advance



# Mold

- Mentioned in the Bible in the book of Leviticus
- No federal regulations

## Fungi/Mold—Possible Health Effects

- Infection
- Allergy, asthma
- Irritation
- Flu-like symptoms from odors (VOCs)
  - Headache, dizziness, nausea



*Check with your physician.*

### Toxic mold blamed for horse deaths

[John Sullivan](#)

Posted on January 17, 2003

LAFAYETTE - State agriculture officials Thursday warned veterinarians to be on the alert for possible toxic mold poisoning of horses.

Commissioner of Agriculture and Forestry Bob Odom said the mold, known as fumonisin, is apparently responsible for the deaths of three horses that were originally thought to have been victims of the West Nile virus during the spring outbreak in 2002.

The mold can produce symptoms that mimic those caused by the West Nile virus, he said, making a diagnosis more difficult.

## Asbestos-related Diseases

Asbestosis

Mesothelioma

Lung Cancer

Other cancers

Symptoms take 10 to 40 years to develop (latency period)

Health effects from exposure continue to progress even after exposure is stopped.

## “King of Cool” - Steve McQueen



- Died of Mesothelioma in 1980 at the Age of 50
- Exposed to Asbestos from Work/Hobbies
  - Brake Pads on Cars
  - Construction Work
  - Ship Work

## Asbestos/Mold Differences

- ✧ We meant to put asbestos into the building
- ✧ Asbestos is an excellent engineering material
- ✧ Asbestos won't return (on its own)
- ✧ Asbestos is defined as a hazardous air pollutant (US Federal)
- ✧ Asbestos is regulated (US Federal)

# Asbestos Abatement & Mold Remediation

- ✦ Abatement and remediation mean the same thing
- ✦ Remove the materials w/o exposing the worker, occupants, or remainder of the structure
- ✦ Think white glove clean

## Before you repair/renovate—Check for asbestos (and other hazardous materials)!

HVAC	
Boilers, furnaces, & fireplaces	
Boiler & HVAC duct insulation	
Ductwork flexible fabric connections	
Flooring	
Vinyl floor tile	
Vinyl sheet or Linoleum flooring	
Asphalt tile	
Floor leveler/filler	
Mastic/glue (floor tile, carpet, etc.)	

Electrical
Electrical panels
Electrical wiring insulation
Heating and electrical ducts/conduit
Pipe and other insulation
Aircell (corrugated cardboard)
Millboard
Preform
Joint compound
Spray applied/blow-in insulation
Block

## Check (continued)

Surfacing materials	Ceiling materials
Acoustical plaster	Ceiling tiles (fixed or lay-in)
Decorative plaster	Ceiling tile adhesives
Textured paints & coatings	<b>Miscellaneous</b>
Spray-applied materials	Taping, joint, and mud
<b>Cementitious materials (transite)</b>	Caulking/putties/glazing
Cementitious pipes (flues & vents)	Fire curtains and blankets
Cementitious wallboard or siding	Fireproofing materials/Fire doors
Pegboard	Laboratory hoods & table tops
	Gaskets
	Roofing felts and mastics

Don't forget about mercury, lead, or pcbs.

## Before remediating mold—stop the water source



## Mold—Stop the water source



**It makes no sense to mitigate mold unless you stop the water**

## Define mitigation scope

### Contract documents

- Drawings—Plans (work to be done)
  1. Ingress/egress
  2. AFD exhaust
  3. Details
- Technical Specifications
- General conditions
- Agreement and forms

