Steps to Healthier Homes

KEEP IT CLEAN

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

Learning Objectives

Page 5.1

List three contaminants or allergens that are frequently found in house dust and their health effects.

Describe three ways allergens or contaminants get into house dust.

Identify three strategies to reduce them.

Why is clean and easily cleanable important?

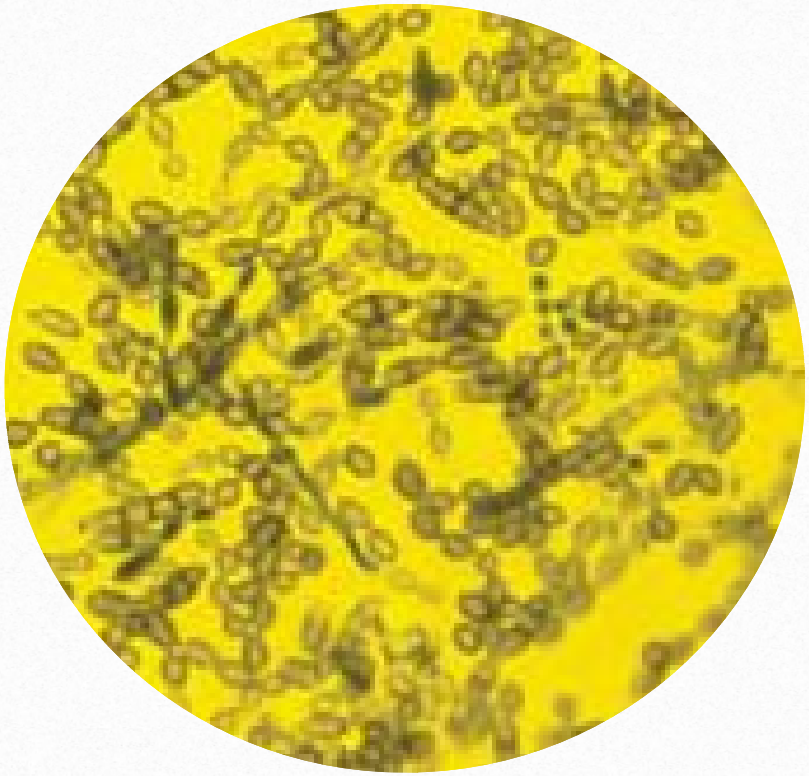
Page 5.1

- Reduce exposure to:
  - Chemical contaminants
  - Allergens
  - Pest droppings and urine
  - Pesticides
  - Heavy metals such as lead and arsenic
- Reduced harborage for pests

Environmental Allergens

Page 5.2

- Animals
- Dust Mites
- Molds
- Tree Pollen
- Grass Pollen
- Weed Pollen
- Latex
- Foods
- Stinging Insects
- Medications



Page 5.2

Dust mites in humid and dry buildings

Page 5.2

Dust mite control

- Keep humidity at or below 50%
- Wash bedding
- Use mattress and pillow encasements
- Freeze soft toys and small items
- If possible, replace carpets with hard surfaces, and remove draperies and upholstery

Where does house dust come from?

Page 5.3

Brought-In

Home-Grown

- Lead Dust
- Dust Mites

Resident-Made

- Garbage
- Clutter

Page 5.3

Brought In Dust

- Four Steps to Reduce
  - Hard Surface Walkways
  - Outside Grate-Like Mat
  - Inside Carpet Pad
  - Hard Surface Floor

Page 5.3

Shoes Off – Less Dust Enters

Page 5.3

Healthy Cleaning

Page 5.4

Don't dry dust or dry sweep

Vacuuming:

- Low-emission vacuum with beater bar
- Very slowly (or use vacuum with dirt finder)

Wet cleaning:

- Use "elbow grease"
- Frequently change water

Make buildings more cleanable

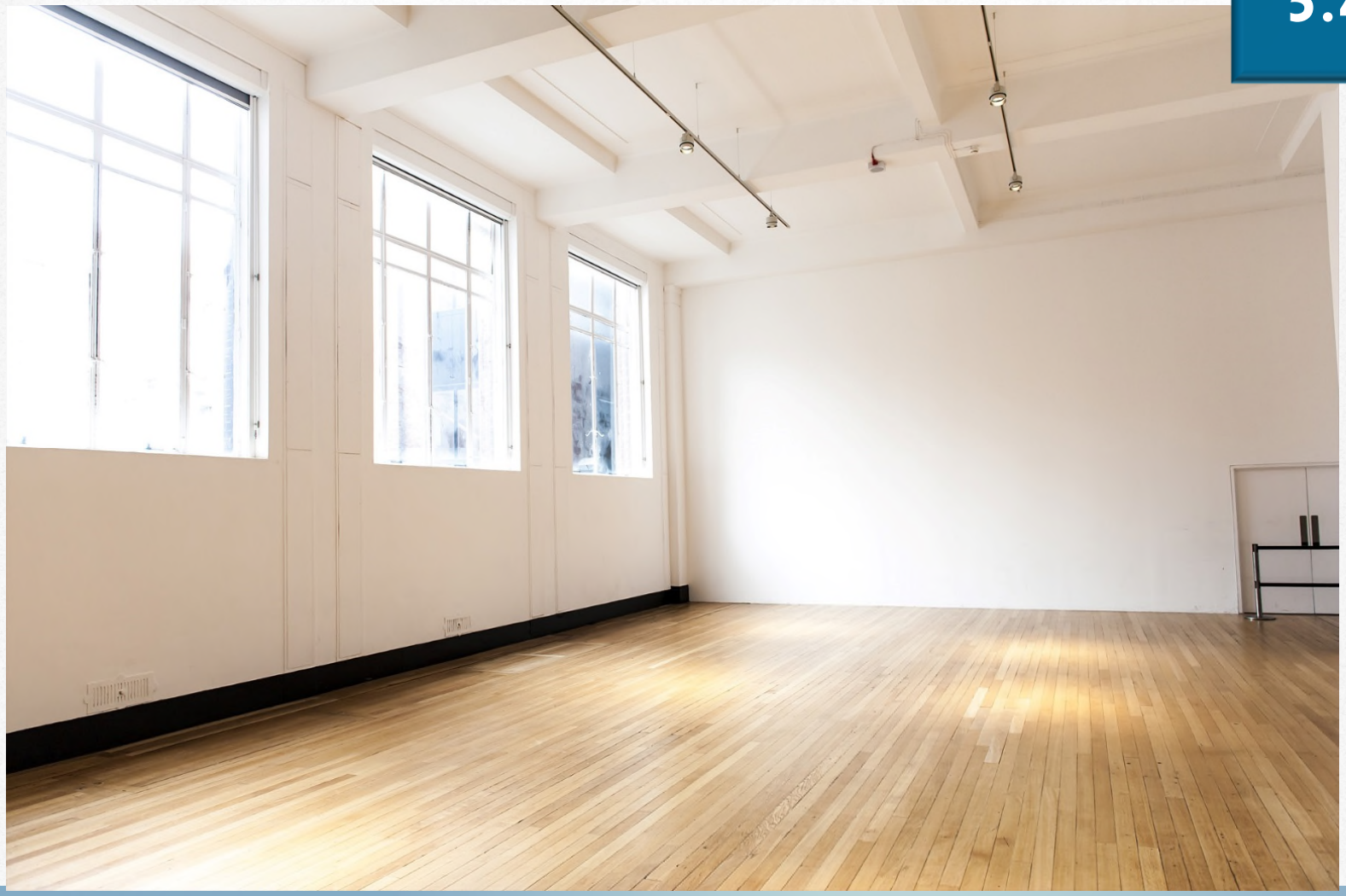
Page 5.4

- Dust walk-off systems at entryways
- Dust-creating activities away from people.
- Smooth, cleanable surfaces
- Effective storage space
- Flooring that is easy to clean
- Vacuums with good filtration and easy to use

Keep pets off of beds and out of the bedroom.

Cleanable Flooring

Page 5.4



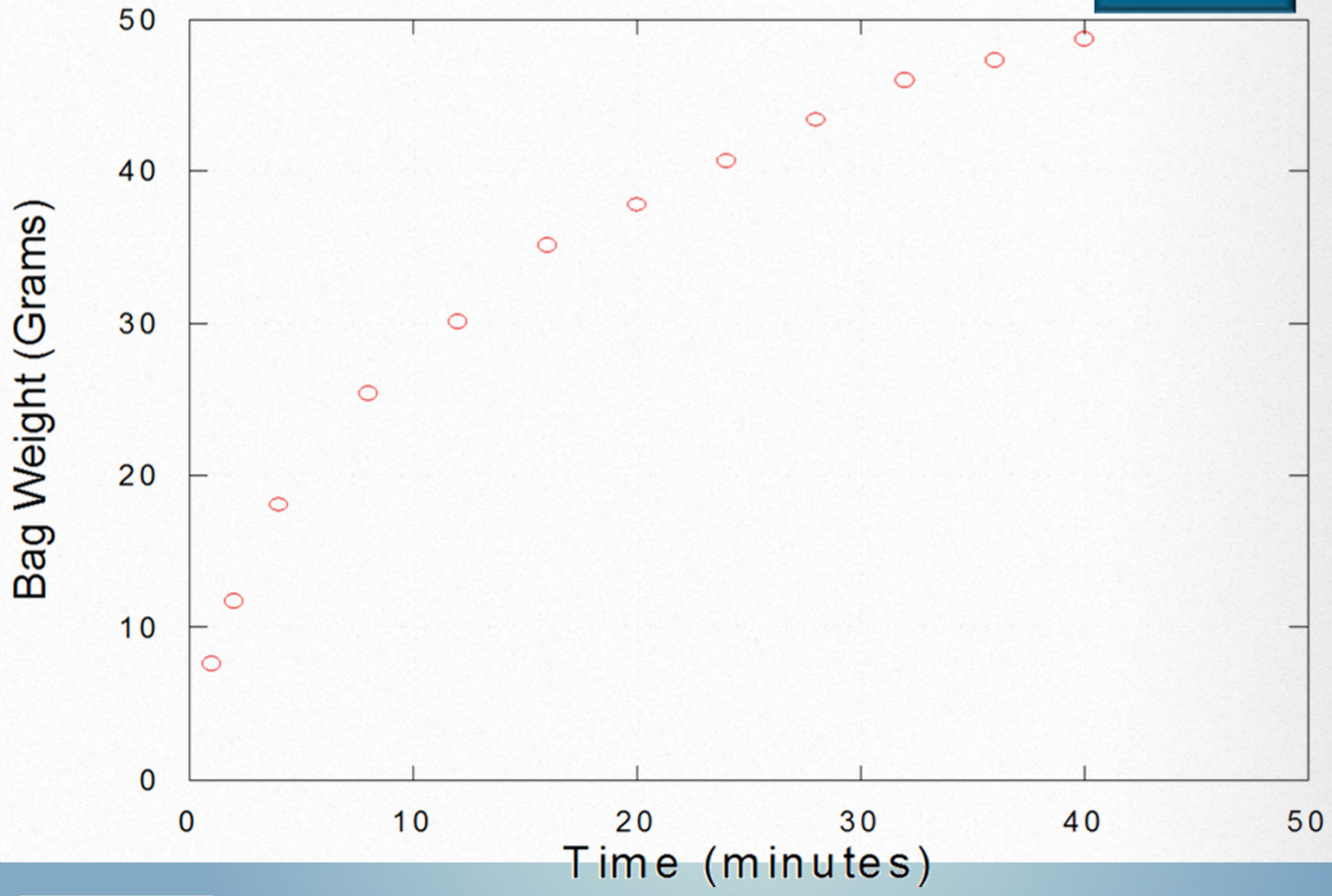
What to look for in a vacuum?

Page 5.5

- Beater Bar
- Vacuum Strength
- Filter Type
- Dirt Sensor

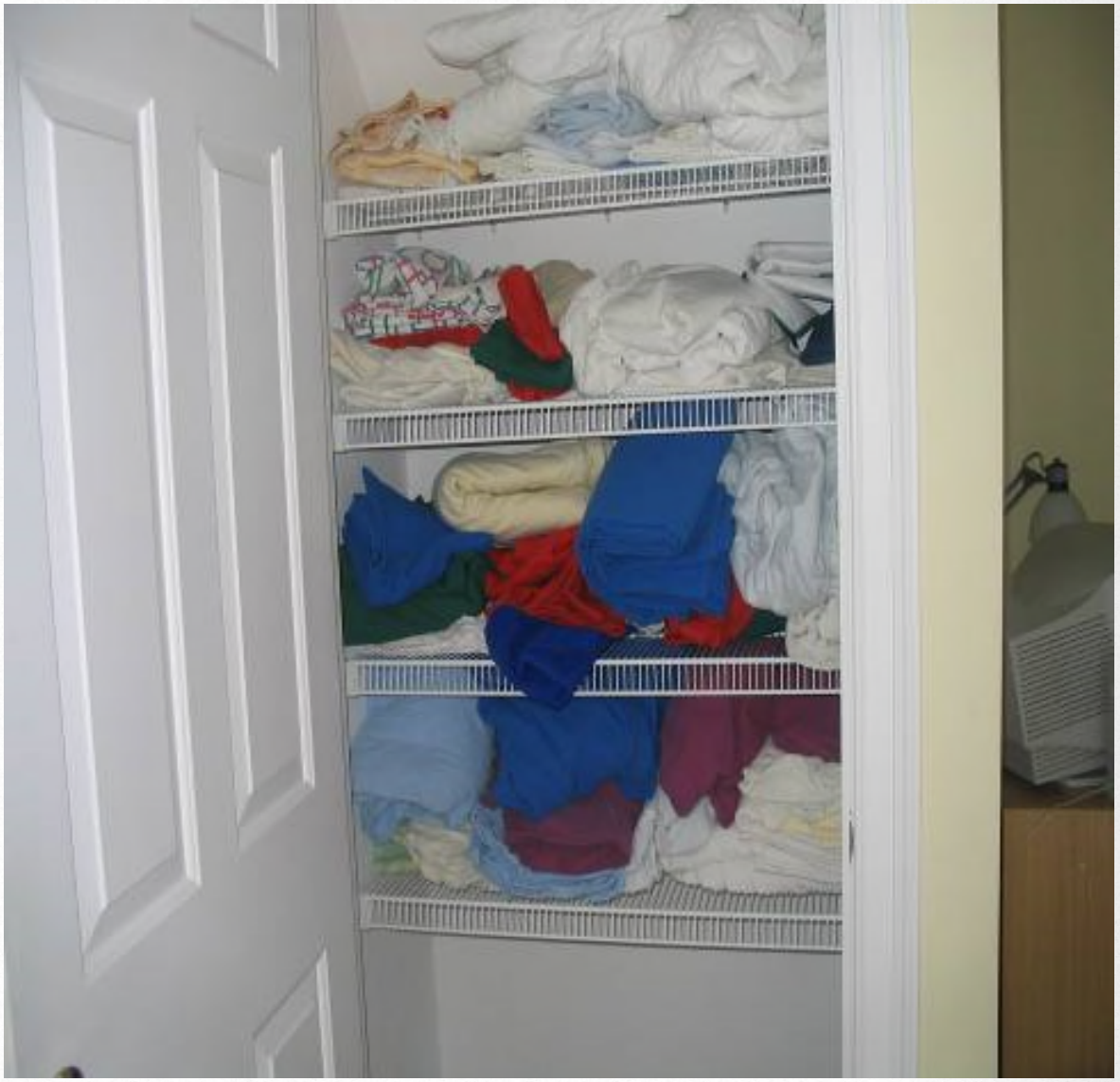
Older Carpets: Difficult to Clean

Page 5.5



Page 5.6

Wire Shelving



How clean is clean?

Page 5.6

- Clearance testing for lead
  - 40 micrograms of lead per square foot on floors
  - 250 micrograms of lead per square foot on window sills.
- Standards for allergens?
- Standards for dust?

Problematic cleaning methods

Page 5.6

- Carpet cleaning
- Overuse of anti-microbials
- Sanitizers
- Air fresheners

Duct Cleaning

Page 5.6

United States Environmental Protection Agency | Indoor Environments Division (6609J) Office of Air and Radiation | EPA 402-K-97-002 October 1997

EPA Should You Have the Air Ducts In Your Home Cleaned?

EPA recommends duct cleaning when:

- Substantial visible mold
- Ducts infested
- Ducts clogged
- Ducts release particles

Page 5.6

CLUTTER

- What's the problem?
- What do we do to help? Organize home, shelves and storage bins.
- Hoarding? What's the psychological aspect of this?

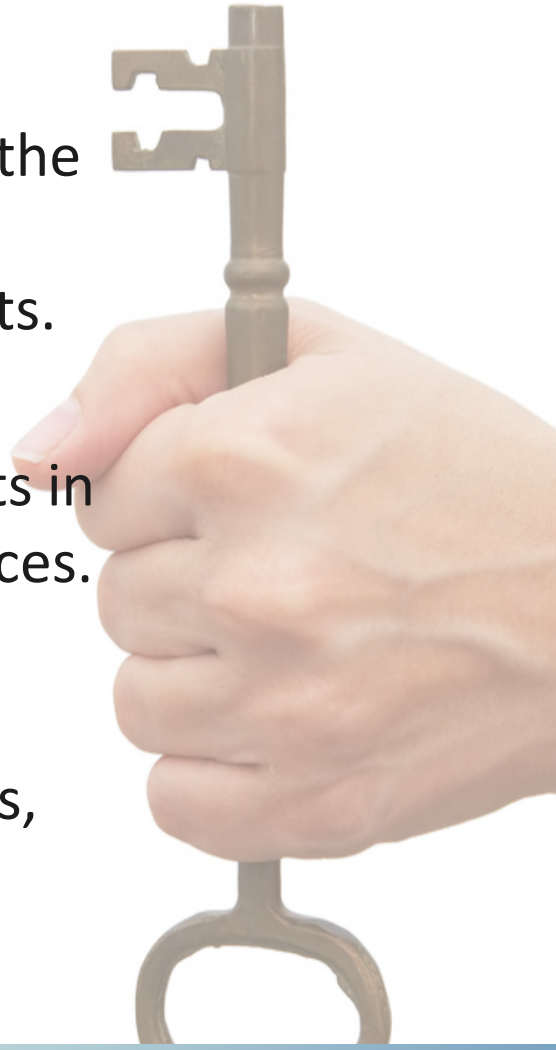
Code Requirements

Page 5.7

Code requirements related to cleanliness

305.1	302.1	307.1	503.4
• General	• Sanitation	• Accumulation of rubbish or garbage	• Floor surface

Key Messages



Pesticides, allergens, and general chemicals in the home can cause allergic reactions, asthma and asthma exacerbation, and toxic exposure effects.

Potential sources of allergens and contaminants in the home come from outdoor and indoor sources.

Keeping a home clean includes controlling the source, creating smooth and cleanable surfaces, reducing clutter, and using effective cleaning methods.

Learning Objectives

List three contaminants or allergens that are frequently found in house dust and their health effects.

Describe three ways allergens or contaminants get into house dust.

Identify three strategies to reduce them.

KEEP IT PEST-FREE

Steps to Healthier Homes

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

Learning Objectives

Page 6.1

Name three illnesses or injuries associated with pest infestation.

Identify three clues of pest infestation.

Identify the three strategies associated with an IPM approach.

Name two illegal pesticides that may be used in the home.

Health Effects of Pests

Page 6.1

Asthma

Infectious diseases

Health effects greater on children

Health Effects of Pests

- Exposure to Pest Allergens

Pest	Pathway	Allergen
Dust Mite	Feces	Der p 1
Cockroaches	Feces	Bla g 1 & 2
Mice	Urine	MUP

Health Effects of Pests

- Bites
- Common Culprits
- Rabies

Mosquito bites

Page 6.2

Health Effects of Pests

- Rat Bites

Rat bites, multiple

Allergens in cockroach feces
Poop arithmetic 101

1 fecal pellet = ~1 mg

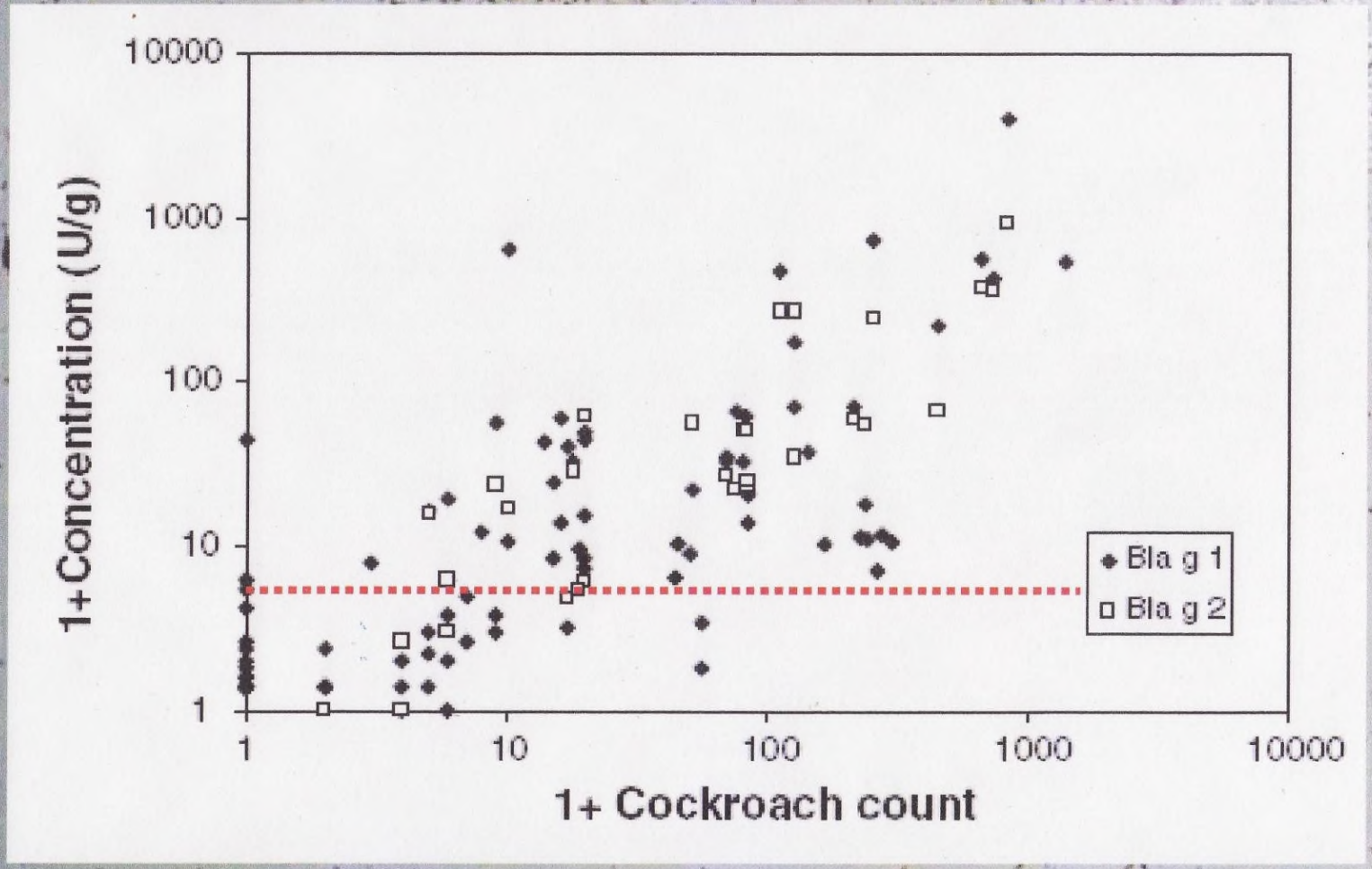
1 mg feces = 500 Units Bla g 1

1 female = 3 mg feces per day

1 day = ~1500 Units Bla g 1

		per grm dust
Human sensitization threshold	=	2 Units
Morbidity (illness) threshold	=	8 Units

More cockroaches = More allergen



Wang *et al.* 2008. *J Community Health* 33: 31–39

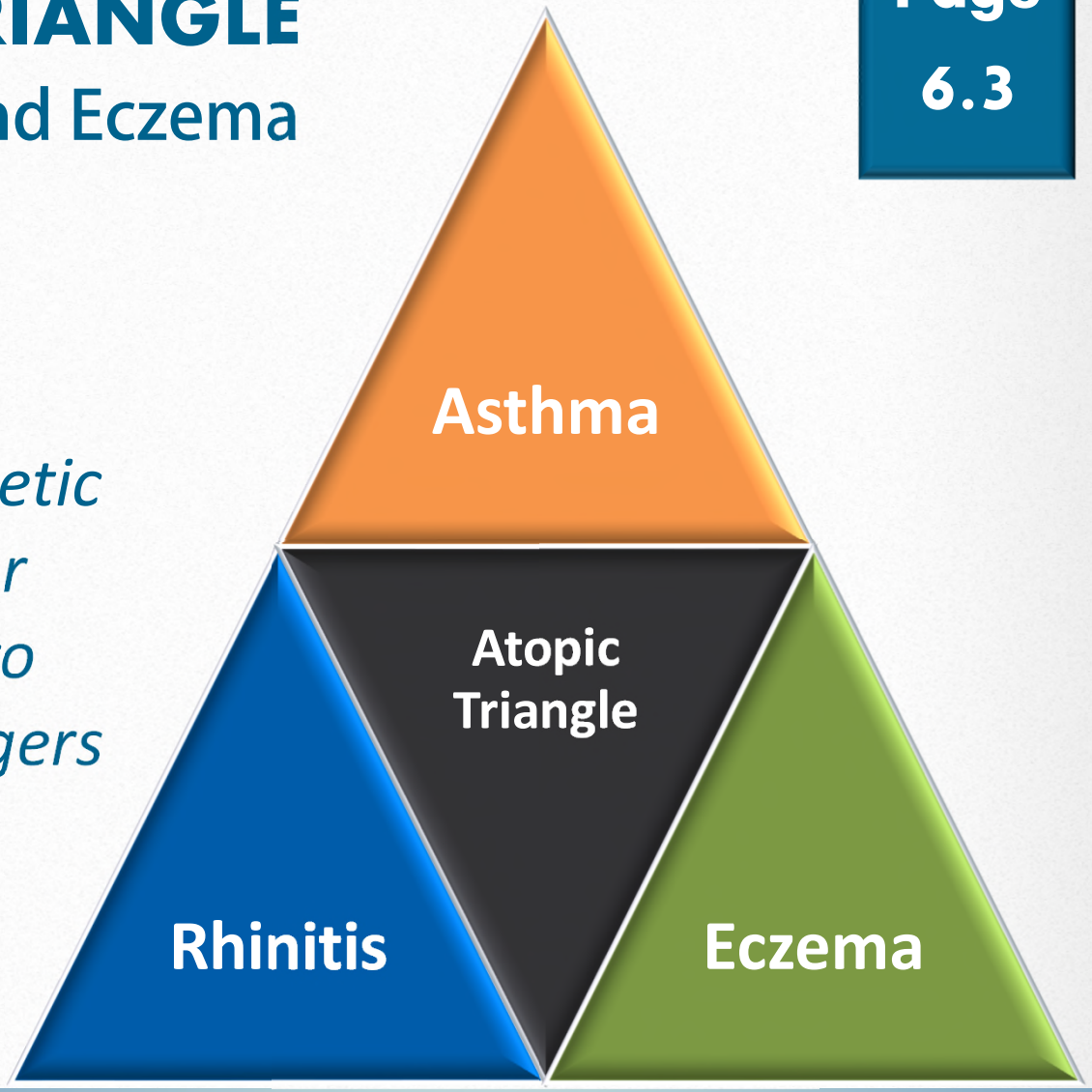
The Atopic Triangle

Asthma, Allergies and Eczema

Page 6.3

Atopic:

pertaining to a genetic predisposition for hypersensitivity to environmental triggers



The Atopic Triangle

Asthma, Allergies and Eczema

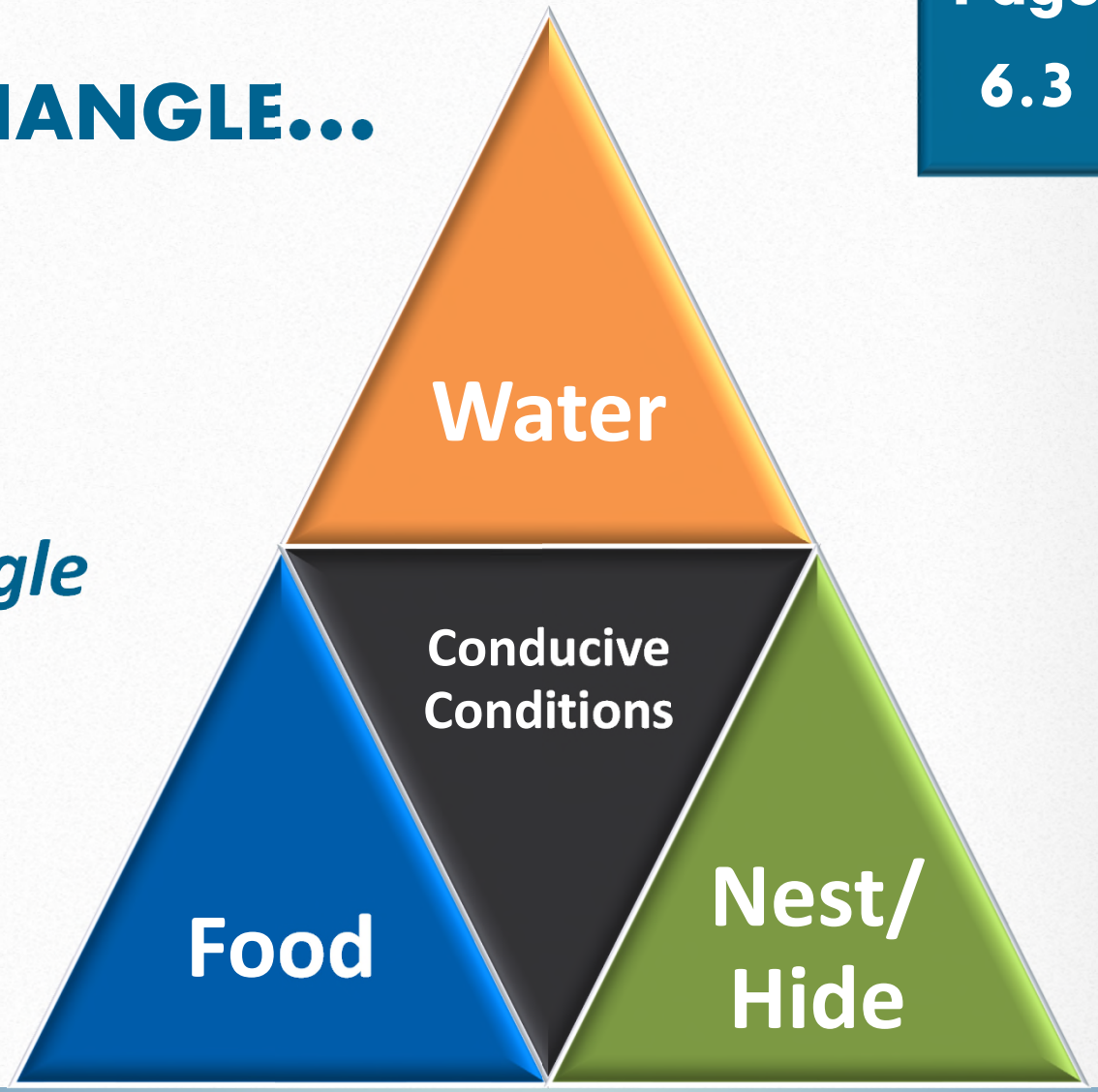
Page 6.3

- Pests
- Immunoglobulin E (IgE) producing conditions
- Conditions interact/trigger; commonly coexist
- Environmental conditions trump genetics
- Hygiene hypothesis

Page 6.3

Another Triangle...

The Pest Triangle



How Common are Pests?

American Housing Survey (2015)

All Housing

- 11.2% Mice or Rats
- 11.8% cockroaches

Below Poverty

- 13.2% Mice or Rats
- 18.4% cockroaches

Rat feces in insulation

How Common are Pests?

Page 6.4

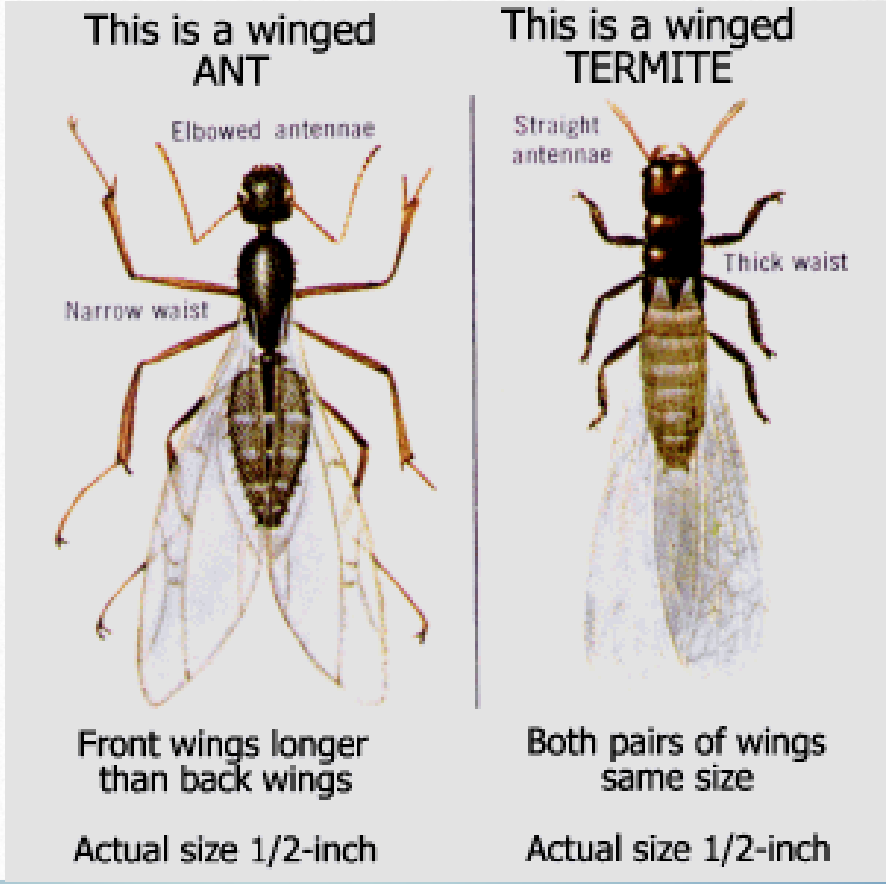
- **Philadelphia, 2007**
  - 62% Cockroaches
  - 72% Mice

- **National 2002-2006**
  - 33% Rat allergens (inner-city)
  - 63% Mice allergens
    - (95% low-income)
  - 85%Cockroach allergens

How do we control them?

Page 6.4

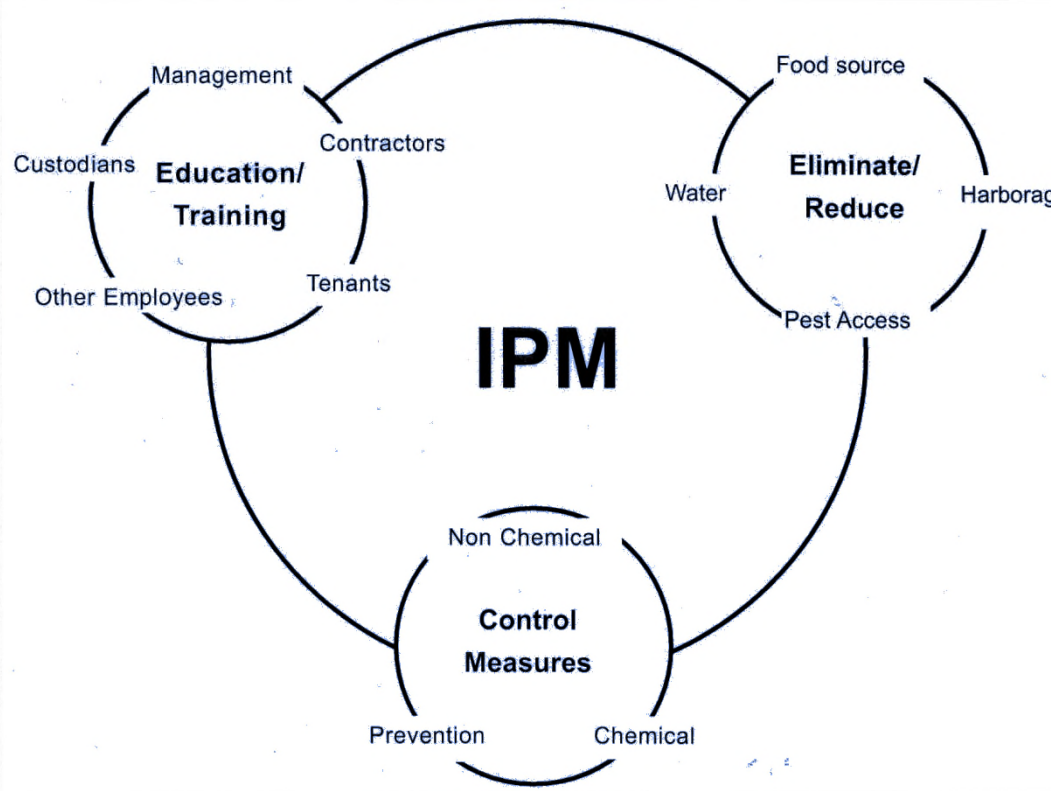
- Prevention
- Sanitation
- Physical controls
- Ongoing monitoring



Integrated Pest Management

Page 6.5

- Best practice
- Multiple tactics
- Effective control
- Least risk to the environment
- Least exposure of non-target organisms
- Economic sustainability



Reduce Pesticide Use

Pest pressure can drive people to unsafe use of pesticides.

- Too much
- Too many
- Wrong kind – unsafe & Illegal

Pesticides and Poisonings

Page 6.6

- 13,905 pesticide exposures requiring treatment reported (2016)
- Pesticides usually stored within reach of children
- 95% of all poisoning of children under age 6 occurred in their home.

The IPM Pyramid

Page 6.7

Pesticides

Biological Controls

Physical/ Mechanical Controls

Design / Sanitation Practices

IPM v. Conventional Pest Control

Page 6.8

Activities	Conventional	IPM
Program Strategy	Reactive pest control	Preventive pest control
Resident Education	Minimal	Extensive
Spraying & Fogging	Extensive	Rare
Rodent/bird control	Poisons	Exclusion/ Trapping

HUD Guidance on IPM (2011)

Page 6.9

- Communication
- Environmental conditions
- Identification and reporting
- Ongoing monitoring, reporting and tracking
- Action levels
- Waste management

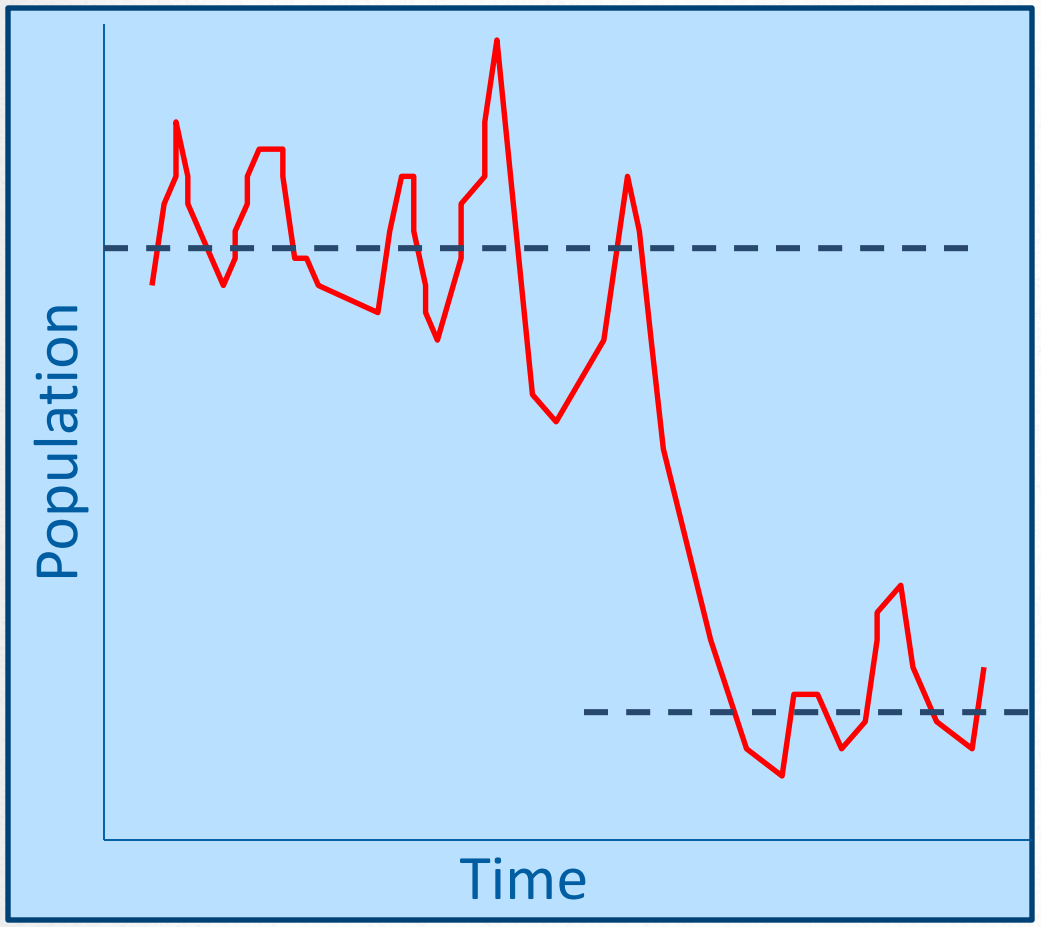
HUD Guidance on IPM (2011)

Page 6.9

- Appropriate pesticides
- Exclusion & denial
- Educational outreach
- State laws on used furnishings
- Use least-risk pesticides when necessary
- Pesticide-use notification signs

Change the Habitat

Page 6.9



- Don't just kill, change "conditions conducive" to pests
- Reduce the carrying capacity of the environment

Page 6.10

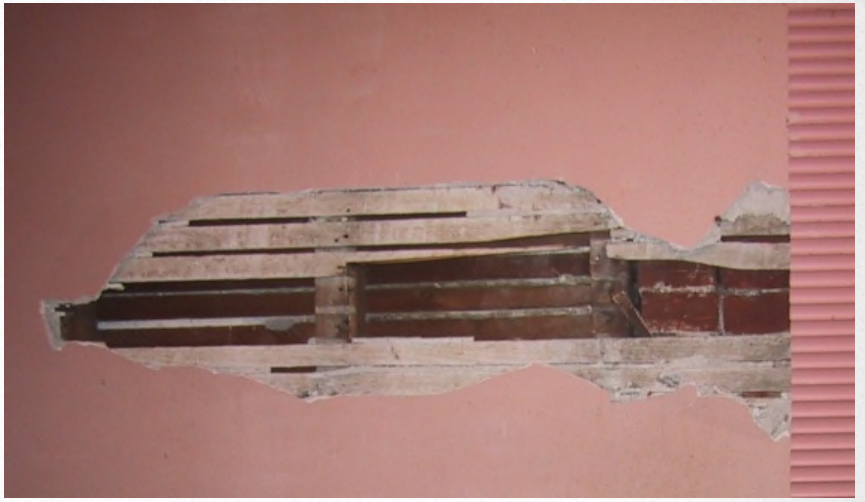
IPM: Step-by-Step

- Inspection & Identification
- Exclusion & Denial
- Education & Action
- Sanitation
- Physical control
- Monitoring

1. Inspection & Identification

Page 6.10

- Thorough inspection
- Identification of pests found



See the Creature, Be the Creature

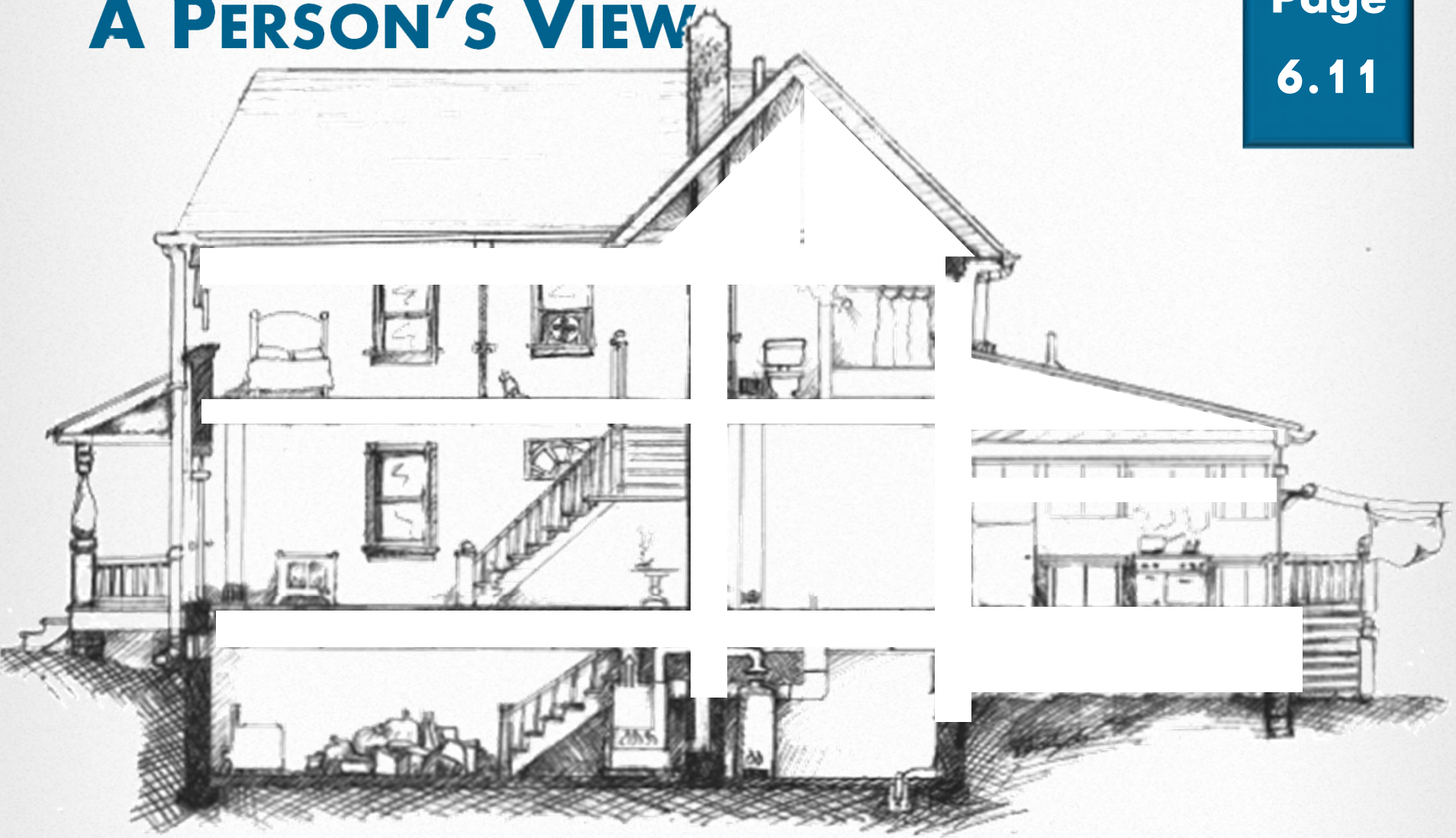
Page 6.11

What to look for and where to look

- The pest
- Droppings
- Nests and burrows
- Food and water sources
- Hidden places
- Near entry holes
- Warm cavities for insects

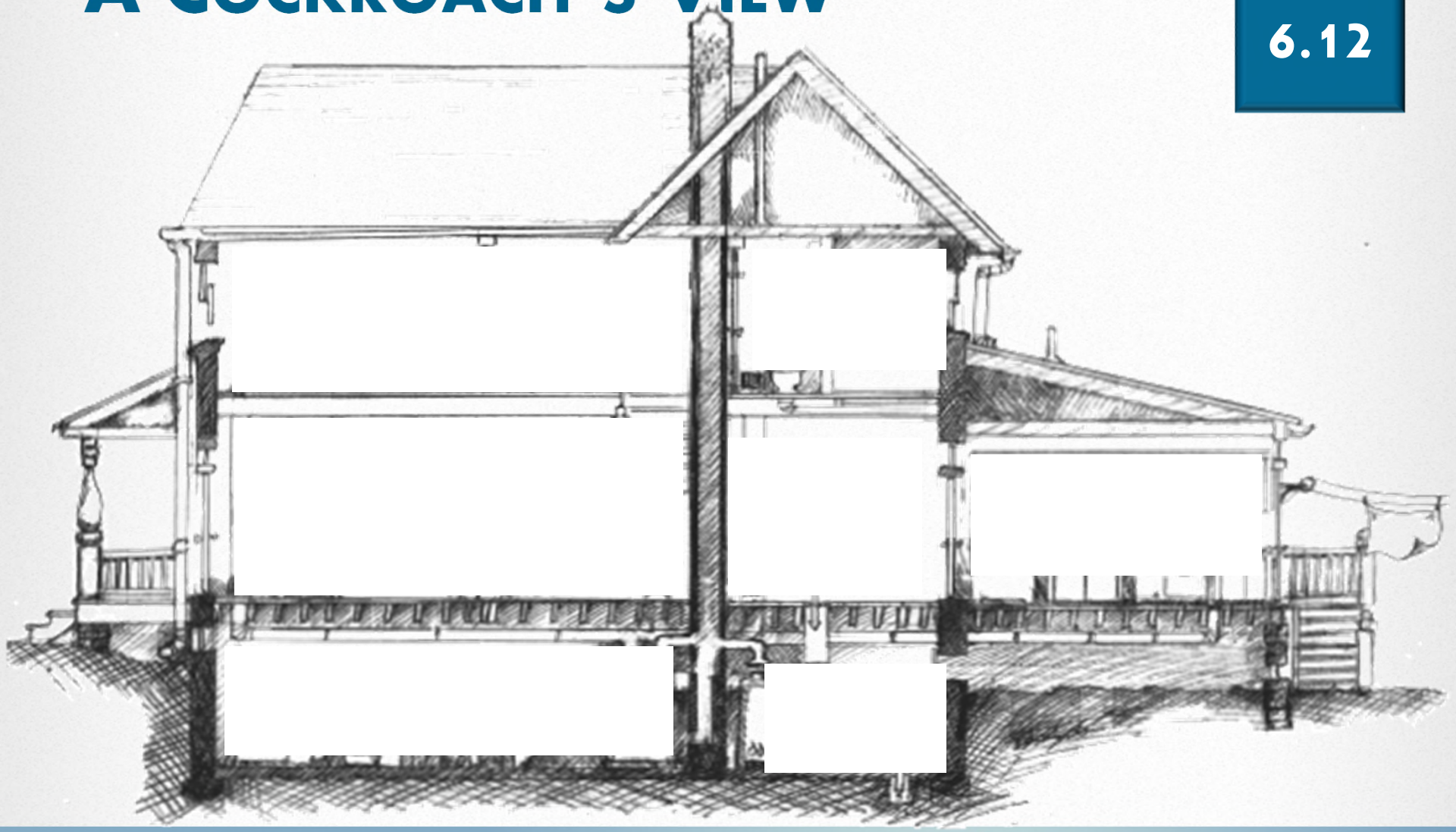
A Person's View

Page 6.11



A Cockroach's View

Page 6.12



A Cockroach's View

Page 6.12

Rat burrow entrance

Rat proofing did not work here…

Page 6.13

Get down on the ground and look under the pipe…

2. Exclusion and denial

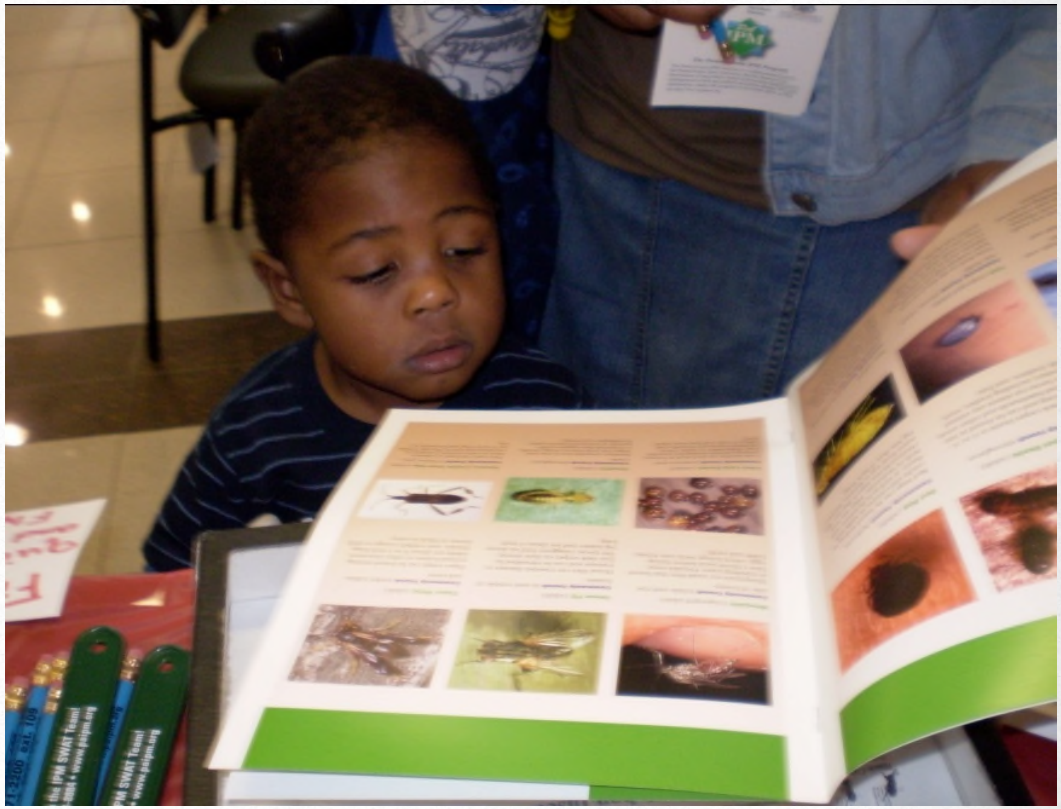
Page 6.14

- Stoppage
- Inspection
- Holes filled
- Stuff-It
- Silicone Caulk
- Spackle, etc

3. Education & Action

Page 6.14

- Understand pests
- Control – what, how, and when
- Safe vs. unsafe practices
- Educating residents
- Choosing PCO's
- Training PCO's



4. Sanitation

Page 6.15

- Food
- Water
- Harborage

hoto: City of Houston Bureau of Children's
nd Environmental Health

Water

Page 6.15

- Essential for insects & rats, but not for mice or bedbugs
- Mosquitoes
- Structural damage

Photo: City of Houston Bureau of Children's and Environmental Health

5. PHYSICAL CONTROL

Page 6.16

- Identify & assess problem
- Same strategy
- Different tactics – pest specific

Photo: City of Houston Bureau of Children's and Environmental Health

Reduce Exposure

Choose safer products

- Roach baits
- Gels
- Dusts
- Glueboards and Snap Traps

Cockroach gel bait

Illegal and Risky Pesticides

- Pesticides that look like candy - mothballs
- “Miraculous” Chinese Insecticide chalk
- “Tres Pasitos”
- Many pesticide have been withdrawn

candy!

Federal Pesticide Law

- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Administered by EPA
- Pesticide – Broad term
- No pesticides are safe – some are low-risk
- The label is the law

Are These Labels?