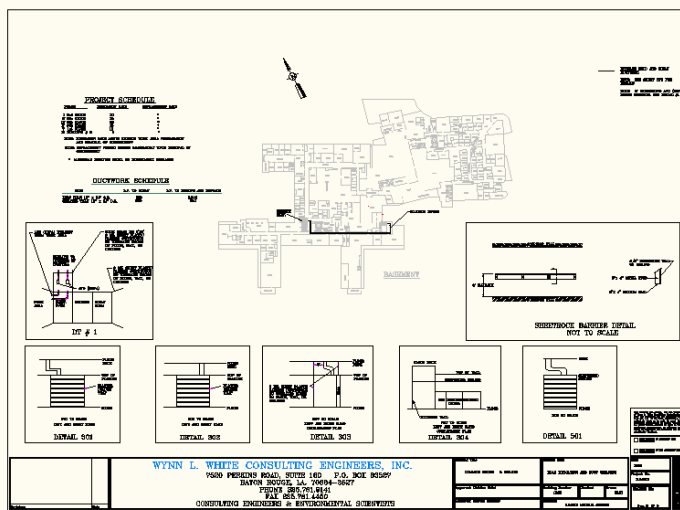
### Protocol

- Comparable to technical specifications

Confine emissions (dust).

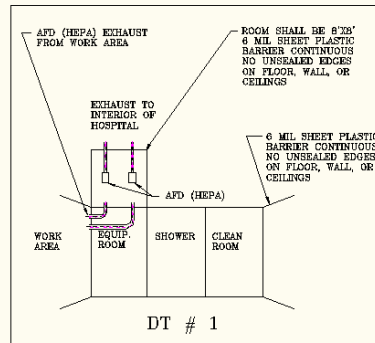
Protect yourselves and those around you.

Get the job done.





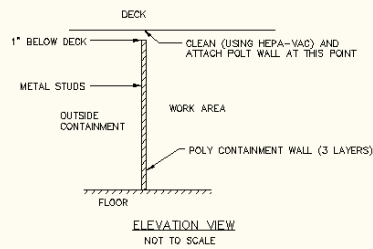
Control work area air flow  
(air should leak into the work area, not out)






When you exhaust HEPA filtered AFDs to the interior.

.02" (water) pressure differential  
and  
4 air changes per hour

Connecting containment when the ceiling is contaminated



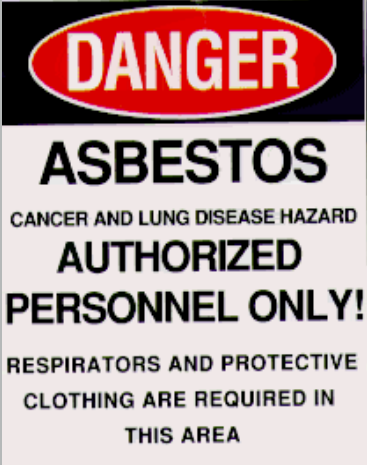
CONTAINMENT DETAIL:  
CONSTRUCT POLY CONTAINMENT WALL TO APPROXIMATELY 1" BELOW THE DECK. CLEAN (USING A HEPA-VAC) A 6" WIDE AREA AND ATTACH THE POLY CONTAINMENT WALL TO THE DECK.  
AFD'S (W/HEPA) RUNNING WHILE DOING THE MITIGATION AND CLEANING.