Page 6.18

EPA Pesticide Product Labels

Page 6.19

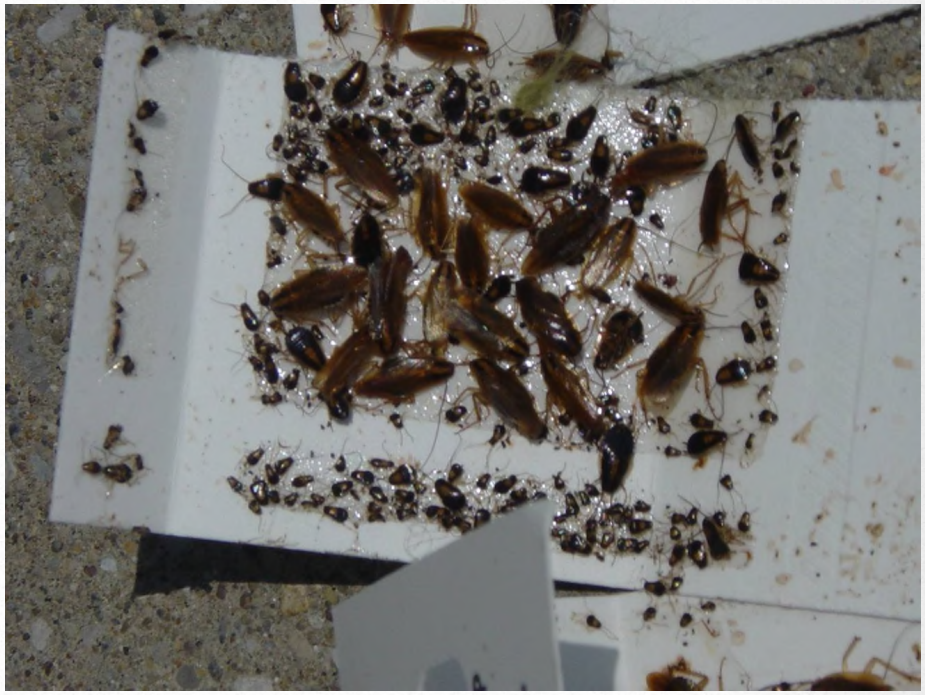
- Product Name
- EPA Reg. No.
- Ingredients
  - Active
  - Inert / Other
- "Keep Out of Reach of Children"
- First Aid
- Net contents

Signal Word:
Caution
Warning
Danger
Poison – skull & crossbones

Page 6.20

6. Monitoring

- Keep looking for pests
- Spot reinfestations
- Place in corners
  - Behind appliances
  - Under sink
  - Under cover!
- Do date & mark
- Don't disturb



Monitoring for Rodents

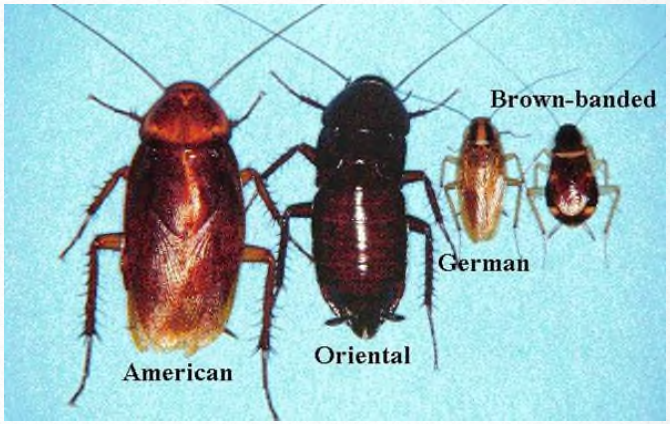
- **Similar to insects – use snap traps**
- Place in corners, along runways, in tight dark spaces
- Check daily
- Increase trapping if monitors indicate activity
- Always have monitors for insects and rodents in place

Keep it Pest-Free

Know your Pests

Cockroaches

- Identification & biology
- Life cycle:
- Diseases
- Key harborage sites

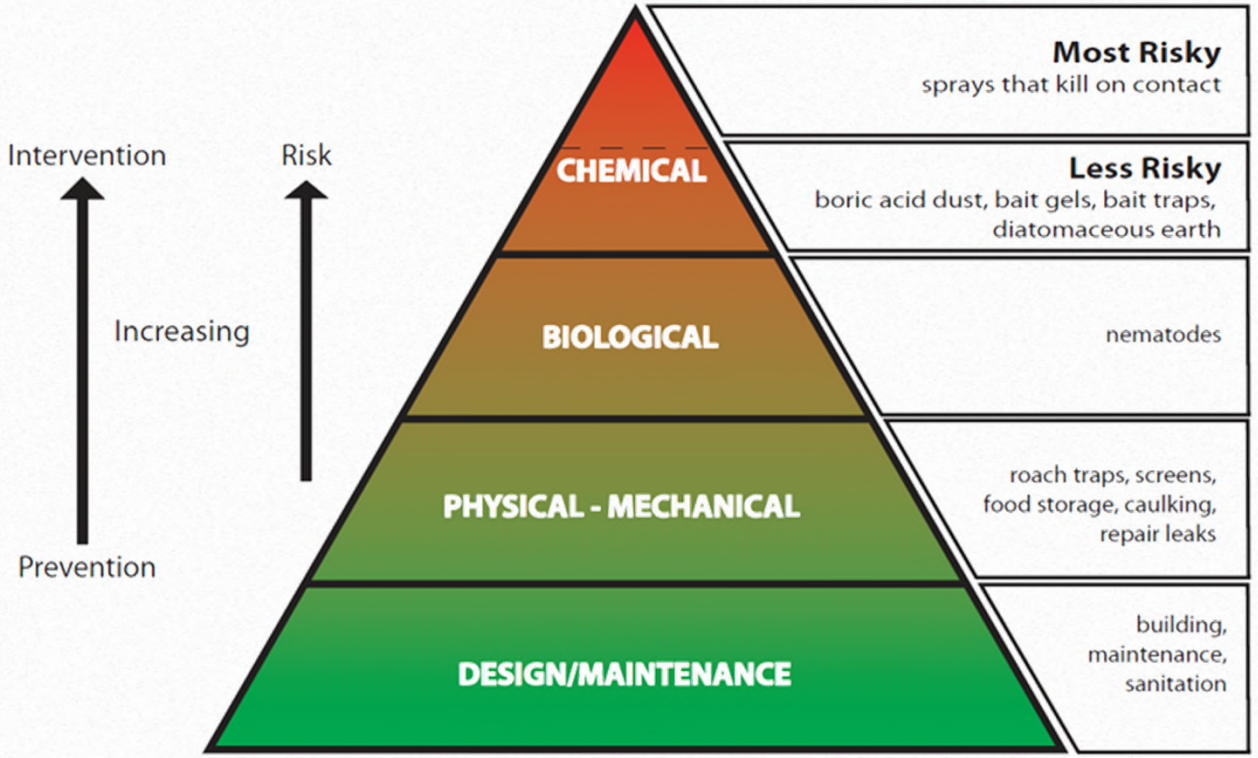


Pest cockroaches of North America

German cockroach life cycle

Handling Roaches the IPM Way

Page 6.22



Pyramid of IPM Tactics for Roaches

PENNSTATE College of Agricultural Sciences

PA IPM

Pennsylvania Department of AGRICULTURE


Door


Behind
wallpaper

Page
6.23

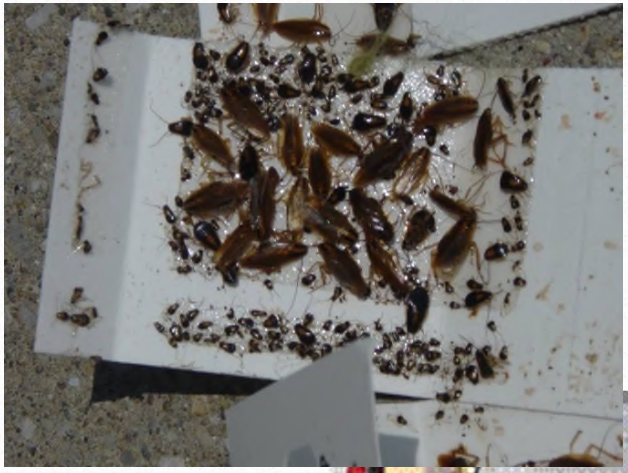

Wall clock


Under a
cabinet shelf


Behind the
wall clock

Cockroach Control

Page 6.24



- Habitat modification
- Monitors
- Dust and caulk
- Baits and gels
- Insect growth regulators
- Sticky traps

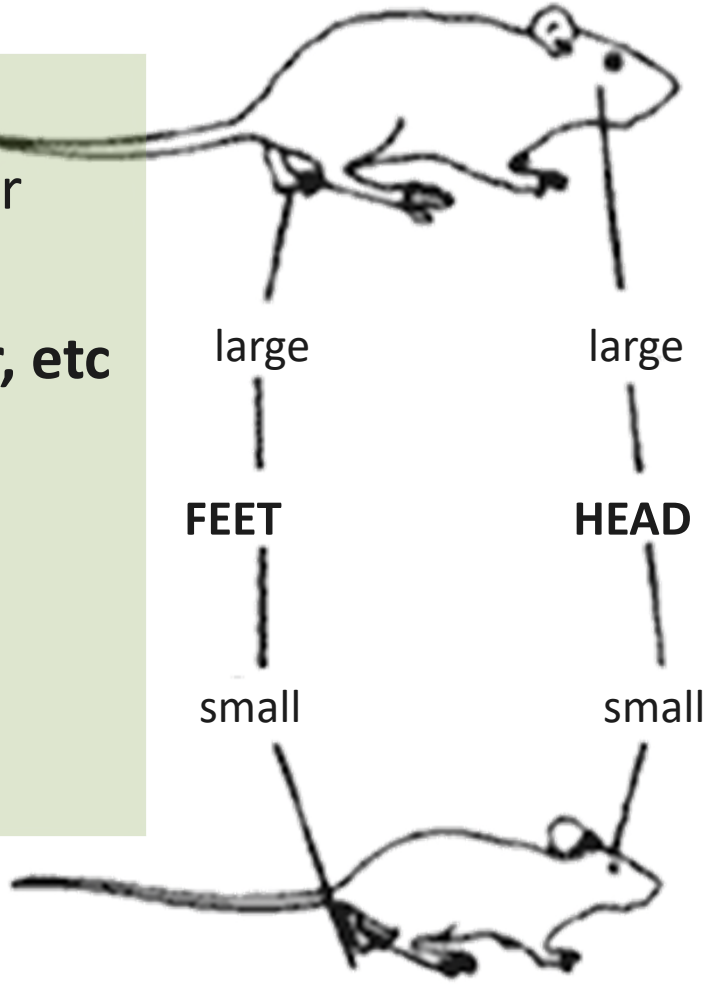
Rodent control

- Rodents are mammals like us
- Think like a rodent
- Not all rodents are the same
  - Mice – curious & persistent
  - Rats – cautious & smart
  - Squirrels - outdoors

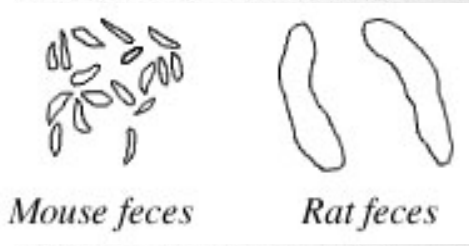
Rodent identification

Page 6.24

- **House Mouse**
  - Also: White Footed, Deer
- **Norway Rat**
- **Brown rat, Wharf, Sewer, etc**
- **Roof Rat**
- **Black rat**
  - Also: Cane rat, etc.
- **Squirrel**
- **Groundhogs, etc.**



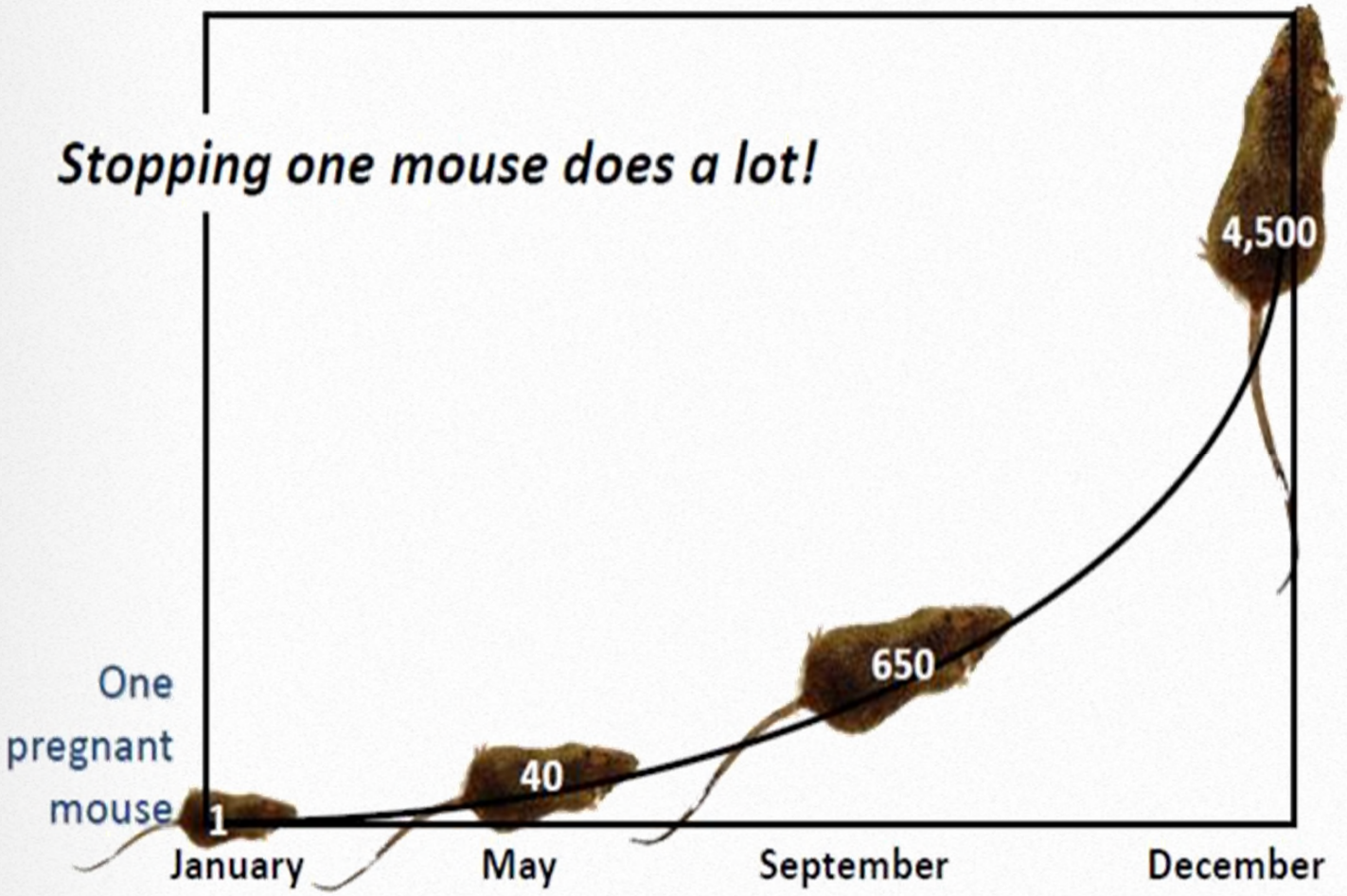
Young Rat



House Mouse

Rodent Reproduction

Page 6.25



Page
6.25

Demo

How to trap a rat and a mouse

Things that DON'T work

- Contact sprays
- Foggers
- Mothballs
- Ultrasonics
- Dryer sheets, etc.

Things that may work, but...

- Essential oils and cleaners
- Carbon dioxide traps
- Kerosene
- Homemade traps and gadgets
- What have you seen?

Bed bugs - Don't Panic

- Can be avoided and eliminated
- Every skin irritation or bite is not bed bugs
- You can see them.
- Do not cause or spread diseases.
- Heat and/or steam can kill them.
- Protocols and communication key to control

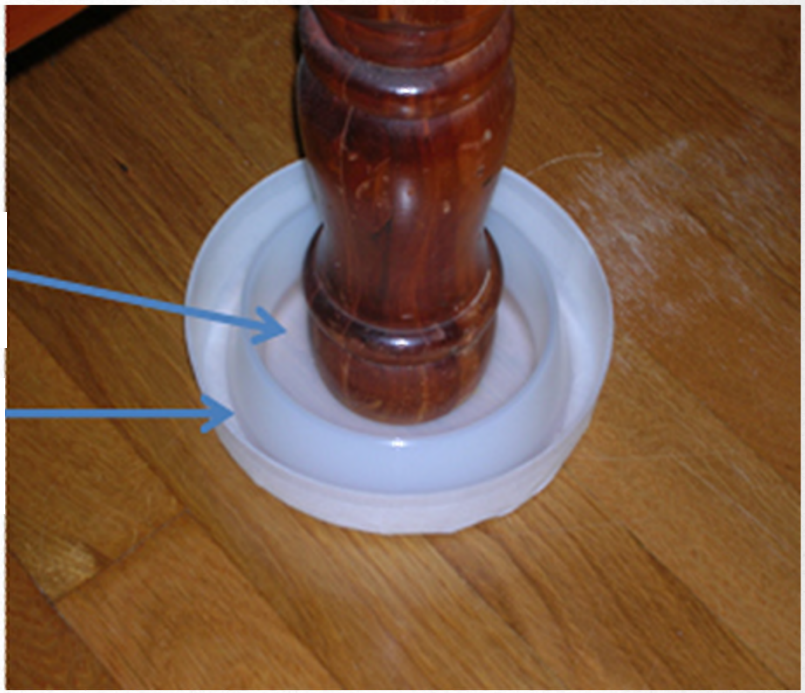
Bedbugs

- Identify properly – don't assume
- Life cycle

Photo credit:
Changlu Wang & John Obermeyer/Rutgers University

Bedbugs - Control

- Exclusion
- Preparation
- Traps – interceptors



Bed bug - Treatment

Page 6.30

- Inspection
- Vacuum
- Heat or cold
- Pesticides by PCO only
- Re-inspection & retreatment
- Encasements & interceptors

Code Requirements

Page 6.31

Code requirements related to pests

- Infestation
  - 309.1 Infestation
- 304.14 Insect screens
- 302.5 Rodents
- 309.2 Owner
- 309.3 Single occupant
- 309.4 Multiple occupancy
- 309.5 Occupant

Page 6.32

Resources

- Cooperative Extension Services
- State Pesticide Regulator for Pest Control Applicators/Operators
  - Often at universities
- www.ehw.org
- healthyhousingsolutions.com/training-course/ipm/
- http://www.stoppests.org/

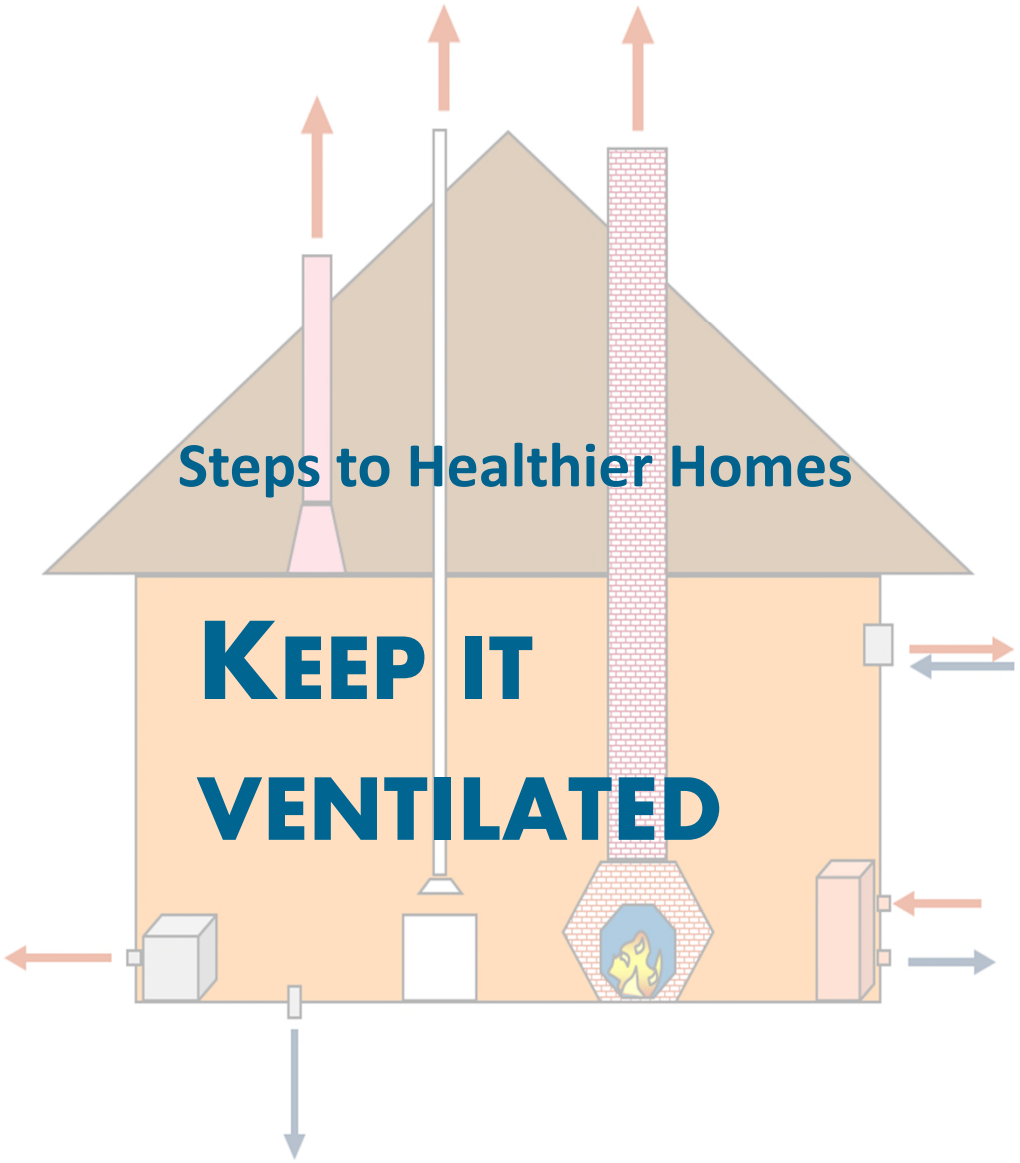
Key Messages

Page 6.32

- Pests can create allergens and be vectors of disease.
- Control of pests through pesticides can lead to poisonings and other neurological problems.
- Some pesticides found in homes have been banned.
- Make house less hospitable for pests. Prevent entry, control food, water, and places for shelter.
- Integrated Pest Management is the recommended strategy.

Learning Objectives

- Name three illnesses or injuries associated with pest infestation.
- Identify three clues of pest infestation.
- Identify the three strategies associated with an IPM approach.
- Name two illegal pesticides that may be used in the home.



Steps to Healthier Homes

KEEP IT VENTILATED

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

Learning Objectives

Page 7.1

NAME five unhealthy conditions associated with poor ventilation.

LIST five things (e.g. a room, appliance, mechanical system) in a household that need ventilation.

NAME three things that power airflow in a building.

LIST three household contaminants that can be removed by ventilation.

DESCRIBE two ways ventilation reduces air contaminant levels.

Why Well Ventilated?

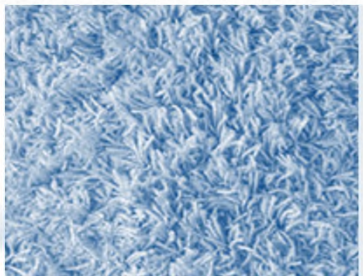
Page 7.1

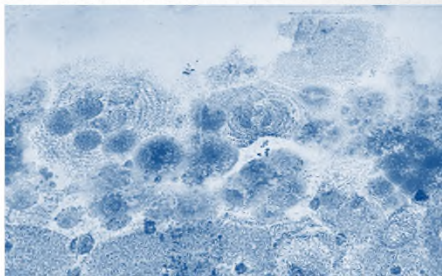
Pollutants found in concentrations 2-5 times higher indoors than outdoors.

Why Well Ventilated?

Proper ventilation can reduce hazards of:

- Volatile organic compounds
- Moisture
- Environmental tobacco smoke
- Particulate matter
- Allergens
- Mold
- Carbon monoxide
- Formaldehyde

Why Well Ventilated?

Page 7.1

Proper ventilation can also address sources of combustion contaminants:

- Ovens as heaters
- Spillage from furnace, water heater, fireplace
- Ventless heater or fireplace
- Car exhaust from attached garage

Type of Heating Fuel

- Water Heater
  - 49% have gas, LP/bottled gas
  - 43.6% have electricity
- Clothes Dryer
  - 20.9% have gas, LP/bottled gas
  - 79% have electricity

From American Housing Survey – 2017

Primary Heating Equipment

Primary heating equipment:

- 65.3% have warm air furnace
- 9.1% have steam or hot water system
- 11.6% have electric heat pump

But . . .

- 749,000 (0.6%) have room heaters without flue
- 1.3 million homes (1.1%) rely on wood-burning stoves
- 58,000 (0.5%) rely on cooking stoves

For their primary source of heat!

From American Housing Survey – 2017

Heating Problems

- **6.2% were uncomfortably cold** for 24 hours or more
  - 8.8% for renters
  - 10.5% for residents below poverty level
- **0.8%** were uncomfortably cold for at least 24 hours due to **inadequate heating capacity**
  - 1.6% for renters
  - 1.8% for residents below poverty level
- **0.9%** were uncomfortably cold for at least 24 hours due to **inadequate insulation**
  - 1.5% for renters
  - 1.8% for residents below poverty level

From American Housing Survey – 2017

Sources of Combustion Contaminants

Page 7.2

- Oven as heater
- Spillage from furnace, water heater, fireplace
- Ventless heater or fireplace
- Car exhaust from attached garage

Combustion Contaminants? Health Effects

Page 7.3

- **Carbon Monoxide**
  - Fatigue, headaches, dizziness, confusion
  - The "Silent Killer"
- **Nitrogen Dioxide**
  - Eye, nose, and throat irritation
  - Shortness of breath

Carbon Monoxide Limits

Page 7.3

Agency	Situation	Maximum CO Level	Duration
Environmental Protection Agency (EPA)	Outdoor / Ambient Air	9 ppm	8 hours
		35 ppm	1 hour
Consumer Products Safety Commission/Underwriter Laboratories (UL)	Alarms for Immediate Life Threats in Residential Air	70 ppm	1 - 4 hrs
		150 ppm	10 - 50 min
		400 ppm	4 - 15 min
Canadian Department of National Health & Welfare	Air in Residences	11 ppm	8 hours
		25 ppm	1 hour
World Health Organization	Indoor Air	32 ppm	Max.

Carbon Monoxide Alarms

Consumer Product Safety Commission (CPSC) recommends:

- Place near sleeping area
- Put on every level of a home to provide extra protection
- Do not install directly above or beside fuel-burning appliances

Combination smoke and CO alarm

CO Alarm Installation

Should be installed:

- According to the manufacturer's instructions
- Higher placement is preferred
- One CO alarm should be installed in the hallway outside the bedrooms of each separate sleeping area of the home

Why Ventilated

Health Effects

Page 7.5

Approximately 500 carbon monoxide deaths plus more than 15,000 non-fire related healthcare visits per year.

Why Ventilate

Page 7.6

Health effects

- Higher rates of respiratory irritation and illness in housing with poor ventilation
  - Common colds
  - Influenza
  - Pneumonia
  - Bronchitis

...and increased rates of absence from school or work

Page 7.5

Well ventilated?

A Well-Ventilated Building?

Page 7.6

Good Building Ventilation Provides:

Page 7.6

Local Exhaust Ventilation	• to remove moisture, odors, and other pollutants at the source
Whole House Ventilation	• for supplying fresh air to reduce contaminants by dilution
Control of airflow through building	• so unbalanced airflows can't carry contaminants into and around the house

Understanding Ventilation

Page 7.6

Key Concepts

- If any portion of air leaves a house the same amount will enter
- Air, like water, seeks the path of least resistance
- When heated, air rises
- When cooled, air falls
- Air can be hot, cold, wet, dry, or polluted when it enters or exits a house

What Powers Air Flow?

Page 7.7

Temperature differences

Fans

Wind

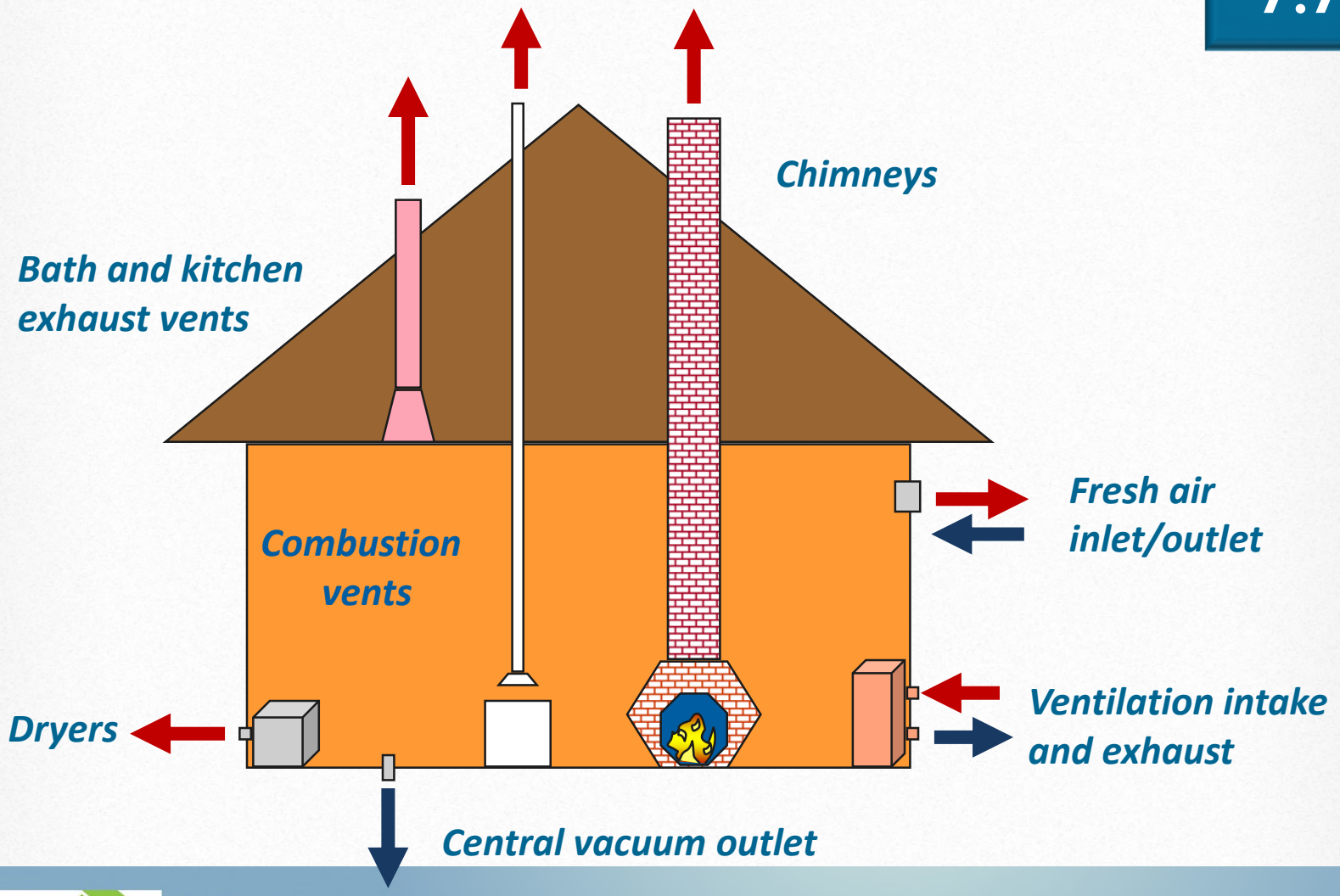
Air Flow in Homes

Page 7.7

- Typical homes do not have a planned supply of fresh air.
- We depend on leakage such as windows, doors, and cracks.
- This is usually not adequate.

Air Flow Needs Designed Holes

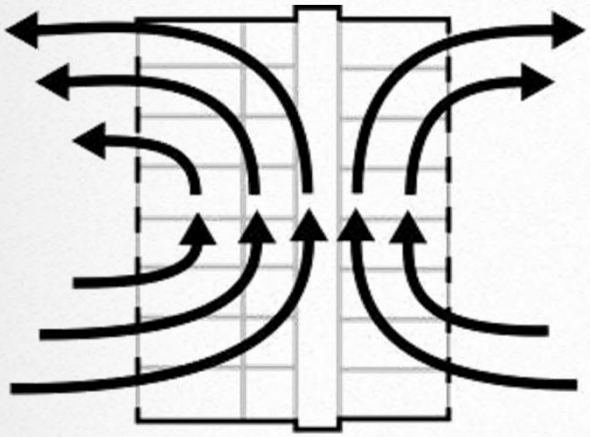
Page 7.7



Multifamily dwellings should have planned fresh air supply because:

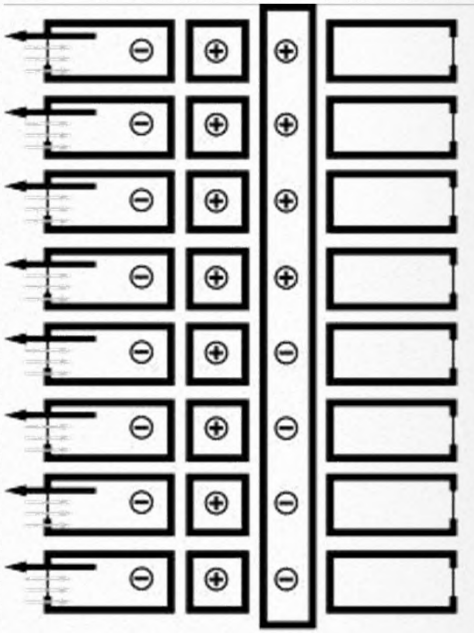
Page 7.8

- Neighbors are closer together
- Stack effect- this dominates in cold weather



Typical Air Flow

- Odors, pollutants and stale air from lower floors supplied to upper floors
- Adversely affects smoke and fire spread, IAQ, comfort and energy efficiency
- Operable windows make problems worse



Distributed Ventilation

- Units ventilated individually
- Make-up air is provided from exterior not from corridors
- Corridors are pressurized only for smoke and odor control, not for make-up air requirements
- Corridors are pressurized by individual fans supply each corridor, not by a central roof-top system
- Ductwork between floors avoided

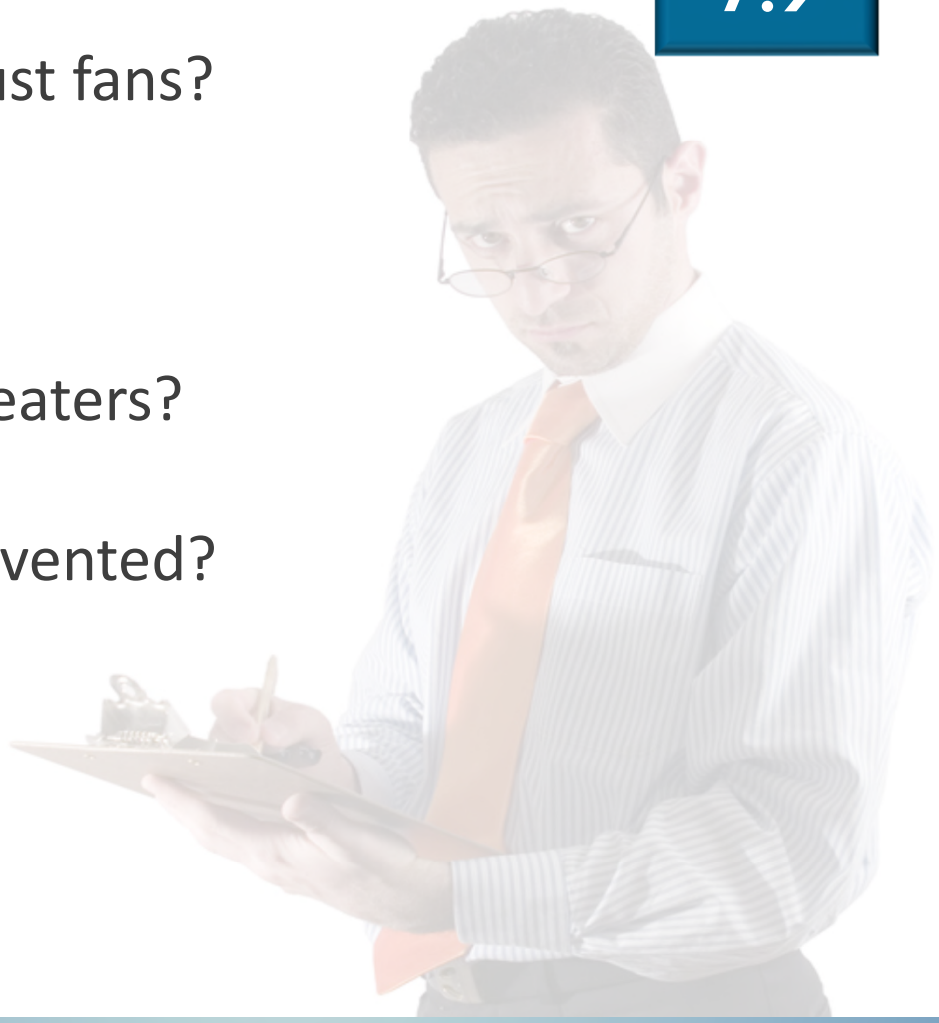
Page 7.8

Multifamily exhaust only – new construction

What are we looking for?

Page 7.9

- ☑ Bath, dryer, and range exhaust fans?
- ☑ Gas stove used as heater?
- ☑ Windows work?
- ☑ Smoke alarm goes off?
- ☑ Unvented gas or kerosene heaters?
- ☑ Vented hot water heater?
- ☑ Furnaces, boilers, fireplaces vented?
- ☑ Rooms without windows?
- ☑ Lingering odors?
- ☑ Stale air?
- ☑ Windows fog?



Page 7.9

Things that Need Exhaust Ventilation

- Bathrooms
- Kitchen ranges
- Clothes dryers
- Boilers, furnaces, hot water heaters
- Fireplaces, wood burning stoves

Page 7.9

Is there an exhaust in the bathroom? Does it work?

Testing Exhaust Fan: The Charmin Method

Page 7.10

Damper work?

Ducted ok?

Local Ventilation: Kitchen

Page 7.10

Remove moisture, odors, grease

If gas oven or range, remove products of combustion:

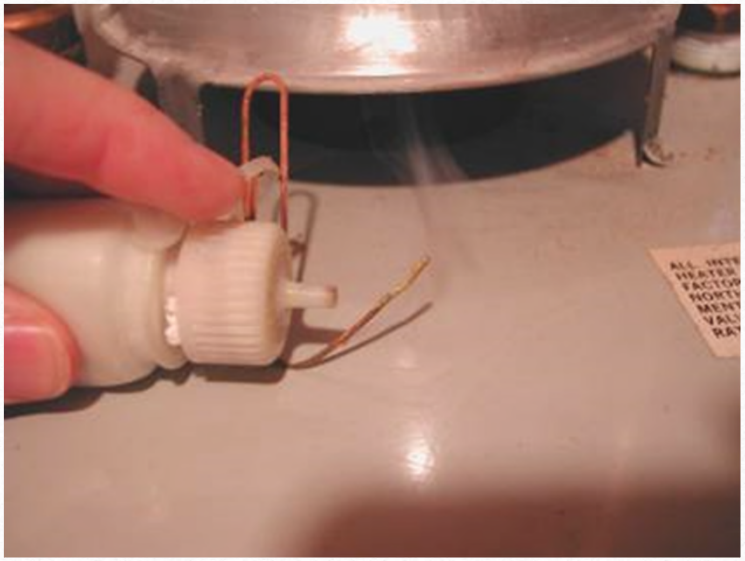
- moisture, CO, NO2

Must be vented to the outside

If it is not reasonably quiet, many people will not use it.

Page 7.10

Page 7.11



Page 7.12

Page 7.12

Leaks in ducts:

- Cause pressure imbalance
- “Mine” contaminated air from garages, crawlspaces
- Increase energy costs

Does this look bad?

Page 7.12

Page 7.13

Poorly sealed filter access panel

MERV- Filter Rating System

Page 7.14

- Minimum Efficiency Rating Value (MERV)
- ASHRAE Standard 52.2 – Efficiency in collecting very small particles

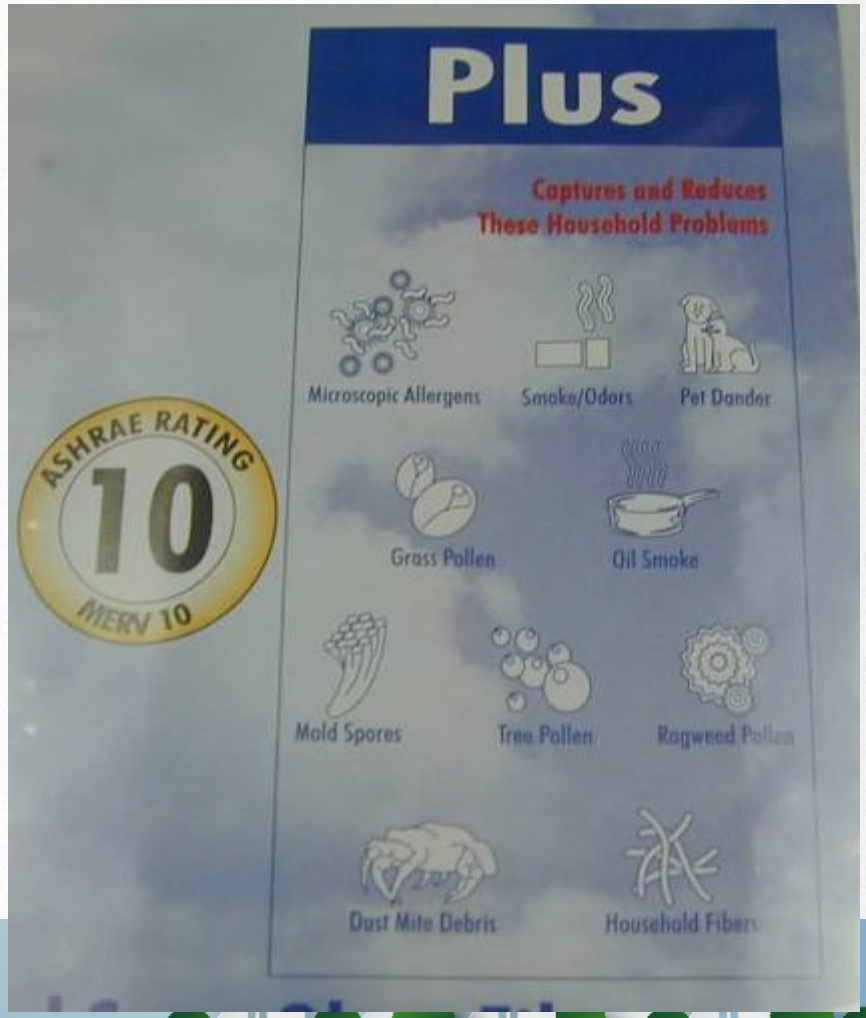
MERV Ratings

Page 7.14

MERV Ratings		
MERV	**Particle size**	**Typical controlled contaminant**
1-4	>10.0	*Pollen, sanding dust, textile and carpet fibers*
5-8	3.0-10.0	*Mold, spores, hair-spray, cement dust*
9-12	1.0-3.0	*Legionella, lead dust, welding fumes*
13-16	0.3-1.0	*Bacteria, most tobacco smoke, insecticide dust, copier toner*
17-20	≤ 0.3	*Virus, combustion particles, radon progeny*

MERV 8 vs. 10

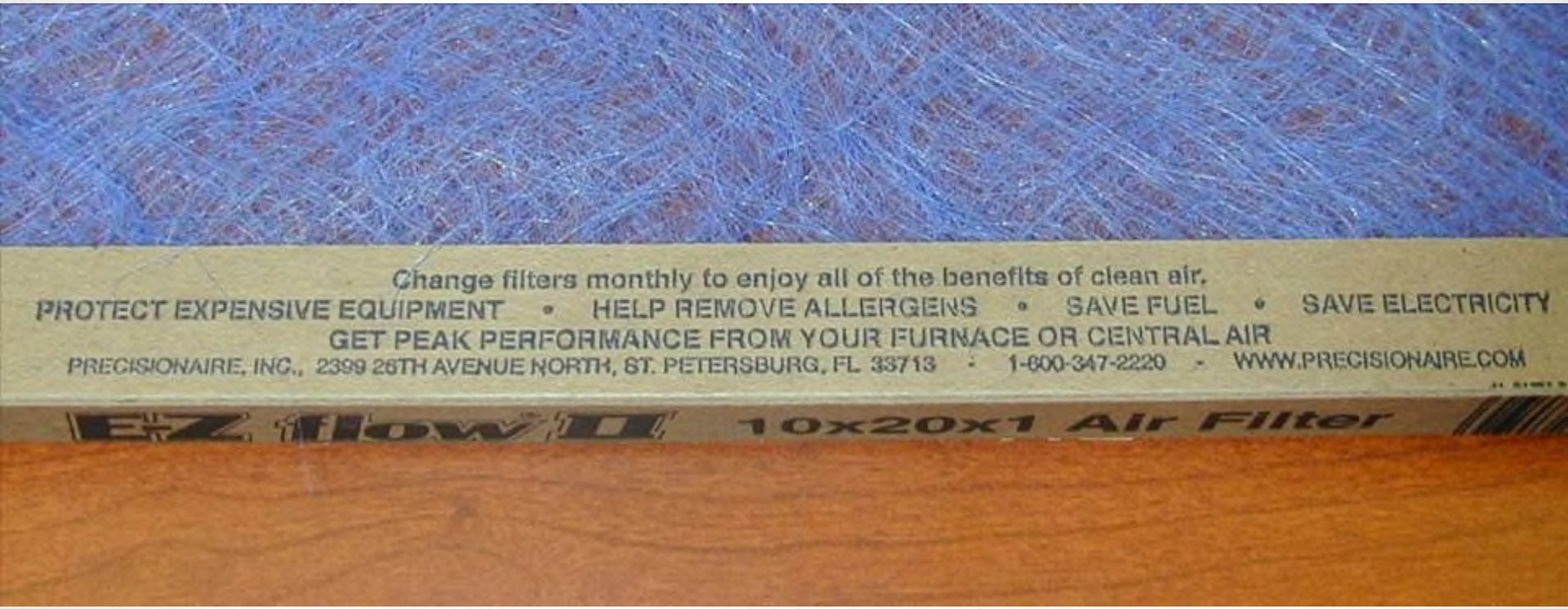
Page 7.14



Other Rating Systems

AND . . .

Page 7.15


Change filters monthly to enjoy all of the benefits of clean air.
PROTECT EXPENSIVE EQUIPMENT • HELP REMOVE ALLERGENS • SAVE FUEL • SAVE ELECTRICITY
GET PEAK PERFORMANCE FROM YOUR FURNACE OR CENTRAL AIR
PRECISIONAIRE, INC., 2399 26TH AVENUE NORTH, ST. PETERSBURG, FL 33713 · 1-800-347-2220 · WWW.PRECISIONAIRE.COM
EZ flow II
10x20x1 Air Filter

Code Requirements

Page 7.16

Code requirements related to ventilation

403.1	403.2
• Habitable spaces	• Bathrooms and toilet rooms

Code Requirements

Page 7.16

Code requirements related to ventilation

302.6	403.4	403.5
• Exhaust vents	• Process ventilation	• Clothes dryer exhaust

Code Requirements

Page 7.16

Code requirements related to ventilation

603.2	607.1	603.5	505.4
• Removal of combustion products	• General	• Combustion air	• Water heating facilities

Key Messages

Page 7.17

- Ventilation plays an important role in maintaining health.
- Ventilation is necessary to remove humidity and dilute or remove contaminants.
- Local exhaust ventilation removes contaminants from a point source, while whole house ventilation uses fresh air to dilute contaminants.

Learning Objectives

Page 7.17

- NAME five unhealthy conditions associated with poor ventilation.
- LIST five things (e.g. a room, appliance, mechanical system) in a household that need ventilation.
- NAME three things that power airflow in a building.
- LIST three household contaminants that can be removed by ventilation.
- DESCRIBE two ways ventilation reduces air contaminant levels.

Steps to a Healthier Home

KEEP IT SAFE

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

Learning Objectives

Page 8.1

EXPLAIN the difference between an injury and an accident.

NAME the 3 most common home injury related causes of death.

NAME five locations to look for safety hazards in the home.

NAME five ways to prevent home injuries.

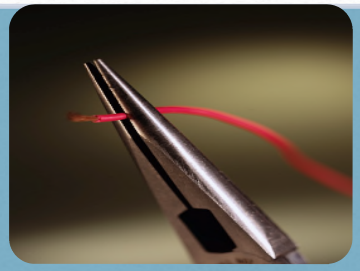
Are Injuries Accidents?

Injuries

Accidents

Safety-Related Housing Issues

Holes big enough to trip on

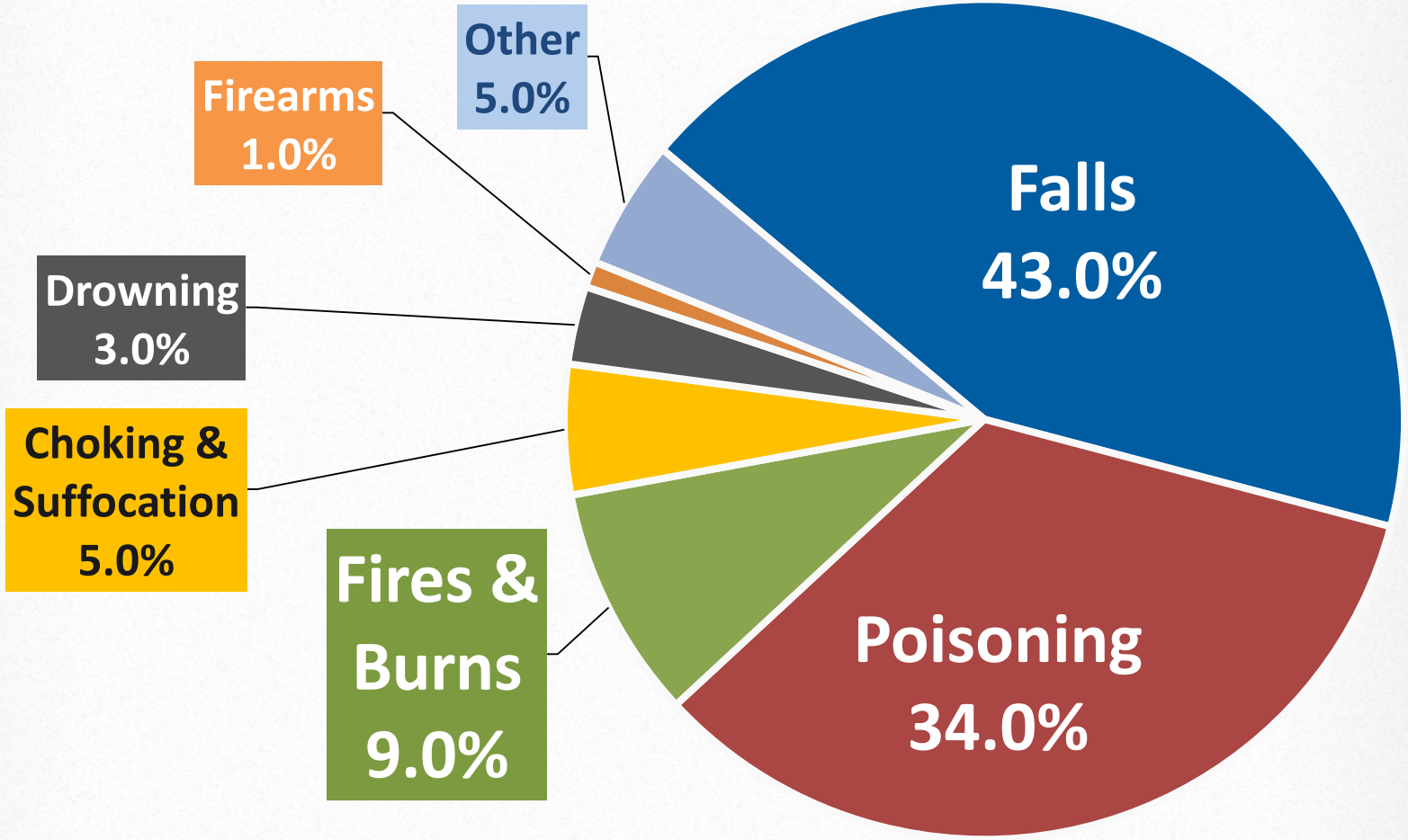


Electrical wiring problems

Lack of alarms

What are the most common causes of home injury deaths?

Page 8.2



Which age groups are most susceptible?

Page 8.3

Age Group	Susceptibility
Infants	Choking/suffocation is the highest rate of injury death
Birth – age 14	Nonfatal falls at home
1-14 years old	Highest rate of home injury death is fires and burns
Older adults	Nonfatal falls at home
Adults 80+ years	20 times higher risk for death from injury than younger individuals

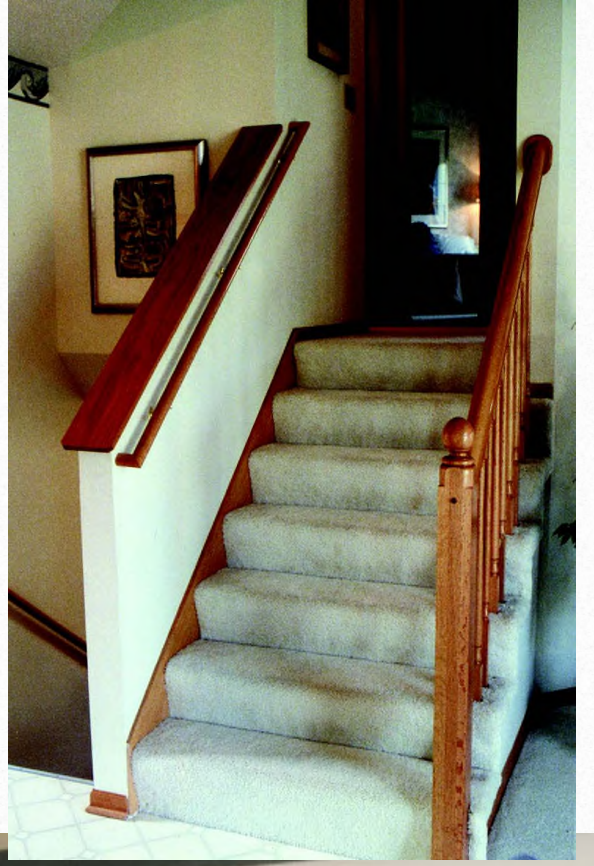
Window Safety Guard

Page 8.3

Safety Glass?

Handrails and grab bars where needed?

Page 8.4



Where do kids play?

Page 8.4

Page 8.5

Page 8.5

Sharp edges
Splinters

What Do They Land On?

Page 8.5

Poisoning

- **82%** of households keep medicines in unlocked drawers or cabinets.
- **69%** of homes with young children store household chemicals in unlocked areas.

Page 8.6

Labels

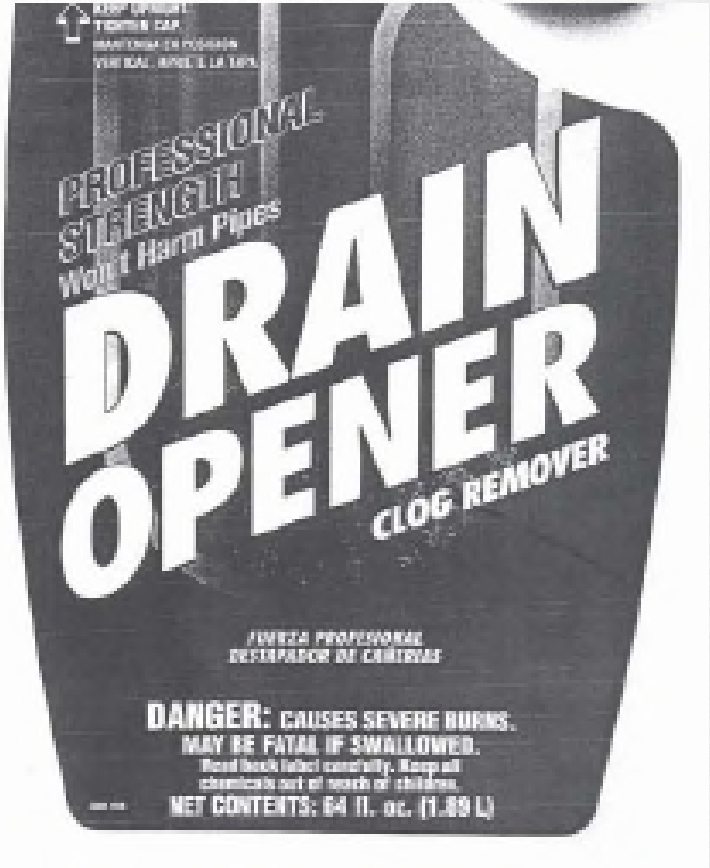
Page 8.7

Food, Drugs and Cosmetics	• Food and Drug Administration
Pesticides	• Environmental Protection Agency
Other Products Containing Hazardous Substances	• Consumer Products Safety Commission (CPSC)
Material Safety Data Sheets (MSDS)	• Occupational Safety and Health Administration

CPSC Principal Display Panel

Page 8.7

- Signal word
- Affirmative statement of principal hazard
- Statement to read other cautions on another panel if all labeling is not on Principal Display Panel



Page 8.8

What's under the sink?