Containment Area

Photo B: Full containment on large job

Contain work area  
Confine dust/debris to the work area



**DANGER**

**ASBESTOS**

CANCER AND LUNG DISEASE HAZARD

**AUTHORIZED  
PERSONNEL ONLY!**

RESPIRATORS AND PROTECTIVE  
CLOTHING ARE REQUIRED IN  
THIS AREA

## Asbestos Limits in the Air

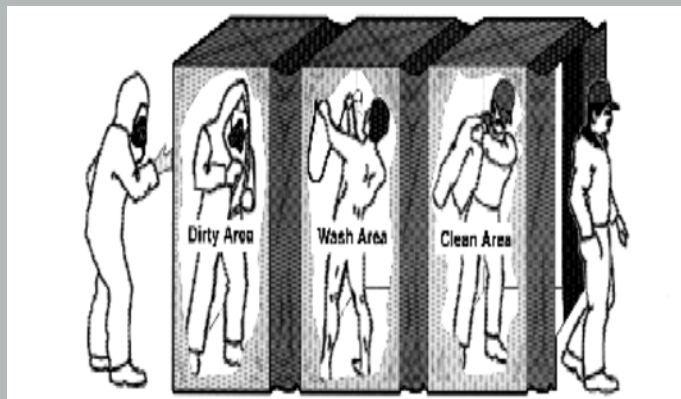


Air monitoring equipment on a worker

### Asbestos Permissible Exposure Limits (PEL)

- 0.1 fibers per cubic centimeter of air (0.1 f/cc) 8-hour time weighted average
- 1.0 f/cc 30-minute short-term exposure limit

Asbestos in the air at these levels would be invisible to the naked eye.



Decontamination Unit  
(Required for asbestos abatement)



Clean  
Up

Distilled (white) vinegar and borax  
are effective disinfectants and  
cleaners

A person in a white protective suit and respirator mask is shown from the side, leaning over and cleaning a surface with a brush. The background is a blue wall with a white electrical outlet. The text "Clean Up" is written in white on a blue background to the right of the image. Below the image, the text "Distilled (white) vinegar and borax are effective disinfectants and cleaners" is written in yellow.



Get clean!

## Similarities

- ✦ Selective demolition required
- ✦ Containment required
- ✦ Differential pressure required
- ✦ Super duper cleanup required (think white glove clean)

## Clearance Issues

Asbestos: Regulated 70 s/mm<sup>2</sup> AHERA (schools)

Asbestos: Standard Practice .01 f/cc

Mold: Unregulated

## Differences

- Asbestos Containing Materials (ACM)
  1. ACM worked wet!
  2. Won't return on its own (discounting disgruntled employees or enemies)
  3. Doesn't grow (but can be spread through stupidity/ignorance)
  4. Regulated
    - A. Clearance levels 70 s/mm<sup>2</sup>, schools (.01 f/cc others)
    - B. Exposure levels (.1 f/cc OSHA PEL)
- Mold
  5. No federal standards (other than OSHA General Duty Clause)
  6. Clearance—depends upon the consultant



## Cautions

- ✦ ACM
  - ✦ Can be hidden in walls/ceilings (where were radiators? sinks?)
- ✦ Mold
  - ✦ Can be hidden
    - ✦ Where wet (now or in the past)?
    - ✦ Where stains?
  - ✦ Beware dishonesty (painted after dried? dry now—mold can be inside/hidden)

## Cautions

- ✧ Remove all (manage your clients' expectations)?
- ✧ Hidden ACM? Mold?
- ✧ What about that on outside of sheathing? Between slab and sill plate?
- ✧ You can do the best mold remediation on the planet and have it return—if the building doesn't manage moisture properly.

## What do you do here?



Risk Tolerance



## Cautions

- ✦ HEPA AFDs (negative air machines)
  - ✦ small capture radius
  - ✦ “washing” air a slow process
  - ✦ for protection at exhaust (not much of assistance during cleanup)
  - ✦ simply provides a negative pressure differential and fresh air exchanges

## Cautions

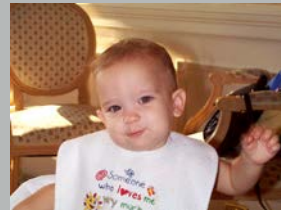
- ✦ **Miracle fog systems**
- ✦ **Heat kill**
- ✦ **Chemical kill**
  
- ✦ **Clean it up, get it dry, keep it dry.**

You gotta kill the skunk—  
spraying a deodorant won't solve the problem!

- ✦ Mold isn't the cause of the problem—it's the symptom.
- ✦ Cure the moisture problem!
  
- ✦ If you had a question, but were afraid to ask, email me or write it on the back of your card and hand it to me after the session.



## Leave a lasting legacy



We use simple science to solve complex problems.