Warning
Caution
Danger

Danger

"Danger" Signal Word Required if:

- Highly Toxic
- Corrosive
- Extremely Flammable

Corrosive v. Irritant

Page 8.8

Understand the difference.

Flammable v. Combustible

Page 8.8

- Flash Point
- Extremely Flammable
- Flammable
- Combustible

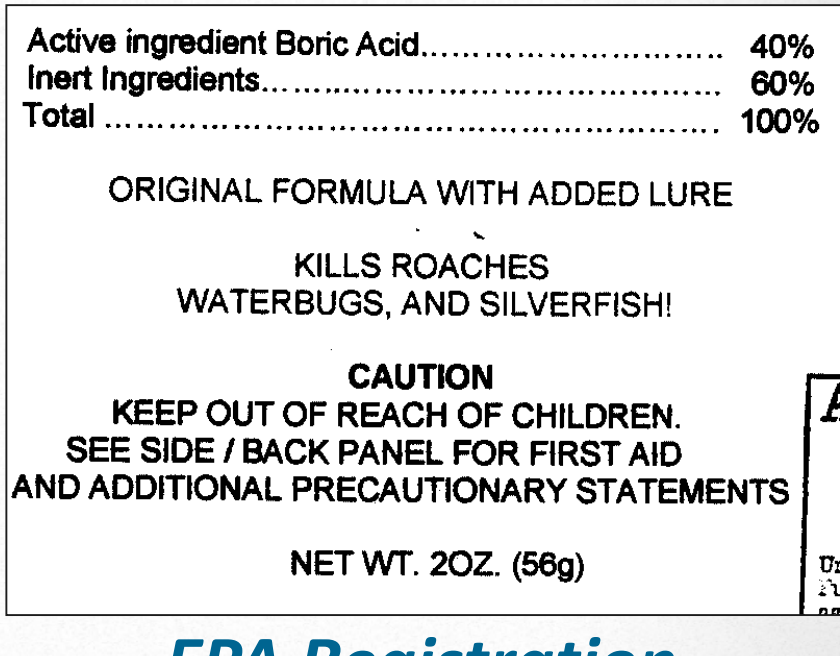
Flammables start fires. Combustibles feed fires.

If you need to choose, pick a combustible.

EPA Pesticide Product Label

Page 8.9

- Product Name
- Ingredients
  - Active
  - Inert / Other
- "Keep Out of Reach of Children"
- Signal Work - Poison/Danger/ Warning/Caution
- First Aid
- If Poison, then skull and crossbones
- Net contents.


Active ingredient Boric Acid..... 40%
Inert Ingredients..... 60%
Total 100%

ORIGINAL FORMULA WITH ADDED LURE

KILLS ROACHES
WATERBUGS, AND SILVERFISH!

CAUTION
KEEP OUT OF REACH OF CHILDREN.
SEE SIDE / BACK PANEL FOR FIRST AID
AND ADDITIONAL PRECAUTIONARY STATEMENTS

NET WT. 2OZ. (56g)

EPA Registration Number is Key

Storing Hazardous Materials

Page 8.9

- Well labeled bottles
- Easy to identify
- Store hazardous materials in secure location

Page 8.10

What about bug spray?

Arts & Craft Materials

Food Safety

Refrigerator:

- 40 degrees F

Freezer:

- 0 degrees F

CLEAN

SEPARATE

COOK

CHILL

Fires and Burns

- House fires
- Water heater temperature

Home Fires from Smoking

Page 8.12

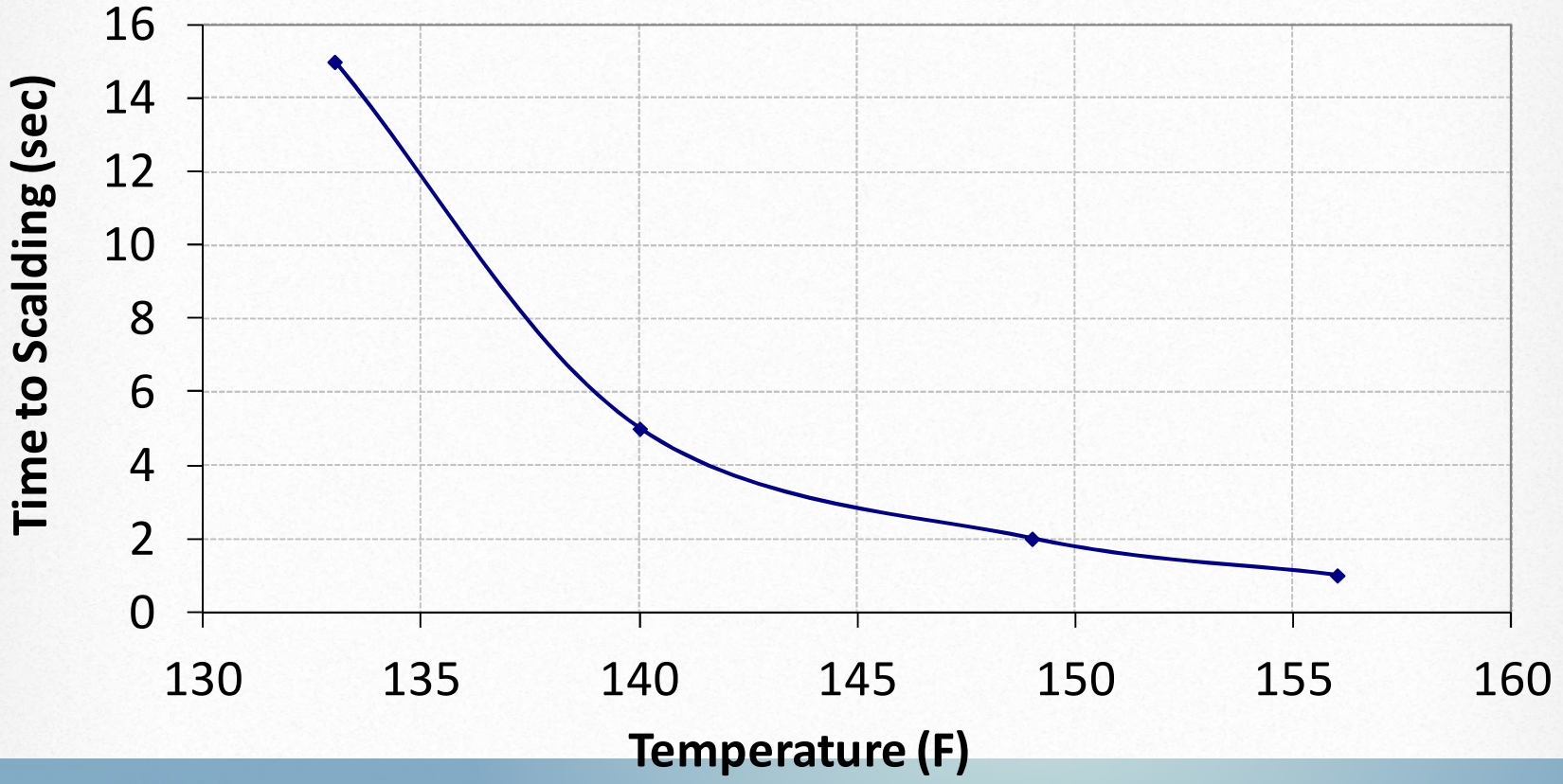
- 7,600 fires each year
- Leading cause of civilian fire deaths
- 67% from abandoned/discarded smoking materials
- Bedroom - leading area of fire origin
- Fires occurred most often from noon to 8 p.m.

- Smoke Alarm
- CO Alarm
- Fire Extinguishers

Scalding

Page 8.13

To avoid risk of scalding:
Hot water should be less than120˚ F

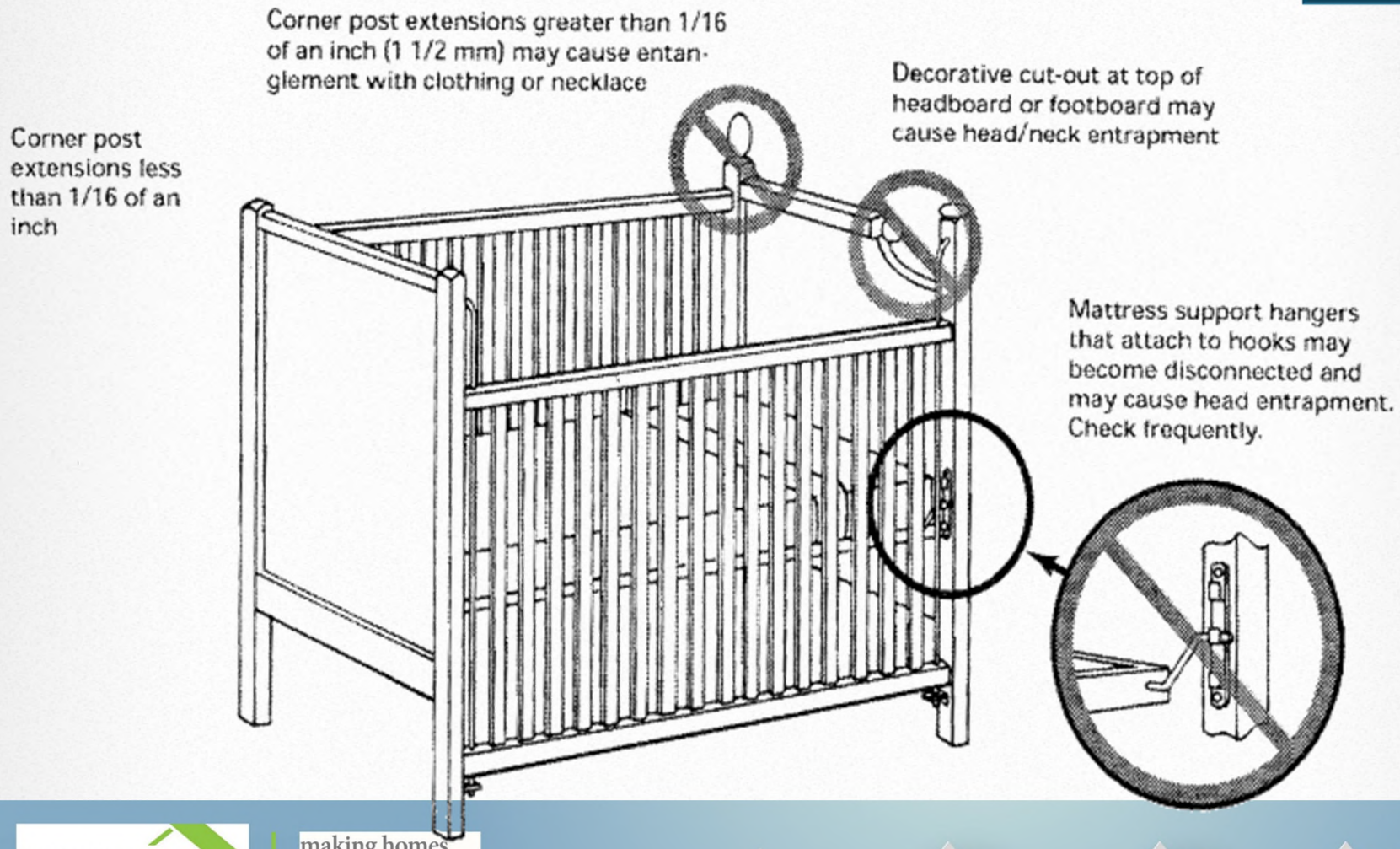


Choking and Suffocation

Page 8.13

Crib Safety

Page 8.14



Choke hazards?

Electric shock hazard?

Drowning

Page 8.15

Firearms

Trigger locks and secured storage

Store ammunition separate from weapon

Keep it Safe

There are many ways to be injured in the home

NATIONAL HEALTHY HOMES TRAINING CENTER & NETWORK | making homes healthier

IPMC Sections Related to Safety

Page 8.16

304.10	304.13	304.18	304.18.2	305.2
• Stairways, decks, porches and balconies	• Window, skylight and door frames	• Building security	• Windows	• Structural members

IPMC Sections Related to Safety

Page 8.17

305.4	305.5	306.1	402.2
• Stairs and walking surfaces	• Handrails and guards	• General	• Common halls and stairways

IPMC Sections Related to Safety

Page 8.17

604.2	604.3	605.2	605.3
• Service	• Electrical system hazards	• Receptacles	• Lighting fixtures

Key Messages

Page 8.18

- Injuries are not accidents. They are preventable.
- There are many simple and inexpensive ways to prevent home injuries.
- Children and older adults are more at risk for injuries in the home.
- Falls, poisoning, and fires/burns are the most common causes of injury deaths.

Learning Objectives

Page 8.18

EXPLAIN the difference between an injury and an accident.

NAME the 3 most common home injury related causes of death.

NAME five locations to look for safety hazards in the home.

NAME five ways to prevent home injuries.

Steps to a Healthier Home

KEEP IT CONTAMINANT-FREE

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

Learning Objectives

Page 9.1

IDENTIFY at least four contaminants in the home and strategies to prevent, contain or control them.

DESCRIBE at least four ways that contaminants get into the home.

IDENTIFY at least three health effects and their associated contaminant.

Contaminant Buying Decisions

Page 9.1

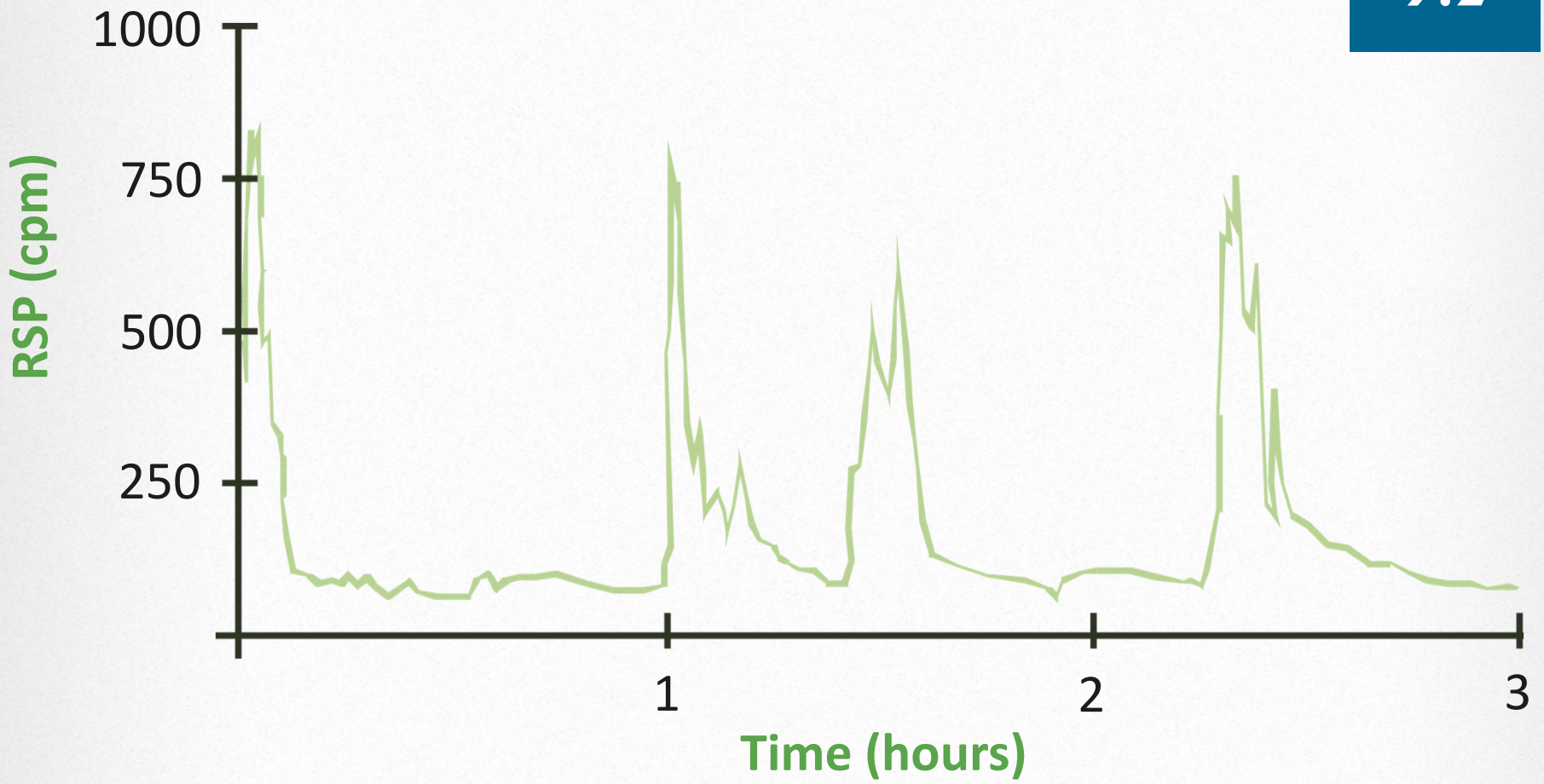
INTENTIONALLY BRING IN:	ALONG FOR THE RIDE:
• Tobacco Smoke • Pesticides • Volatile Organic Comp. • Mercury • Asbestos • Meth Labs	• Bedbugs and Mice • Cockroaches • Mice • Formaldehyde • Lead

Secondhand Smoke

Page 9.2

Tobacco Spikes in Particle Levels

Page 9.2



Source: Indoor Air Quality, Infiltration and Ventilation in Residential Buildings NYSERDA 1985 [5]

Why Avoid Secondhand Smoke:

Page 9.2

- Children's Health Effects
- Adult Health Effects
- 60% of US population has biological evidence of exposure

Smoke-Free Home Rules: State Performance

Page 9.3

	1998-1999	2003	2009-2010	% Increase
Total	60%	72%	81%	33%
Max (state range)	81%	89%	93%	15%
Min (state range)	40%	53%	68%	70%

Health Effects in Children

Page 9.2

In children, second-hand smoke causes the following:

- Ear infections
- More frequent and severe asthma attacks
- Respiratory symptoms (for example, coughing, sneezing, and shortness of breath)
- Respiratory infections (bronchitis and pneumonia)
- A greater risk for sudden infant death syndrome (SIDS)

www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/general_facts/index.htm

Smoke-Free Housing Policies

Smoke Free Saves Property Owners Money

Page 9.4

The Monetary Impact

Cost to Rehabilitate a Unit Where Smoking is Prohibited vs. a Unit Where Smoking is Allowed

	Non-Smoking	Light Smoking	Heavy Smoking
General Cleaning	$240	$500	$720
Paint	$170	$225	$480
Flooring	$50	$950	$1,425
Appliances	$60	$75	$490
Bathroom	$40	$60	$400
TOTAL	$560	$1,810	$3,515

Data reflects surveys from housing authorities and subsidized housing facilities in New England.
Collected and reported by Smoke-Free Housing New England, 2009.

Smoke-Free Housing Policies

Page 9.4

Other benefits

- Increases Demand
- Decrease Fires/Potential Insurance Discount
- Reduces Tenant Conflict

Smoke-Free Housing Policy

Page 9.4

- Policy Approaches
- Voluntary / Grassroots Efforts
- Low Income Housing Tax Credit
- Disclosure

Change is in the Air!

Page 9.4

- No later than Aug. 3, 2018, all public housing communities must implement a policy that bars the use of prohibited tobacco products in all public housing units, interior common areas, and outdoor areas within 25 feet of public housing and administrative office buildings. Prohibited tobacco products are defined as items that involve the ignition and burning of tobacco leaves, such as cigarettes, cigars, pipes, and water pipes (also known as hookahs).

Smoking Cessation Programs

Page 9.5

- Smoke-free policies work best if coupled with cessation resources

Volatile Organic Compounds

Page 9.5

- Air Fresheners
- Cleaning Products
- Sprays & Coatings
- Formaldehyde
- Carpets
- Vinyl Floors
- Drywall
- Hobbies
- Home Maintenance

Volatile Organic Compounds

Page 9.5

Concentration of VOC's can be **2-5 times greater** in the home.

During or immediately after paint stripping activities, VOC levels can be **1,000 times higher** than outdoors.

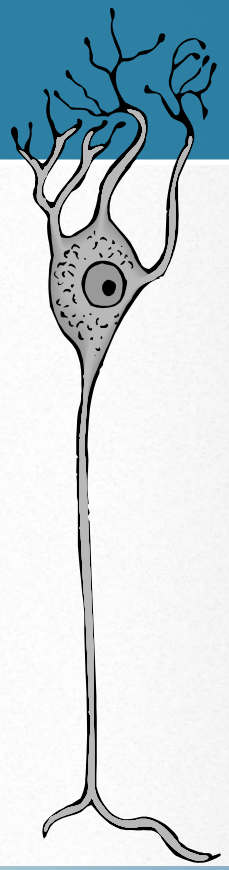
Page 9.6

Paints, varnishes and glues may contain a variety of materials with potential health or nuisance effects. Use low VOC paints but with caution or use traditional paints with lots of ventilation.

Why Avoid VOCs?

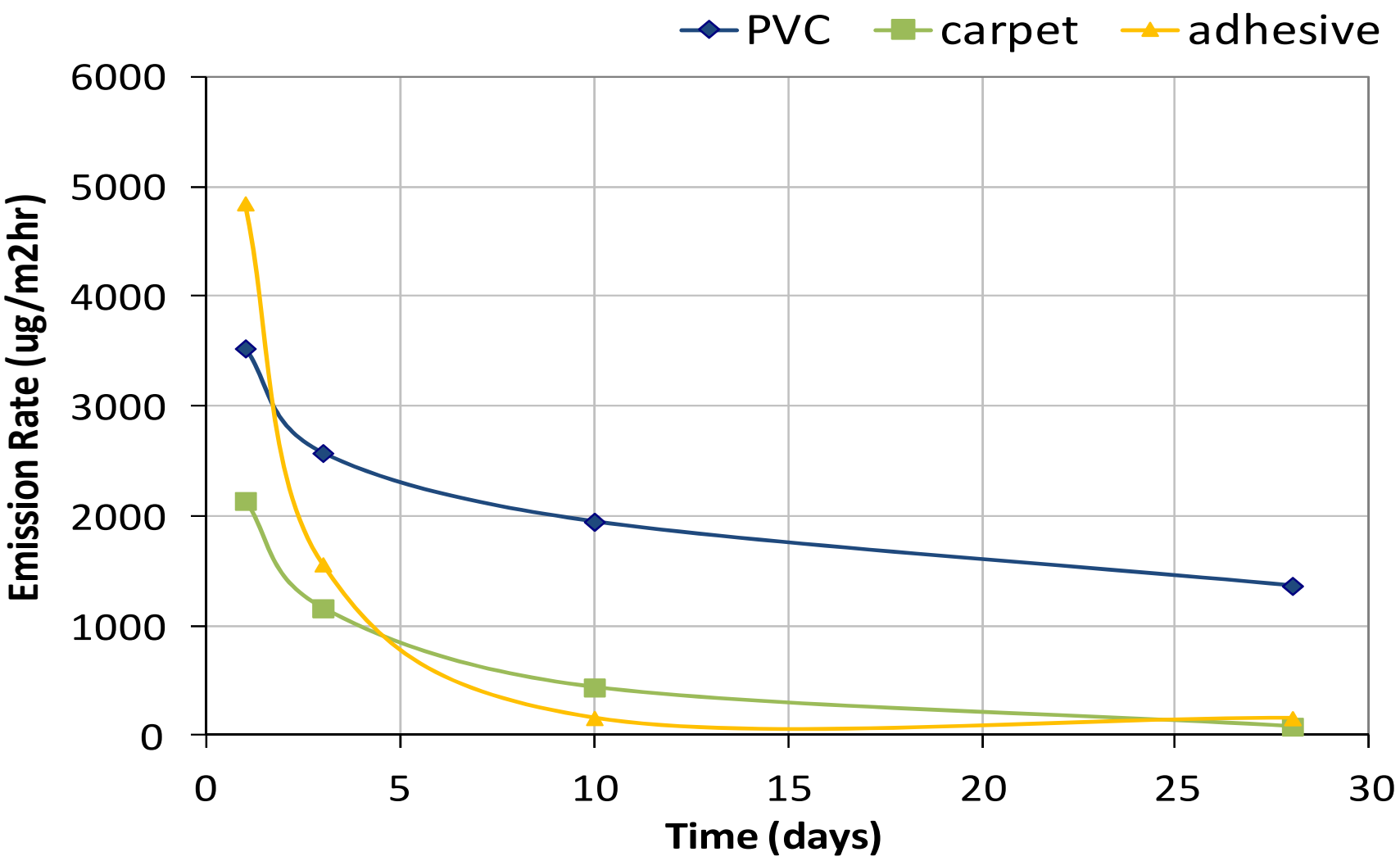
Page 9.6

Potential health effects of VOCs:



- Eye, nose, throat irritation
- Headaches, nausea, coordination
- Liver, kidney, and brain damage
- Some can cause cancers
- Child development

VOC- AND SVOC-EMISSIONS FROM ADHESIVES, FLOOR COVERINGS AND COMPLETE FLOOR STRUCTURES [12]



Reduce Potential Sources

Page 9.7

- Don’t use it if you don’t have to.
- Substitute a better product

Steps to Control VOCs

Control the source

Store materials properly

Ventilate

Third-Party Certifications

Page 9.7

Buildings

Products and Services

Industry Stewardship Programs

Page 9.8

Understand the Motivations & Research the Options

Examples

Other Programs

Track Emerging Issues

Page 9.8

- Healthyhomes.net listserve:
  - Healthyhomesnet-on@mail-list.com
- Phthalates from Vinyl Products
- Sulfur from Chinese Drywall
- Cadmium in Jewelry?

And then we have meth labs . . .

Page 9.8

Meth Labs

Health & Safety Hazards

Page 9.9

- Explosive
- Flammable
- Toxic
- Caustic

Key Messages

Page 9.9

- It is easier to prevent exposure to contaminants then it is to remove them and treat their effects.
- Should contamination occur: control, contain, and clean-up.
- Contaminants are not always detectable by our senses.

Learning Objectives

Page 9.9

IDENTIFY at least four contaminants in the home and strategies to prevent, contain or control them.

DESCRIBE at least four ways that contaminants get into the home.

IDENTIFY at least three health effects and their associated contaminant.

Steps to a Healthier Home

Keep it Maintained

Learning Objectives

Page 10.1

- Name at least three systems that require ongoing maintenance.
- Identify two maintenance actions that require the use of a professional.
- Name at least two health effects from lead.
- Identify housing targeted by the RRP rule.
- Describe the two ways to mitigate radon in a home.

Contaminants & Maintenance

Page 10.1

LEGACY TOXICS:

- Lead-Based Paint
- Asbestos
- Chromated Copper Arsenate Wood
- Mercury
- Pesticide Residues

CREATED OR GROWN:

- Cockroaches
- Mice and Rats
- Mold
- Carbon Monoxide
- Sewer Gas
- And Then There is Radon

Maintenance

- Solid Waste
- Water supply
- Sewer system
- Heating/cooling/dehumidification/humidification
- Cooking
- Ventilation
- Rainwater control/drainage
- Structural integrity
- Storage / Organization

Maintenance Actions

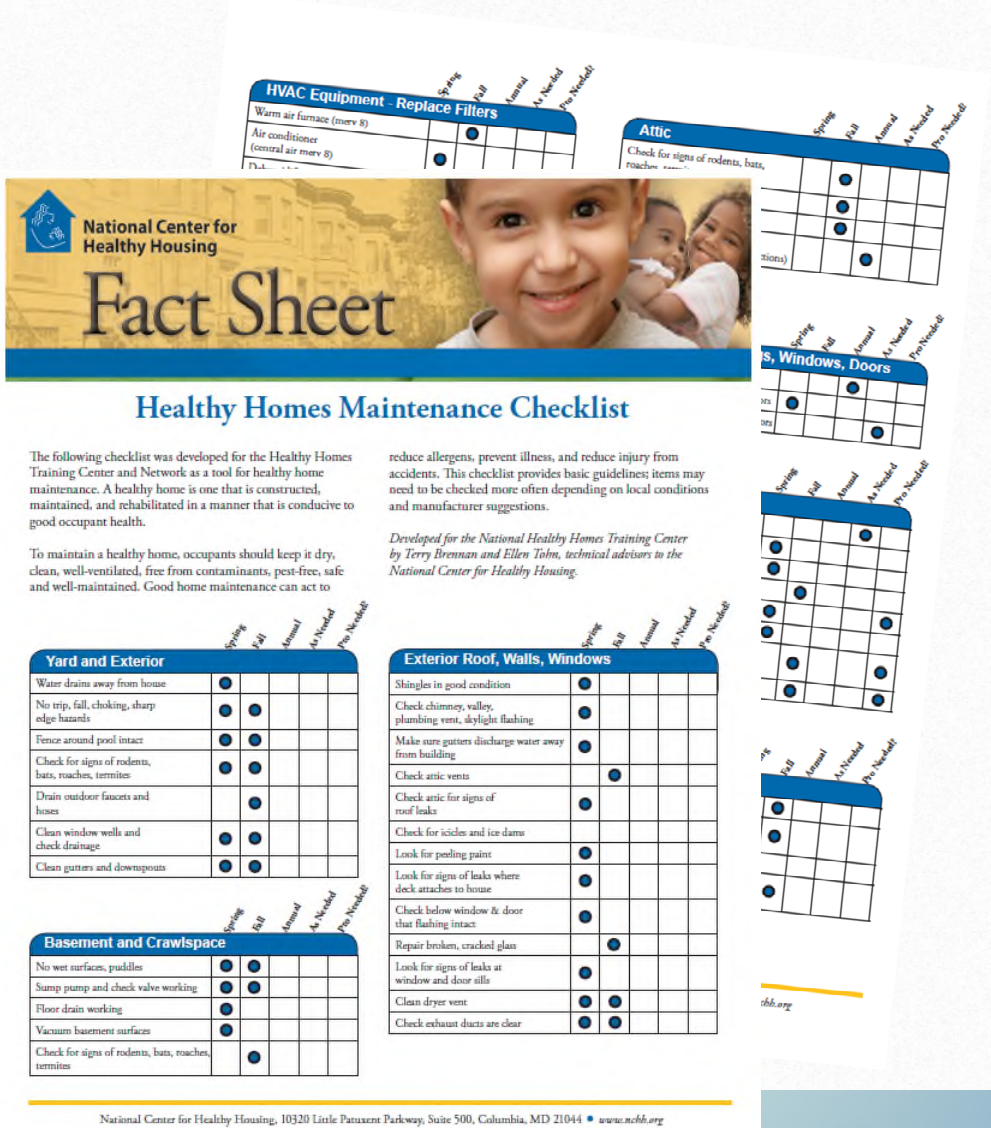
- Inspect
- Clean
- Lubricate
- Replace
- Repair
- Organize

Page 10.2

How's the filter? A clogged low efficiency filter partially sucked out of the frame.

When?

- On-going
- Seasonally
- Annually



National Center for Healthy Housing

Fact Sheet

Healthy Homes Maintenance Checklist

The following checklist was developed for the Healthy Homes Training Center and Network as a tool for healthy home maintenance. A healthy home is one that is constructed, maintained, and rehabilitated in a manner that is conducive to good occupant health.

To maintain a healthy home, occupants should keep it dry, clean, well-ventilated, free from contaminants, pest-free, safe and well-maintained. Good home maintenance can act to reduce allergens, prevent illness, and reduce injury from accidents. This checklist provides basic guidelines; items may need to be checked more often depending on local conditions and manufacturer suggestions.

Developed for the National Healthy Homes Training Center by Terry Brennan and Ellen Tohn, technical advisors to the National Center for Healthy Housing.

Yard and Exterior	Spring	Fall	Annual	As Needed	Pro Needed
Water drains away from house	●				
No trip, fall, choking, sharp edge hazards	●	●			
Fence around pool intact	●	●			
Check for signs of rodents, bats, roaches, termites	●	●			
Drain outdoor faucets and hoses		●			
Clean window wells and check drainage	●	●			
Clean gutters and downspouts	●	●			

Basement and Crawlspace	Spring	Fall	Annual	As Needed	Pro Needed
No wet surfaces, puddles	●	●			
Sump pump and check valve working	●	●			
Floor drain working	●				
Vacuum basement surfaces	●				
Check for signs of rodents, bats, roaches, termites		●			

Exterior Roof, Walls, Windows	Spring	Fall	Annual	As Needed	Pro Needed
Shingles in good condition	●				
Check chimney, valley, plumbing vent, skylight flashing	●				
Make sure gutters discharge water away from building	●				
Check attic vents		●			
Check attic for signs of roof leaks	●				
Check for icicles and ice dams					
Look for peeling paint	●				
Look for signs of leaks where deck attaches to house	●				
Check below window & door that flashing intact	●				
Repair broken, cracked glass		●			
Look for signs of leaks at window and door sills	●				
Clean dryer vent	●	●			
Check exhaust ducts are clear	●	●			

National Center for Healthy Housing, 10320 Little Patuxent Parkway, Suite 500, Columbia, MD 21044 • www.nchh.org

Lead and Lead-Based Paint

- Peeling, Chipping Paint / Deteriorated Paint
- Dust
- Soil
- Drinking water
- Consumer Products such Pottery, Cribs, Jewelry, Candle Wicks
- Cultural Items
- Contaminated Sites

Why Lead?

Why Avoid Lead?

- Reduced IQ
- Learning disabilities
- Impaired hearing
- Reduced attention spans, behavior problems
- Anemia
- Kidney damage
- Damage to central nervous system
- Coma, convulsions, death

Peeling paint outside

Lead: Age of Housing Matters

Year House Was Built	Percent of Houses with Lead-Based Paint
Before 1940	87 percent
1940-1959	69 percent
1960-1978	24 percent
All US Housing Stock	40 percent

Prevalence of deteriorated paint

2015 American Housing Survey

2.4%

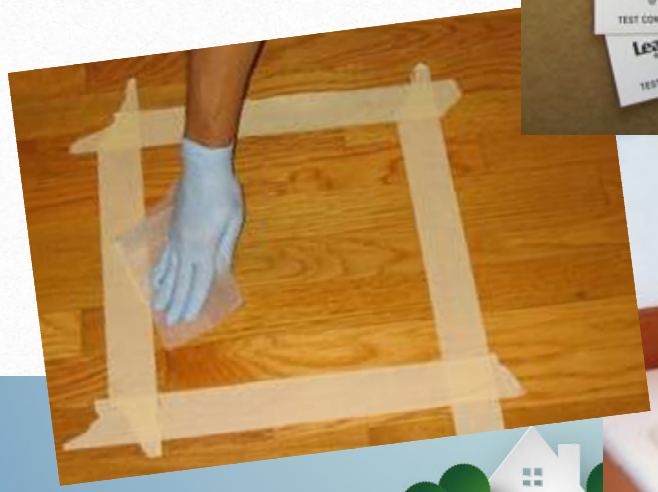
of homes have broken plaster or peeling paint

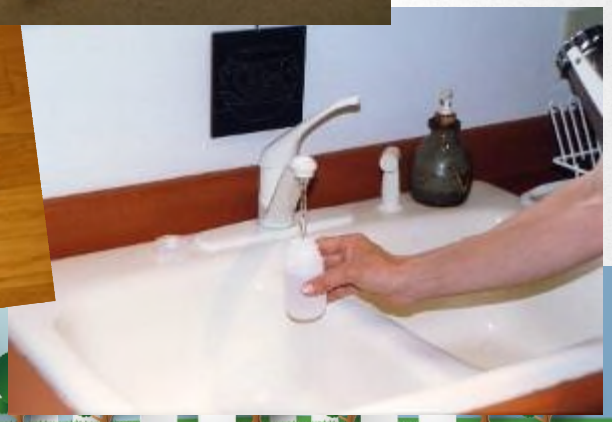
Conditions that Deteriorate Paint

- In past twelve months,
  - 8.5% of homes had interior water leakage
  - 9.9% of homes had exterior water leakage

Available Testing

- Paint
- Dust - Clearance testing
- Bare soil
- Drinking water

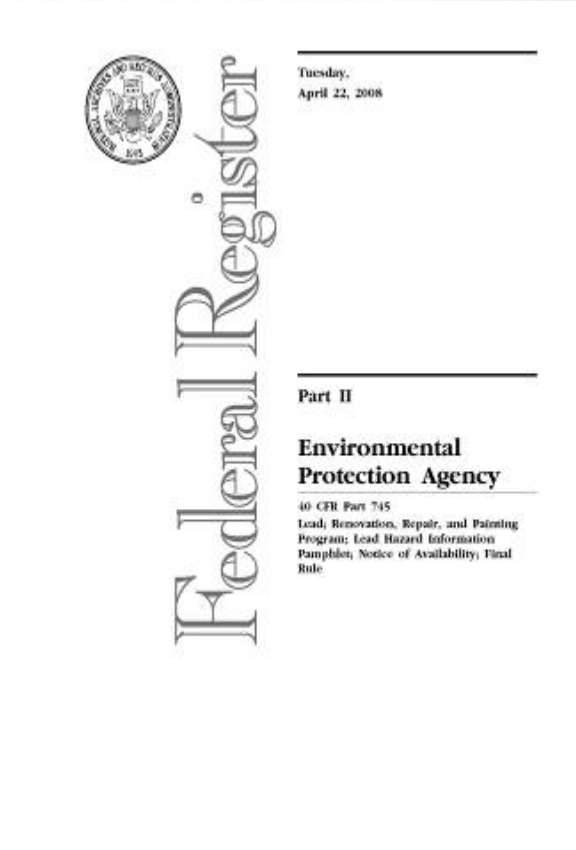




EPA RRP Rule

Lead Renovation, Repair and Painting (RRP) Rule

- Effective April 22, 2010
- Pre-1978 housing (target or child-occupied)
- Triggers
- 40 CFR 745.80 to 745.91
- April 22, 2008 Federal Register



Authorized States to implement the RRP

Page 10.6

14

States have been authorized to administer and enforce the RRP Rule.

1. Wisconsin
2. Iowa
3. North Carolina
4. Utah
5. Mississippi
6. Kansas
7. Rhode Island
8. Oregon
9. Massachusetts
10. Alabama
11. Washington
12. Georgia
13. Oklahoma
14. Delaware

Impacts of RRP Rule

- 8.4 million renovation events annually
- Required certification of firms and individuals

Why Now?

- Final major rule from the Residential Lead-based Hazard Reduction Act of 1992
- Congress required rule to be finalized in 1996
- Still to come:
  - Public buildings built before 1978
  - Commercial buildings that create lead-based paint hazards

LEAD-BASED PAINT RULES

1970

1980

1990

2000

2010

1976 Toxic Substance Control Act (TSCA)

1978 U.S. Consumer Product Safety Commission bans the use of lead paint for residential use

OSHA general industry standard

1992 **Title X (Residential Lead-Based Paint Hazard Reduction Act)**

OSHA addresses lead exposure in construction

1996 Real Estate Notification and Disclosure Act (REND)

Lead-Based Paint Activities Regulation

1999 HUD Lead-Safe Housing Rule

EPA Pre-Renovation Education Rule (PRE-rule)

2001 EPA Lead Hazard Standard

LEAD-SAFE EPA CERTIFIED FIRM

2008 Consumer Product Safety Improvement Act (CPSIA)

Renovation, Remodeling and Painting (RRP)*

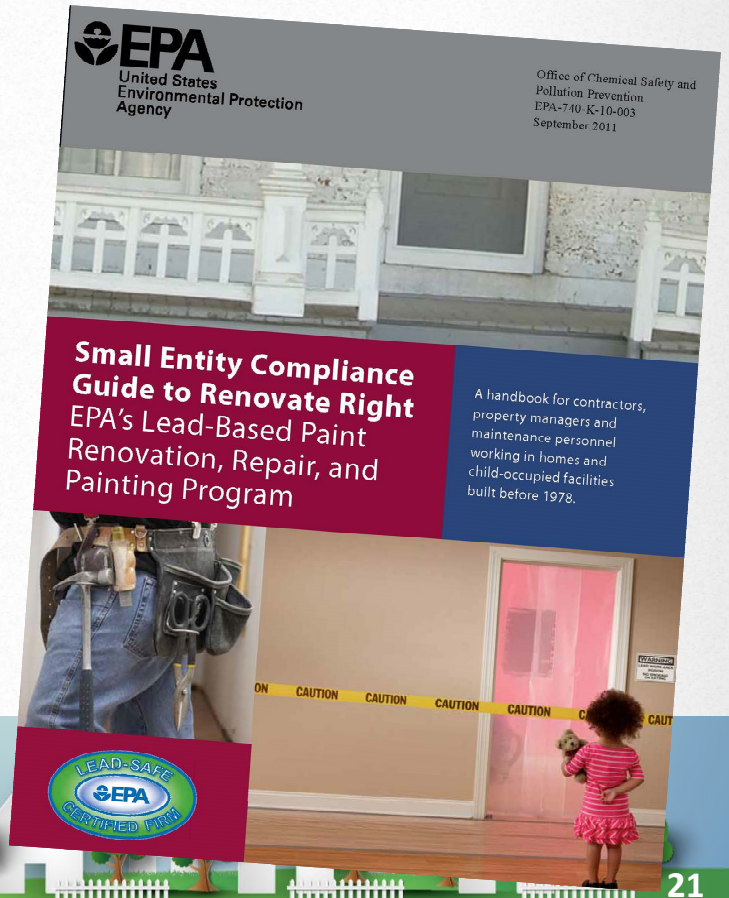
**RRP took effect in 2010, revised in 2011*

EPA Resources:

- www.epa.gov/lead
- www.epa.gov/lead/pubs/renovation.htm

HUD Resources:

- www.hud.gov/lead



Summary of Changes from RRP

- "Certified Renovation Firm" Disturbs Paint
- "Certified Renovators" Supervise Work
- Mandatory Work Practices
- Post-renovation Cleaning Verification
- Documentation!

Summary of Requirements

- Interior

Summary of Requirements

- Exterior

How clean is clean?

- Clearance testing is required for jobs receiving HUD funding and as the clients requests

A New Booklet

Only for Leases and Sales of Target Housing

For Renovations in Target Housing and Child-occupied Facilities

Lead Disclosure

- For property transfers
- For rentals

Housing Code

Housing code provisions related to paint

304.2	304.6	305.3
• Protective treatment	• Exterior walls	• Interior surfaces

Page 10.11

Asbestos

Why Avoid Asbestos?

- Health effects:
  - Lung Cancer
  - Mesothelioma
  - Asbestosis
- Smokers are at greater risk!

How to Handle Asbestos

- LEAVE IT ALONE (if in good condition).
- Look for signs of wear or damage - avoid touching.
- If damaged or renovation might disturb it, repair or remove by licensed professional.

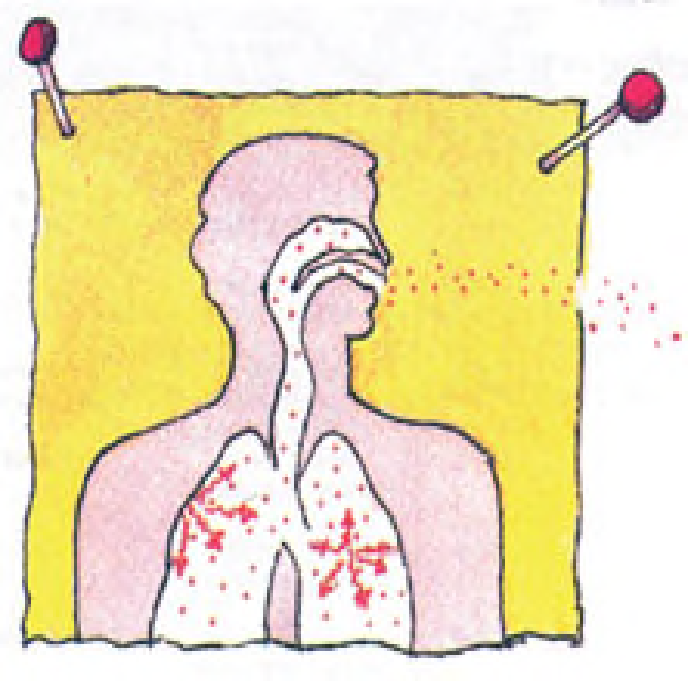
Vermiculite

Asbestos Regulations

- National Emission Standard for Hazardous Air Pollutant (NESHAP)
- Model Asbestos Program for States
- EPA's Ban on Asbestos in Products Reversed in 1992
- OSHA standards for workers

Radon

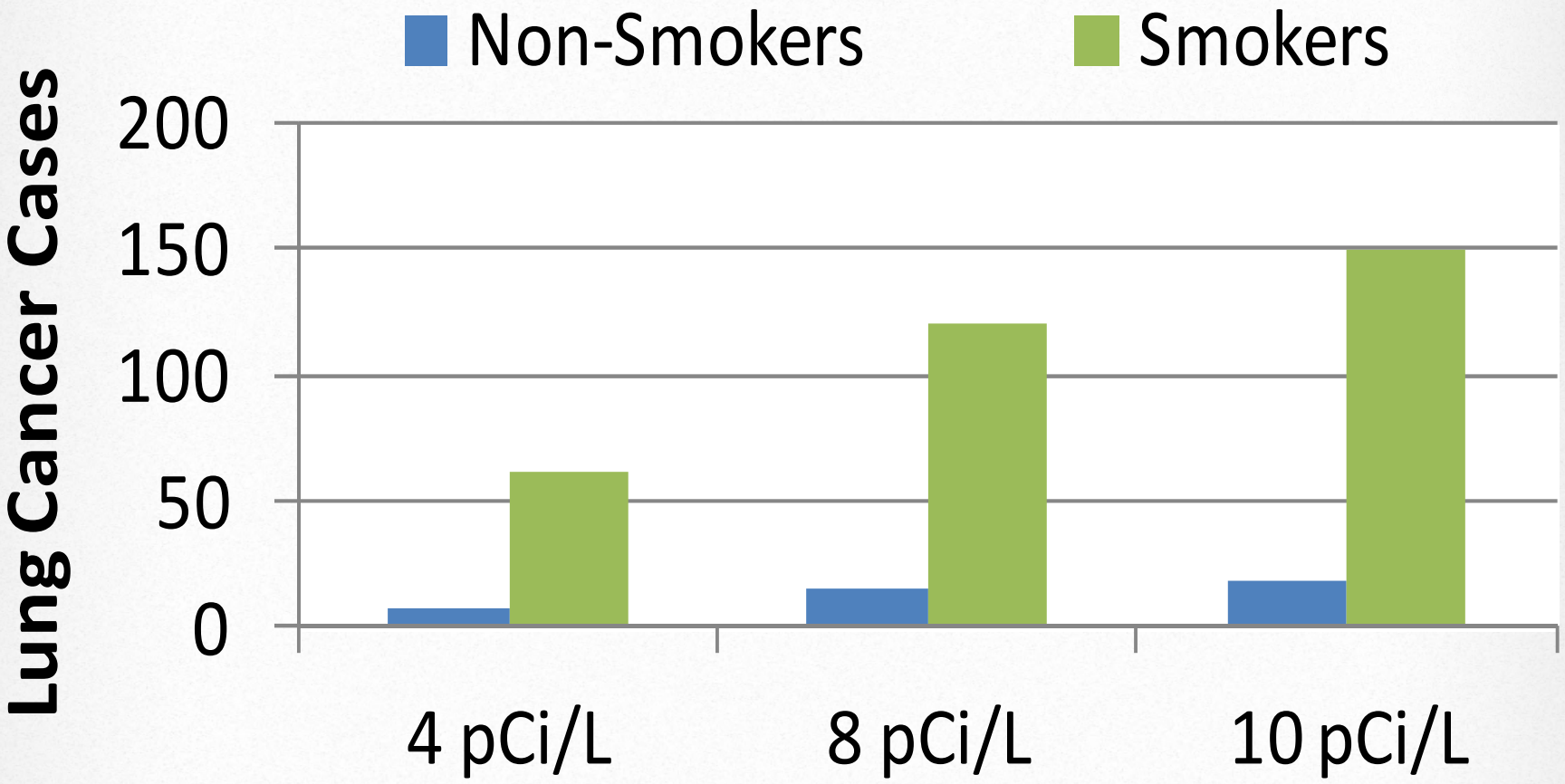
A Serious Health Concern



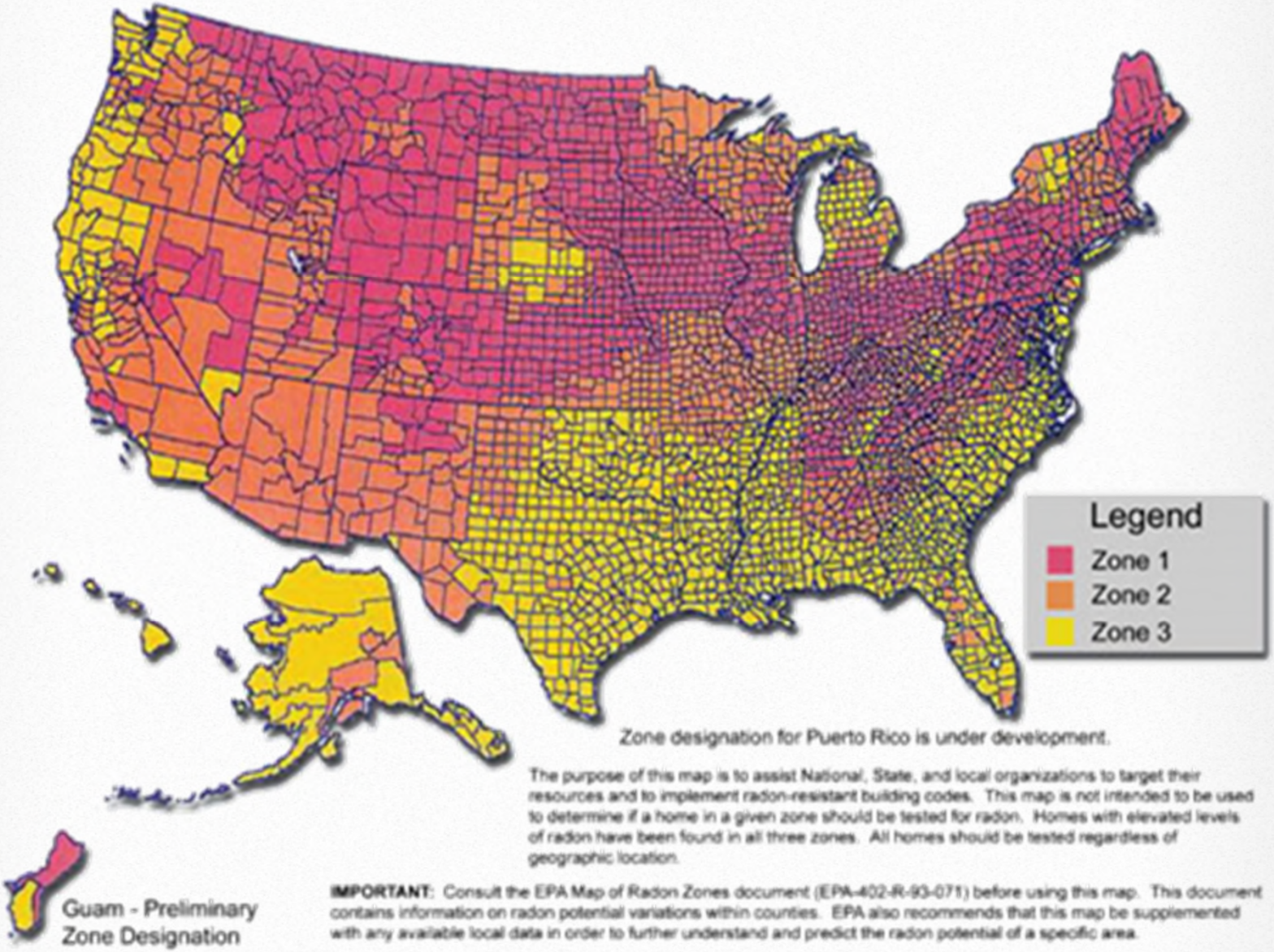
- Naturally occurring gas
- 2nd leading cause of lung cancer after smoking
- Leading cause of lung cancer in nonsmokers and people who have never smoked.

Page 10.15

Estimated Lung Cancer Cases in a Population of 1,000



EPA Map of Radon Zones



Zone designation for Puerto Rico is under development.

The purpose of this map is to assist National, State, and local organizations to target their resources and to implement radon-resistant building codes. This map is not intended to be used to determine if a home in a given zone should be tested for radon. Homes with elevated levels of radon have been found in all three zones. All homes should be tested regardless of geographic location.

IMPORTANT: Consult the EPA Map of Radon Zones document (EPA-402-R-93-071) before using this map. This document contains information on radon potential variations within counties. EPA also recommends that this map be supplemented with any available local data in order to further understand and predict the radon potential of a specific area.

How Radon Gets into a Home

Page 10.17

- ✓ Cracks in solid floors
- ✓ Construction joints
- ✓ Cracks in walls
- ✓ Gaps in suspended floors
- ✓ Gaps around service pipes
- ✓ Cavities inside walls
- ✓ Other openings
- ✓ Water supply

Testing for Radon

Short Term

Long Term

If result is 4 pCi/L or higher take a follow-up test OR fix the home

Testing for Radon

Testing Options:

- Kits
- Hire a professional

Radon Data Card
(Write Comments on Back)

In order to Analyze test, all information must be filled out completely.
(Please Print) Please Enter Radon Unit Serial No.'s (A) [illegible]
(B) [illegible]

Name JOAN SMITH Phone (XXX) XXX-XXXX

Address 4 PRETEND ST, APT 4B County SMITH

City SMITH State MD Zip 22222

Room Used For: ☐ Living Room ☒ Bedroom ☐ Other

Room Level: ☒ Basement ☐ 1st Floor ☐ 2nd Floor ☐ Other

(Begin) Cap Removed: Date 5/19/07 Time 2:15 AM/PM (Exact Time)

(End)Cap Re-Installed: Date 5/22/07 Time 2:23 AM/PM (Exact Time)

If testing address Differs from mailing address please enter Below.

227 MASSACHUSETTS AVE, NE - STE 200
WASHINGTON, DC 20002

ATTN: AECLP

Interpreting Radon Results

Short term test > 4 pCi/L

- Take second short term test or long term test

Short term average or long term test >4 pCi/L

- Fix home for radon

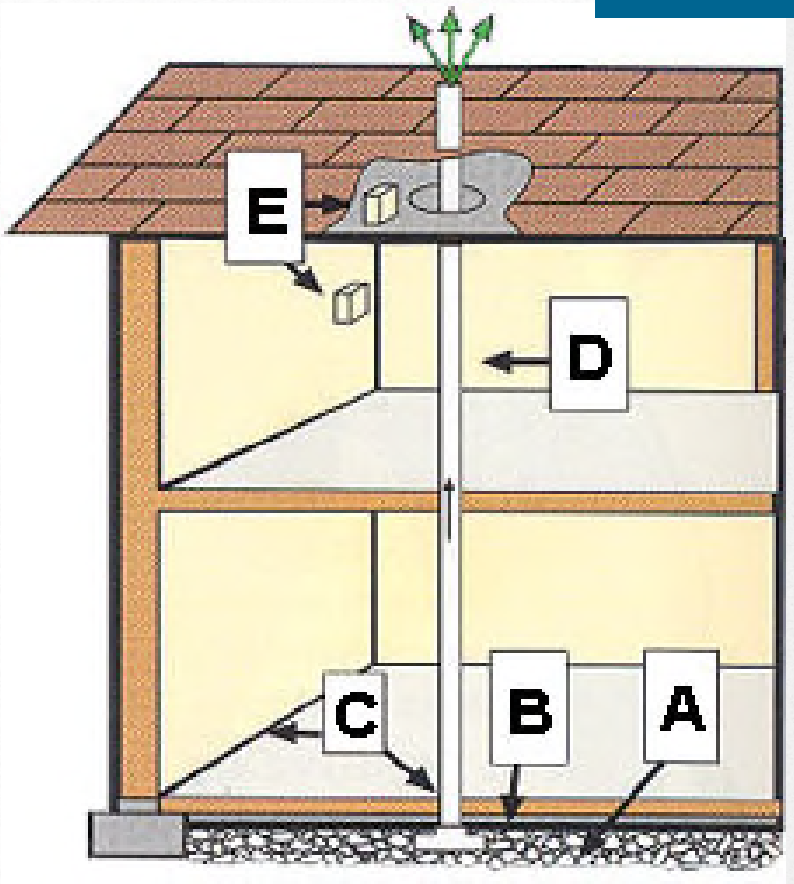
Radon Reduction Systems

- New Construction
- Existing Housing

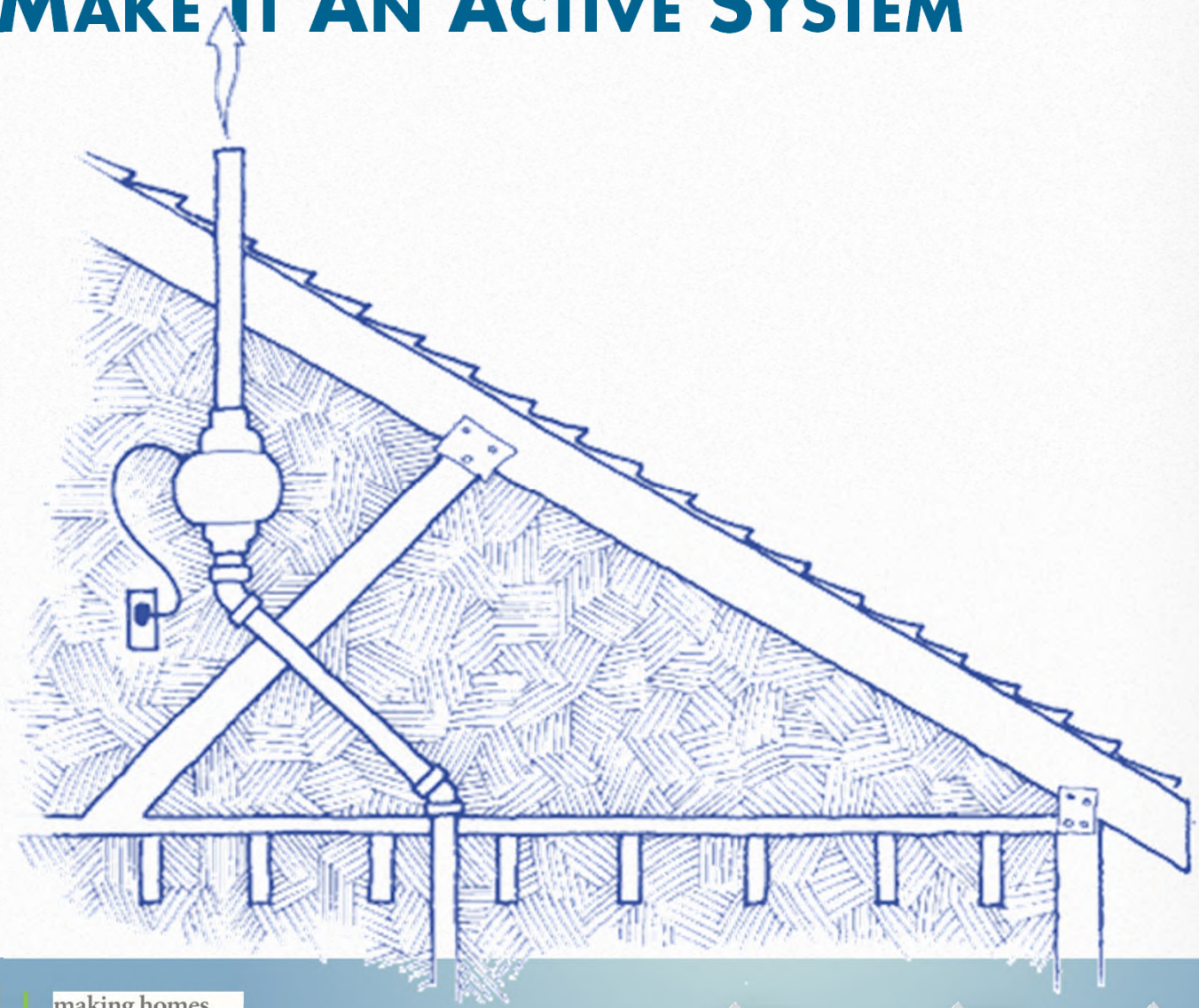
Passive Sub-Slab Depressurization System (New Construction)

Page 10.21

A.	• Gas-Permeable Layer
B.	• Plastic Sheeting
C.	• Seal and Caulk
D.	• Vent Pipe
E.	• Junction Boxes



Fans Make It An Active System



Radon Fixes

Existing Housing

- ✓Seal floor and cracks
- ✓Vent from below slab
- ✓Fan sucks air – active system
- ✓Sump suction reduces entry

Label Radon Systems

Radon Mitigation Costs

	Average Costs
New Construction	
Passive only	$350 - $500
Active system	$650 - $800
Existing Homes	$800-$2,500

Finding a Qualified Contractor

- Contact EPA
- 2 Private National Proficiency Programs

Resources

State Radon Contacts	• www.epa.gov/iaq/whereyoulive.html
Coupons for Test Kits	• 800.SOS.RADON or www.sosradon.org
Radon Mitigation	• 800.644.6999
Other Questions	• 800.557.2366
IAQ Questions	• 800.438.4318

Sewer Gas

Page 10.25

- Mixture of gases
- Source

Key Messages

- Systems should be inspected regularly to ensure proper function.
- Some maintenance activities require the use of professionals.
- Lead causes a variety of serious health effects.
- Contractors doing renovation should be certified to work on houses with lead paint.
- Deteriorating products or areas with asbestos need to be addressed by a certified professional.
- There are two ways to address high radon levels in a home.

Learning Objectives

Page 10.25

- Name at least three systems that require ongoing maintenance.
- Identify two maintenance actions that require the use of a professional.
- Name at least two health effects from lead.
- Identify housing targeted by the RRP rule.
- Describe the two ways to mitigate radon in a home.

Steps to a Healthier Home

Keep it Climate Controlled

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

KEEP IT 8. Climate Controlled

Climate-Control Systems:

- Heating
- Cooling
- Ventilation
- Think of the house as a System

What are the Health and Safety Risks?

Increased risk from exposure to extreme cold and heat

Exacerbate asthma, mold and other indoor pollution

General discomfort

High monthly utility bills

We Have Systems To:

- Add heat
- Remove heat
- Ventilate
- Add or remove humidity

Heating Systems

- Fuel
  - Gas (natural or LP), oil, wood, coal
  - Electric
- Distribution
  - Hot water, steam, warm air
  - Radiators, baseboard, ducts, space heaters
  - Radiant floors and ceilings
- Chimneys, sealed combustion, fan powered
- Temperature Controls

Mechanical Ventilation

All exhaust appliances "suck" air.

Photos courtesy of The US Department of Energy

Occupant Factors
(The ways we do the things we do)

- Water Usage
- Cooking & Storing Food
- Cleanliness
- Systems Operation
- Maintenance
- Tolerance For Pests
- Lighting, Appliances

These Systems Must Work-Together

- Combustion Appliances
  - Heating systems
  - Water heaters
  - Gas range
- Exhaust Fans & Clothes Dryers
- Building Shell features
  - Type and quality of construction
  - Insulation & air sealing
  - Fenestration: Windows, doors, skylights
- Occupants

Measuring Thermal Comfort

Infrared Thermometer

Extech Mini Infrared Thermometer - (8:1) - $70

- Affordable thermal infrared "camera"
- ~$60 - $250
- Instantaneous, digital reading
- Helps to identify materials that are moist (since condensation of moisture results in cooling)

Measuring Thermal Comfort

Hygro-thermometer

Extech Hygro-Thermometer - $50

- Measures:
  - Temperature
  - Humidity
  - Calculated Dew Point
- Can be used with Laser Thermometer to locate potential sites for condensation

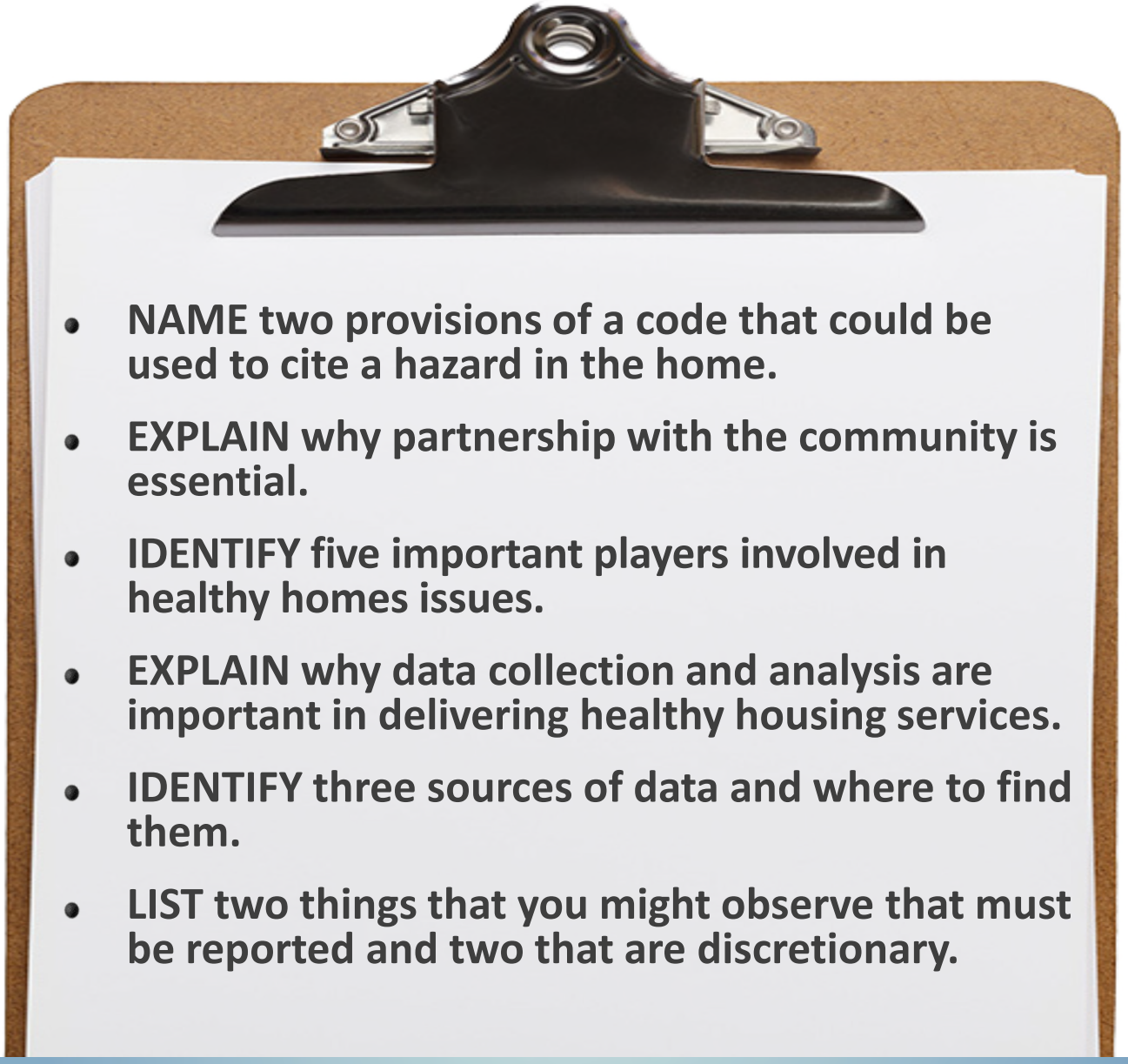
Home Energy Audit

- A home energy audit can suggest strategies that a family can implement to find a healthy compromise to temperature and humidity levels that meet the needs of all their family members
- See www.energy.gov/energysaver for more information.

Steps to a Healthier Home

Making it work

Learning Objectives



- NAME two provisions of a code that could be used to cite a hazard in the home.
- EXPLAIN why partnership with the community is essential.
- IDENTIFY five important players involved in healthy homes issues.
- EXPLAIN why data collection and analysis are important in delivering healthy housing services.
- IDENTIFY three sources of data and where to find them.
- LIST two things that you might observe that must be reported and two that are discretionary.

CREATE

Creating a Healthy Homes Program

Successful healthy home projects need:

- Established objectives
- Administrative infrastructure
- Identified and committed partners
- Secured funding
- Sustainability plan

Implement

Implementing a Healthy Homes Program

Issues to consider:

- Job descriptions
- Training program
- Programmatic changes

Funding Sources

Healthy Homes funding sources

- HUD
- Rental licensing fees or taxes
- EPA
- State & City

Other Funding

- Public agencies can provide "seed" money
- Involve private sector foundations

Health and Housing

Benefits to collaboration

- Long-term success
- Long-term community capacity
- Empower members
- Produce change

Important Players

- Agencies
- Community-Based Organizations
- Property Owners
- Contractors and trades people
- Families
- Others?

Agencies

- Other local agencies regularly enter homes
- Consider coordinating services at single home visit.

Community-Based Organizations

- Solicit input
- Attend community functions
- Consider interests and priorities
- Involve community members

Property Owners

- Involve in initial program plan
- Secure participation
- Conduct work at turnover
- Require prerequisite work
- Offer training
- Stress maintenance

Contractors & Trades People

- Involve in developing work protocols
- Offer to train and equip
- Encourage quality of work standards
- Meet regularly
- Help contractors market

Families

- Always have avenues for the family to become involved
- Provide program materials
- Educate at organizational meetings or “kitchen meetings”

Challenges

Health & Housing Collaborations

- Different visions
- May speak “different languages”
- Many players
- Agency culture
- Power inequities
- “Bad” history
- Competition for funding
- Lack of resources, or unbalanced distribution of resources

Making it Work

Using Information to Build & Improve Program

Why Collect Information?

- Determine the magnitude of the problem & community characteristics

Why Collect Information?

- Establish a baseline
- Evaluate your program
- Make decisions about strategies

Gathering Data

Demographic/Socioeconomic

Housing

Health

Environment

Visual Assessment Tools

- Local Tools
- CDC/HUD Housing Inspection Manual
- Community Environmental Health Resource Center (CEHRC) Visual Survey

Exercise #9

- Conduct a Visual Survey and Assessment of Potential Code Violations
- Use CEHRC Visual Survey as Template
- Use IPMC as Model Code

Visual Survey Report

Resident:

Alternate Contact:

Address:

Unit # **Unique ID**

Resident Phone:

Visual Conducted by:

Date:

Make a checkmark (✓) if the problem appears in the room or area. For deteriorated paint and water damage, indicate the extent of the problem (see instructions) Use the extra rows to identify any other hazards you notice. Put an asterisk (*) above any room(s) where a child sleeps or plays. Circle (◯) where you photograph a problem.

ROOM OR AREA

PROBLEM		Exterior	Porch	Entryway	Living Room	Dining Room	Kitchen	Bedroom 1	Bedroom 2	Bedroom 3	Bathroom 1	Bathroom 2	Basement		
Deteriorated paint	Walls														
	Windows, door, or trim														
	Paint chips on floor														
Soil with no grass or mulch															
Cockroaches															
Rodents															
Holes in wall															
Mold/ Mildew	Obvious source of moisture														
	No obvious source of moisture														
Water Damage: walls wet/newly stained															
Strong musty smell															
Natural gas/sewer gas smell															
Unvented gas oven/dryer/heater															
Worn-out carpeting															
Other:															
Other:															
Other:															
Other:															
Other:															

If renting, received lead hazard disclosure information from landlord? **Yes** **No**

Follow-up visit scheduled for: **Date** _____ **Time:** _____

CEHRC: Community Environmental Health Resource Center www.cehrc.org
Revised 3/04

Step 2: Identify the Potential Code Violations in Photos

Area of Home	Nature of Violation / Code Sections Potentially Violated	Nature of Violation		Responsible Person	
		Definite	Potential	Owner	Occupant
Exterior					
Porch					
Entryway					
Living Room					
Dining Room					
Kitchen					
Bedroom 1					
Bedroom 2					
Bedroom 3					
Bathroom 1					
Bathroom 2					
Basement					
Other: _____					
Other: _____					

Step 3: Evaluate CEHRC Visual Survey

Three Strengths:

1.

2.

3.

Three Weaknesses:

1.

2.

3.

Sampling Results Report

Record of Contact	First Visit	Second Visit	Meeting to Discuss Results
Hazard Investigator			
Resident or Designee			
Date & time			

Resident:

Address:

Unit #: Unique ID

Resident Phone:

Notes:

Hazard		Hazard Checked	Number of Samples	Results of Sampling		Guideline or Standard	Unit of Measure
				Location	Result		
Average Lead Dust	Floor					≥ 40	Micrograms of lead per square foot of sample area (µg/ft²); home-wide average
	Window Sill					≥ 250	
Maximum Lead Dust	Floor					≥ 40	Micrograms of lead per square foot (µg/ft²); highest level found in the home
	Window Sill					≥ 250	
Lead in Paint						≥ 0.5% by weight	Percentage of lead in paint; maximum level found in the home
Lead in Soil	Play Area					≥ 400	Parts per million of lead in soil (ppm); maximum level in a play area
	Drip Line					≥ 1200	Parts per million of lead in soil: average for drip line and other non-play areas
	Other Area						
Cockroaches						None	Highest infestation category
							Cockroaches per trap per night
Radon						≥ 4	Picocuries of radon per liter of air

Prepared by: **Signature:** **Date:**

Name (printed)

Test results noted on this report do not necessarily show all possible health hazards in this home. For example, lead test results are from samples collected in some areas, not the inspection of all painted surfaces.

CEHRC: Community Environmental Health Resource Center
Revised 3/04

www.cehrc.org

Making it Work

Legal Issues: Confidentiality, Disclosure, and Liability

Confidentiality

Community workers and government employees need to balance the privacy rights of people they work with and the obligation to protect the health and safety of others

What Information is Confidential?

- Protected under law
- Defined as confidential under agency or state policy
- “Sensitive” to the home occupants

Likely Sensitive

- Use of addictive products
- Illegal conduct
- Mental health
- Personal hygiene
- Medication
- Health conditions
- Symptoms
- Citizenship

CONFIDENTIAL

Usually Not Sensitive

- Occupation
- Birth date/age
- Race/ethnicity
- Gender
- Organizational affiliation
- Home address

Child Protective Services

Mandated Reporting

- Young children home alone
- Active physical abuse, or evidence of abuse
- Drug activity may not be considered a condition that endangers

Discretionary Reporting

- To whom do you report?
- What do you report?
- When?

Reporting

Conditions to report to both property owner and tenant

- Lack of smoke alarms
- Structural defects that may cause an injury
- Sewage intrusion
- Vermin infestation
- Peeling/ deteriorated paint in homes older than 1978
- Sample results, if taken (lead, radon)
- Lack of window guards in high rise
- Any other immediate hazards found
- Hot water heater temperature, especially if multifamily

"Rules of Thumb"

Information collection and reporting

- Only what you need to know
- Partnerships may be beneficial
- Know which laws apply
- Disclose code violations to the owner
- Don't disclose sensitive information

"Rules of Thumb"

Legal issues and liability

- Follow laws
- Exercise caution when making recommendations for home treatments
- Recommend professionals when needed
- Use applicable standards when available

Liability Exposures

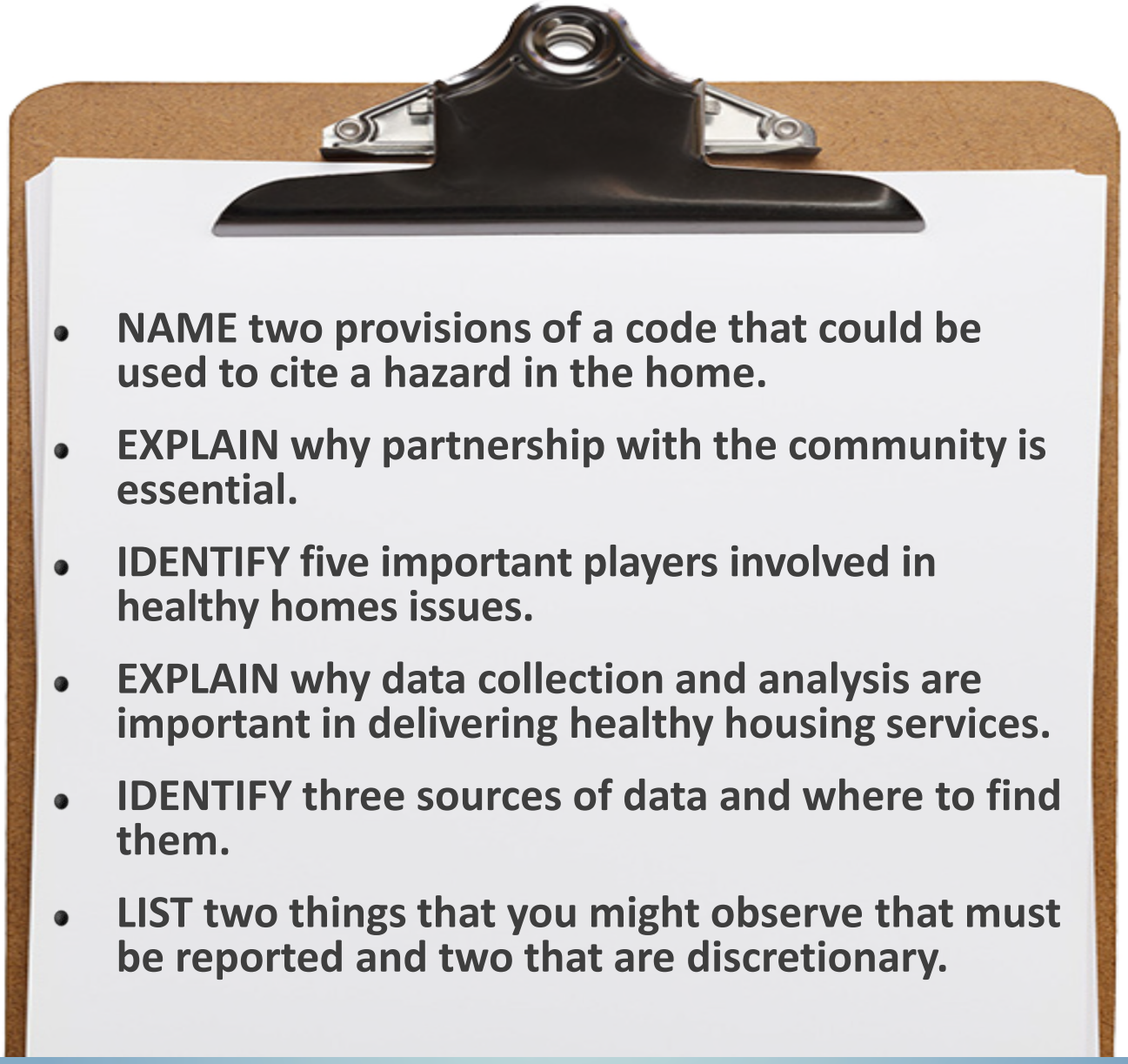
Healthy Homes Practitioners

- Multiple sources and types of exposures
- Limited research and data
- Lack of clear standards and guidelines
- Testing methods and controls

Key Messages

- The community must be engaged in achieving HH goals.
- The holistic approach requires coordination and collaboration among all programs sending staff in the home.
- Data are essential to identify the problem, determine the magnitude, develop an intervention and measure success.
- Healthy homes practitioners need to be aware of legal and ethical issues in their own communities.

Learning Objectives



- NAME two provisions of a code that could be used to cite a hazard in the home.
- EXPLAIN why partnership with the community is essential.
- IDENTIFY five important players involved in healthy homes issues.
- EXPLAIN why data collection and analysis are important in delivering healthy housing services.
- IDENTIFY three sources of data and where to find them.
- LIST two things that you might observe that must be reported and two that are discretionary.

Changes to AHS data for 2015

- Click on the link below to bring up the American Housing Survey Table Creator. You can view national and metro area data.
- https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html#?s_areas=a00000&s_year=n2015&s_tableName=TableS03&s_byGroup1=a1&s_byGroup2=a1&s_filterGroup1=t1&s_filterGroup2=g1.
- To see housing quality for all occupied units: total, owner, and renter:
    1. In the Select Area dropdown box, choose your Metro Area.
    2. In the Select Year dropdown box, choose 2015. Note that out of 41 metro areas, 16 have 2013 data, all the rest have 2015 data. For those, you can only select 2013 in the dropdown box.
    3. In the Select Table dropdown box, choose Housing Quality
    4. In the Variable 1 dropdown box, choose Tenure.

You can still go to Solutions' webpage for AHS data from 2011. But the new link takes the place of using the AHS data on Solutions' website since we will no longer be updating that site due to the changes in the way the data is presented.

Students will receive two handouts showing housing quality for their local area and housing quality from the national area.

NOTE: This is a hidden slide.
It is provided for trainer reference only
and does not display as part of the slideshow.

NATIONAL HEALTHY HOMES

TRAINING CENTER™ & NETWORK

Healthy Housing Solutions Inc.

Essentials For Healthy Homes Practitioner Course

Healthy Housing Solutions Inc.

Learning Objectives

Page 1.1

Describe four housing conditions and their associated health problems.

Identify three populations at higher risk for housing related disease and injury.

Identify three types of codes used to enforce remediation of housing-related hazards.

Link Between Housing & Health

Page 1.1

"The connection between health and the dwelling of the population is one of the most important that exists."

Florence Nightingale

Why Do We Care?

Page 1.2

- **Housing impact on health:**
  - Physical, chemical, biological exposures
  - Psychological
- **Young children spend about 70% of the time in their home.**

Why Do We Care?

Page 1.2

- Annual costs for environmentally attributable childhood diseases in the U.S: $76.6 billion.
  - Lead poisoning cost $50.9 billion
  - Neurobehavioral disorders cost $23.4 billion
  - Asthma cost $2.2 billion
  - Childhood cancer cost $95.0 million

How Significant is the Problem?

American Housing Survey			
Occupied Housing Units	**Severe Physical Problems**	**Moderate Physical Problems**	**Total**
2007	1.8 million	4.0 million	5.8 million
2009	1.9 million	3.9 million	5.8 million
2011	2.1 million	4.2 million	6.3 million
2013	1.9 million	3.9 million	5.8 million
2015	1.5 million	5.2 million	6.7 million

Maslow's Hierarchy of Need

Page 1.4

Home is where the heart is.
Pliny

It may be frail; its roof may shake; the wind may blow through it; the storms may enter; the rain may enter – but the King of England cannot enter; all his forces dare not cross the threshold of the ruined tenement.
William Pitt

One of our deepest needs is to be at home.
Timothy Radcliffe

Where thou art, that is home.
Emily Dickinson

Home is the place where, when you have to go there, They have to take you in.
Robert Frost

The strength of a nation derives from the integrity of the home.
Confucius

There's no place like home.
Dorothy, Wizard of Oz

He is happiest, be he king or peasant, who finds peace in his home.
Johann Wolfgang von Goethe

Institute of Medicine (2000)

Association Between Biological and Chemical Exposures in the Home and			
Development of Asthma in Sensitive Individuals		Exacerbation of Asthma in Sensitive Individuals	
Biological Agents	**Chemical Agents**	**Biological Agents**	**Chemical Agents**
Sufficient Evidence of a Causal Relationship			
• House dust mite	*No agents met this definition*	• Cat • Cockroach • House dust mite	• ETS (in preschool-aged children)
Sufficient Evidence of an Association			
No agents met this definition	• ETS (in preschool-aged children)	• Dog • Fungi or molds • Rhinovirus	• Nitrogen oxides (high-level exposures)[1]
Limited or Suggestive Evidence of an Association			
• Cockroach (in preschool-aged children) • Respiratory Syncytial Virus	*No agents met this definition*	• Domestic birds • *Chlamydia pneumoniae* • *Mycoplasma pneumoniae* • Respiratory Syncytial Virus	• ETS (in school aged and older children, & adults) • Formaldehyde • Fragrances
Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists			
• Cat, Dog, Domestic Birds • Rodents • Cockroaches (except for preschool-aged children) • Endotoxins • Fungi or molds • *Chlamydia pneumoniae* • *Mycoplasma pneumoniae* • *Chlamydia trachomatis* • Houseplants • Pollen	• Nitrogen oxides • Pesticides • Plasticizers • Volatile organic compounds (VOCs) • Formaldehyde • Fragrances • ETS (in older children and adults)	• Rodents (as pets or feral animals)[2] • *Chlamydia trachomatis* • Endotoxins • Houseplants • Pollen exposure in indoor environments • Insects other than Cockroaches	• Pesticides • Plasticizers • Volatile organic compounds (VOCs)
Limited or Suggestive Evidence of No Association			
• Rhinovirus (adults)	*No agents met this definition*	*No agents met this definition*	*No agents met this definition*

Source: ***National Academies Press, 2000****. Clearing the Air: Asthma and Indoor Air Exposures. Executive Summary Institute of Medicine. ISBN 0-309-06496-1 See www.nap.edu/books/0309064961/html/.*

[1] At concentrations that may occur only when gas appliances are used in poorly ventilated kitchens.

INSTITUTE OF MEDICINE (2004)

Page 1.5

Summary of Findings Regarding Association Between Health Outcomes and	
Exposure to Damp Indoor Environments	**Presence of Mold or Other Agents in Damp Indoor Environments**
Sufficient Evidence of a Causal Relationship	
Sufficient Evidence of an Association	
• Upper respiratory (nasal and throat) tract symptoms • Cough • Wheeze • Asthma symptoms in sensitized persons	• Upper respiratory (nasal and throat) tract symptoms • Cough • Hypersensitivity pneumonitis in susceptible persons • Wheeze • Asthma symptoms in sensitized persons
Limited or Suggestive Evidence of an Association	
• Dyspnea (shortness of breath) • Lower respiratory illness in otherwise healthy children • Asthma development	• Lower respiratory illness in otherwise healthy children
Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists	
• Airflow obstruction (in otherwise healthy persons) • Skin symptoms • Mucous membrane irritation syndrome • Gastrointestinal tract problems • Chronic obstructive pulmonary disease • Fatigue • Inhalation fevers (nonoccupational exposures) • Neuropsychiatric symptoms • Lower respiratory illness in otherwise healthy adults • Cancer • Acute idiopathic pulmonary hemorrhage in infants • Reproductive effects • Rheumatologic and other immune diseases	• Dyspnea (shortness of breath) • Skin symptoms • Asthma development • Gastrointestinal tract problems • Airflow obstruction (in otherwise healthy persons) • Fatigue • Mucous membrane irritation syndrome • Neuropsychiatric symptoms • Chronic obstructive pulmonary disease • Cancer • Inhalation fevers (nonoccupational exposures) • Reproductive effects • Lower respiratory illness in otherwise healthy adults • Rheumatologic and other immune diseases • Acute idiopathic pulmonary hemorrhage in infants

Source: ***National Academies Press, 2004****. Damp Indoor Spaces and Health. Tables ES-1 and ES-2 Institute of Medicine of the National Academies, ISBN 0-309-09246-9. See www.nap.edu/books/0309091934/html/.*

More recent evidence – Asthma and Rodents

Association between asthma and rats	Association between asthma and mice
Rat allergen sensitization and exposure are associated with increased asthma morbidity in inner-city children.	*In mouse-sensitized inner-city children, exposure to mouse allergen may be an important cause of asthma morbidity.*
2003 study	**2006 study**

More recent evidence – Dampness and mold

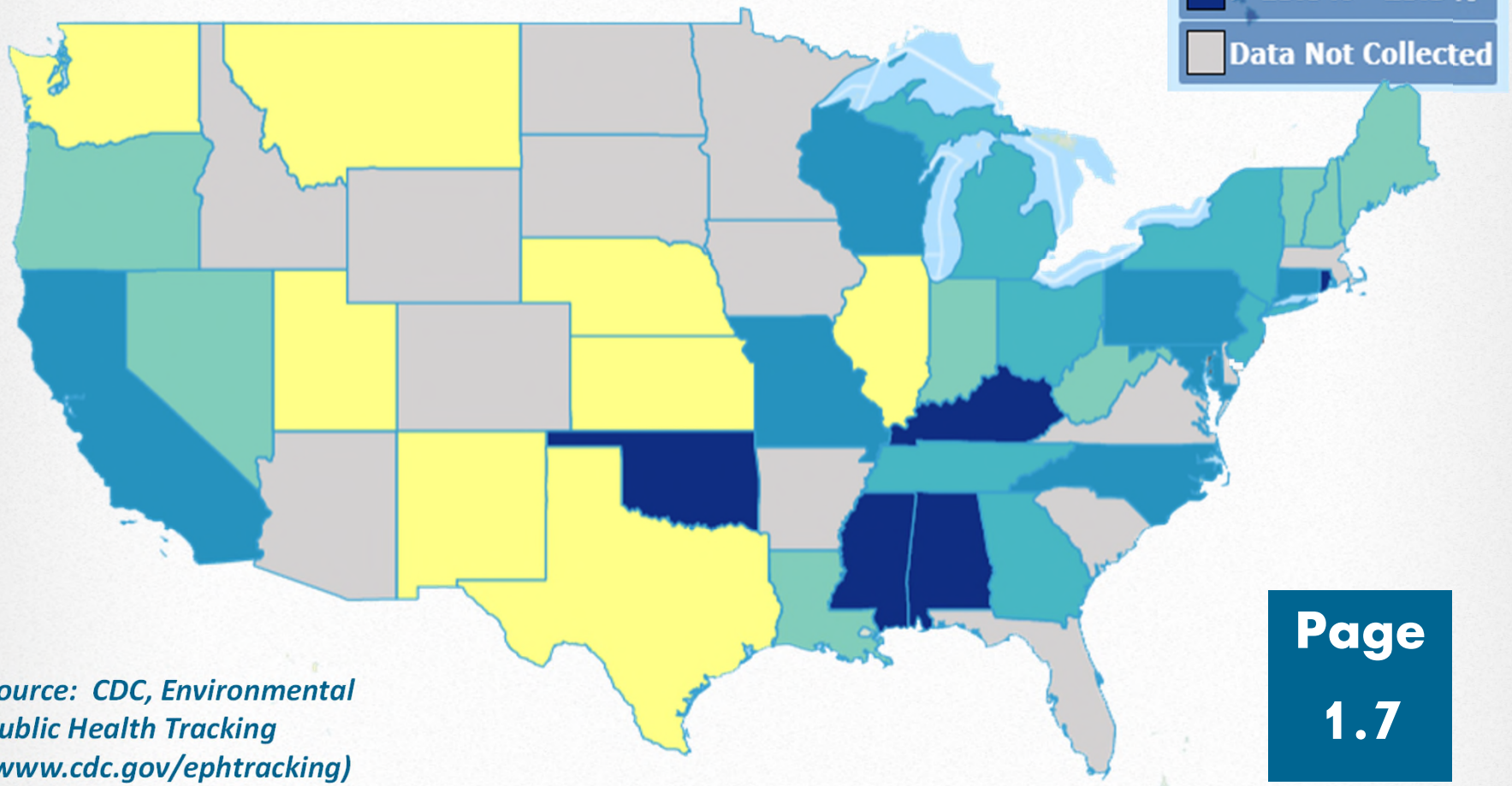
Health Condition	Original Association Status	New Association Status
Asthma exacerbation	Sufficient evidence	No change
Asthma development	Limited or suggestive evidence	Sufficient evidence
Current asthma	Not evaluated in 2004	Sufficient evidence
Respiratory infections	Not evaluated in 2004	Sufficient evidence
Upper respiratory tract symptoms, cough and wheeze	Sufficient evidence	No change
Shortness of breath	Limited or suggestive evidence	Sufficient evidence
Hypersensitivity pneuomonitis	Sufficient evidence	No change

More recent evidence – Dampness and mold (continued)

Health Condition	Original Association Status	New Association Status
Humidifier and inhalation fevers	Limited or suggestive evidence	Sufficient evidence
Allergic rhinitis and bronchitis	NA	Limited or suggestive evidence
Lung function, allergy or atopy, and “asthma, ever”	NA	Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists

Childhood Asthma

Asthma Prevalence Among Children 2014 - BRFSS data

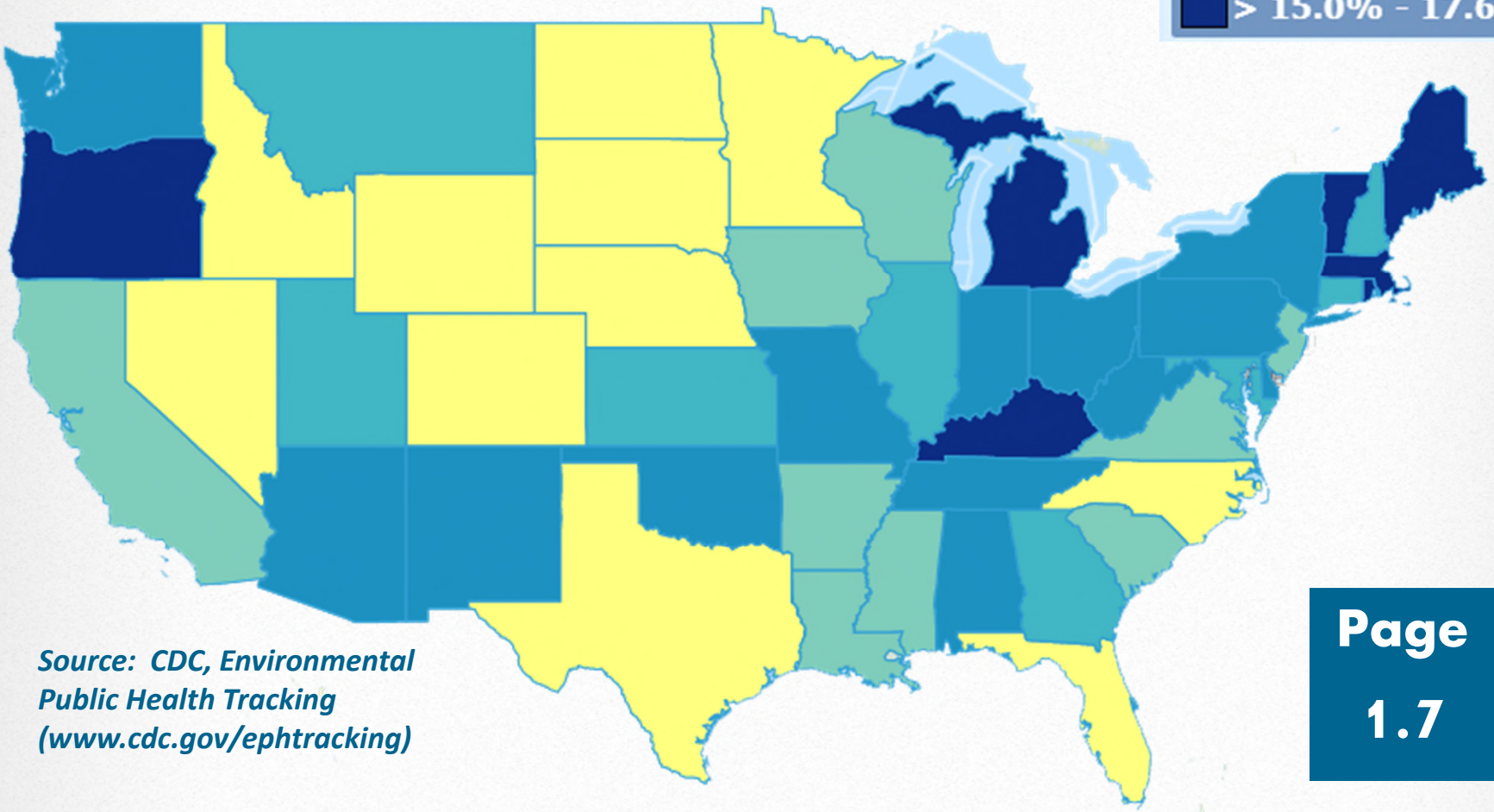


Source: CDC, Environmental Public Health Tracking (www.cdc.gov/ephtracking)

Page 1.7

Adult Asthma

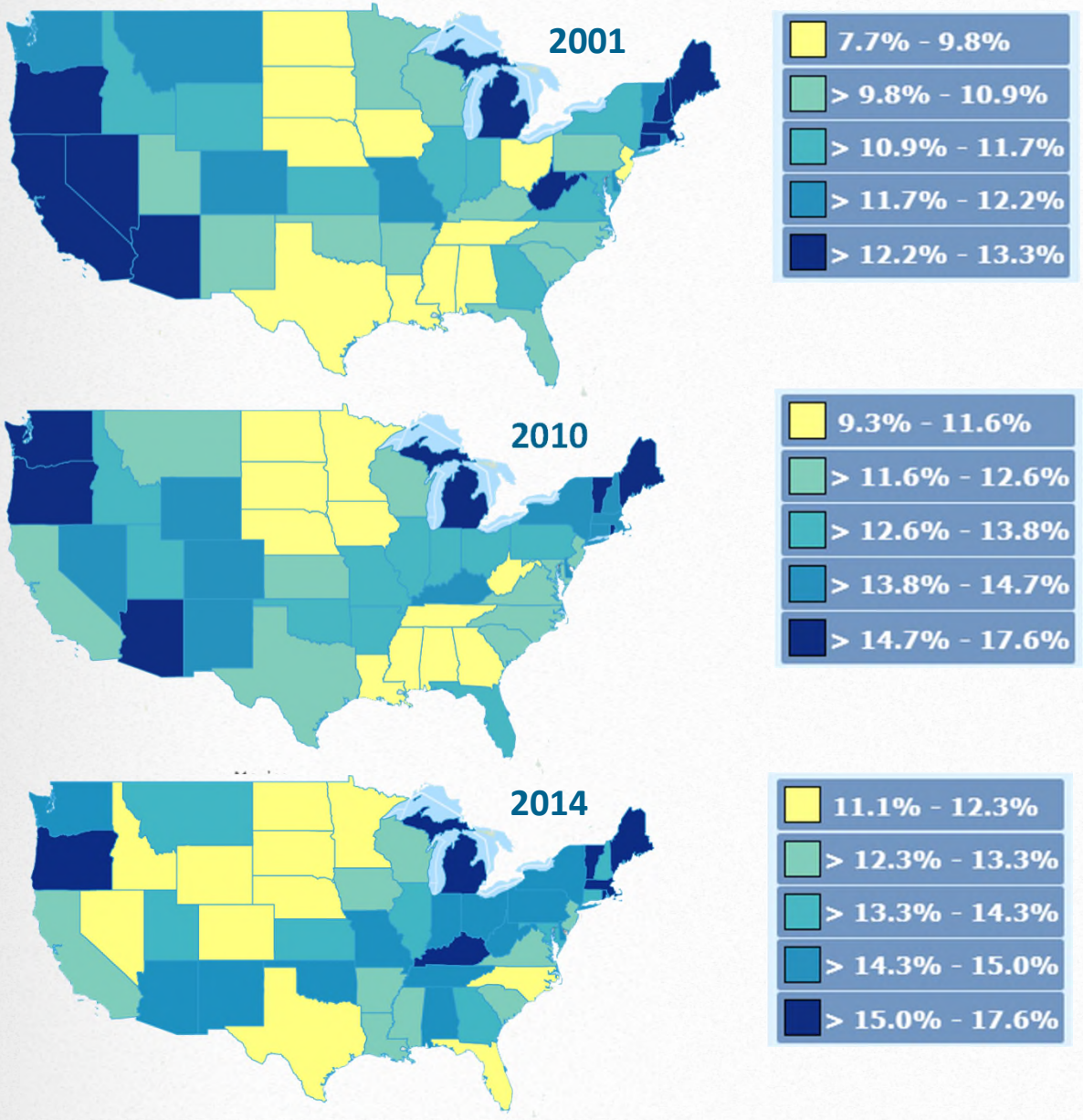
Current prevalence, 2014 - BRFSS data



Source: CDC, Environmental Public Health Tracking (www.cdc.gov/ephtracking)

Page 1.7

ADULT ASTHMA – CURRENT PREVALENCE OVER TIME



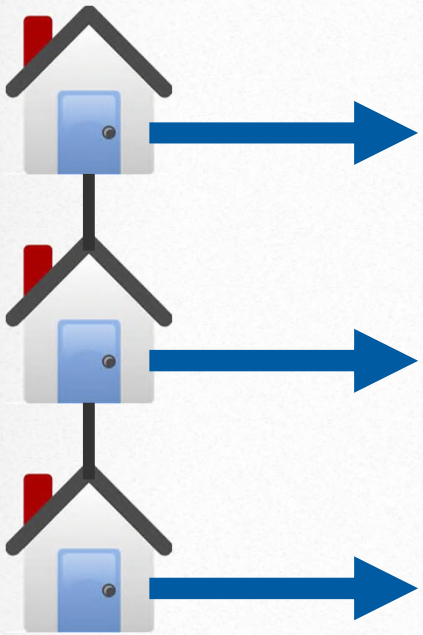
Current asthma prevalence among adults varies across states.

EXERCISE #1

Health Impacts	Housing Hazards	Corrective Action	Resources

Holistic Approach

Integrated approach that considers:



- People living in the home
- The structure
- Potential health hazards

Moisture/water intrusion

Mold

Asthma exacerbation

Why a Holistic Approach?

Moisture/
water intrusion

Structural damage

Structural damage

Pests

Deteriorated lead paint/ lead poisoning

Fire

Injuries

Page 1.7

Pesticides

Pests

Asthma & allergy exacerbation

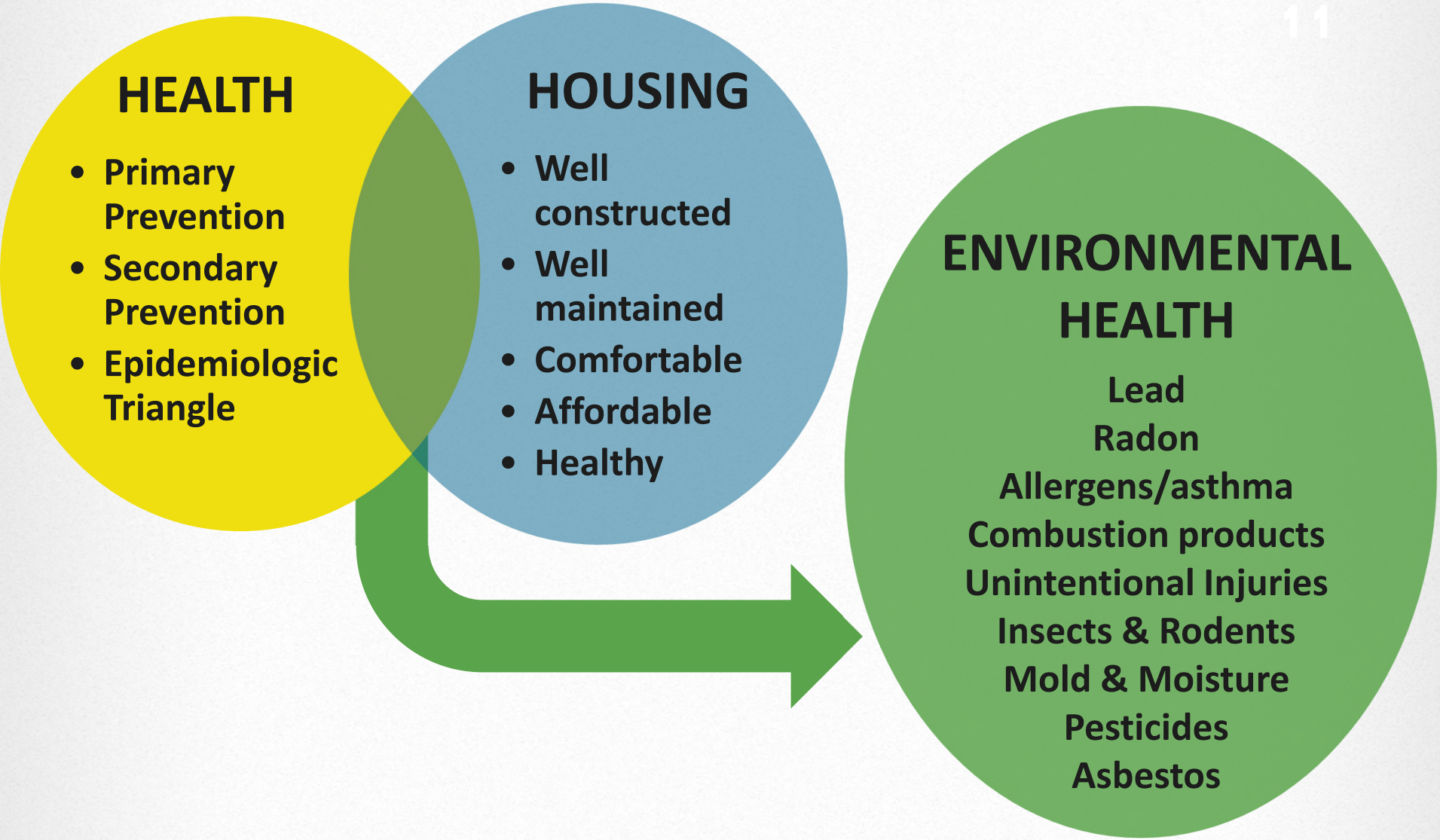
Page 1.7

Pesticides


HOT SHOT
Roach & Ant


VALUE PACK
6 FOGGERS
Spectracide
BUG STOP
INDOOR FOGGER
Protects for up to 4 Weeks!

Different Approaches



Healthy Homes Principles

Keep It:

1. Dry
2. Clean
3. Pest-Free
4. Ventilated
5. Safe
6. Contaminant-Free
7. Maintained
8. Climate Controlled

Page 1.10

11

What is Healthy Housing?

Page 1.11

Healthy Housing is:

- Designed,
- Constructed,
- Maintained, and
- Rehabilitated

in a manner that is conducive to good occupant health.

American Housing Survey

Page 1.11

11

Conducted:

- Every two years since the 1980s
- Periodically for 47 Metropolitan Statistical Areas (MSA)
- Consistent set of homes
- Phone survey since 1997

Exercise #2

Essentials for Healthy Homes Practitioners
Exercise #2 – Get a Handle on Healthy Homes Statistics

Write the number for each characteristic.

_____ # of homes with severe physical problems (note that units are thousands of homes)
_____ # of homes with moderate physical problems
_____ # of homes with either severe or moderate problems
_____ % of homes with exterior water leakage in past 12 months
_____ % of homes with interior water leakage in past 12 months
_____ % of homes with signs of mice in past 3 months
_____ % of rental homes built before 1980
_____ % of homes with warm-air furnaces
_____ % of homes with a clothes dryer fueled by gas (piped or LP)
_____ % of renters rating their home a 1 or 2 (where 1 as worst possible and 10 as best possible)

Checkmark the most common cause of each type of problem.

Exterior water leakage

- ☐ Walls or window problems
- ☐ Basement problems
- ☐ Roof problems
- ☐ Other / Unknown

Interior water leakage

- ☐ Leaking pipes
- ☐ Broken fixtures
- ☐ Broken water heater
- ☐ Other / Unknown

Moderate Physical Problems

- ☐ Plumbing
- ☐ Heating
- ☐ Upkeep
- ☐ Kitchen

AHS National (2015)

Page 1.11

Demographics

- 118.3 million homes
- 37.3% rental
- 63% single-family detached homes
- 55.6% built pre-1980
- 22.1% basement under all of house*

Exterior Problems

- 20% exterior physical problems
- 2.8% missing roofing material
- 9.9% exterior water leakage

AHS National (2015)

Page 1.12

Interior Problems

- 8.5% interior water leakage
- 6.3% open cracks or holes
- 3.9% pipes leaked
- 11.2% mice or rats
- 8.5% blown fuses or breakers in the last three months

Heating

- 64.5% warm air furnace
- 0.5% room heater without flue
- 1% stove as main heating equipment
- 8.2% uncomfortably cold for 24 hours or more

(Note: Safety devices information was not available before 2007)

Your Community

Page 1.12

Healthy Homes Profiles

- Comparison to similarly situated housing

Interior-Exterior Relationships

- Likely to be interior problems if exterior problem is present.

More Detailed Snapshot

Page 1.12

Characteristic	Outside Central City				Central City			
	Owner-Occupied		Rental		Owner-Occupied		Rental	
	Number/ Percent	National	Number/ Percent	National	Number/ Percent	National	Number/ Percent	National
Number of units	449,400	-	257,600	-	59,200	-	89,500	-
Percent of Area	63.6%	-	**36.4%**	12,765,700	39.8%	-	60.2%	-
Median year of construction	1968	-	1965	-	1944	-	1950	-
% Pre-1940	9.5%	-	13.5%	-	**43.1%**	25.5%	38.2%	-
% Post-1979	27.3%	-	**18.1%**	29.6%	15.0%	-	**5.3%**	17.7%
% Below poverty	8.1%	-	**3.7%**	18.0%	**13.5%**	9.6%	**8.3%**	25.6%
Basic Housing Quality		-		-		-		-
Severe physical problems	0.9%	-	**3.5%**	2.4%	**1.1%**	1.6%	**6.5%**	4.6%
Moderate physical problems	2.2%	-	6.8%	-	2.7%	-	9.7%	-
Interior Problems		-		-		-		-
Holes in floors	0.2%	0.6%	**1.9%**	1.4%	0.7%	-	3.0%	-
Open cracks or holes in walls	7.4%	3.5%	10.8%	6.2%	9.3%	5.0%	13.4%	-
Broken plaster/peeling paint	**2.2%**	1.6%	6.4%	3.4%	4.4%	2.5%	10.0%	5.7%
Signs of rats	1.8%	0.6%	1.8%	1.0%	3.2%	1.0%	**3.4%**	2.2%
Signs of mice	6.4%	-	**8.1%**	5.6%	**7.9%**	5.6%	10.1%	-
Water leaks from inside	**10.9%**	8.0%	**17.4%**	11.7%	10.1%	-	17.4%	-
Water leaks from outside	**17.7%**	12.8%	16.1%	9.4%	30.3%	14.3%	18.4%	10.6%
Water supply stoppage	5.0%	-	9.9%	5.3%	2.4%	-	5.5%	-
Flush toilet breakdown	**2.7%**	1.7%	**6.8%**	4.6%	1.9%	-	6.0%	-
Sewage disposal breakdown	**2.1%**	1.3%	3.8%	2.1%	2.3%	-	**3.8%**	2.5%
Lacking complete plumbing	1.5%	0.8%	1.9%	-	2.6%	1.2%	2.5%	-
Heating equip breakdown	**2.4%**	1.5%	4.4%	2.3%	**1.5%**	2.0%	**6.0%**	4.3%
Space heater w/o flues	0.9%	2.8%	1.9%	3.8%	0.7%	3.0%	4.8%	-
Exposed wiring in unit	0.2%	0.5%	1.0%	-	0.0%	0.5%	**1.3%**	0.8%
Rooms w/o working elect. outlet	0.9%	-	2.7%	-	2.2%	1.3%	5.4%	2.4%
Lacking kitchen facilities	0.9%	0.5%	4.0%	-	1.2%	0.6%	**6.6%**	4.8%
Exterior Problems		-		-		-		-
Roofing problems	8.3%	4.5%	**11.5%**	7.0%	11.1%	6.1%	12.9%	7.1%
Siding problems	3.8%	2.0%	8.3%	4.0%	6.1%	2.7%	9.9%	5.2%
Window problems	**4.0%**	2.9%	**7.4%**	4.8%	8.3%	4.5%	**11.7%**	7.1%
Foundation problems	**3.1%**	1.9%	**4.6%**	3.0%	5.4%	3.0%	**5.8%**	4.0%
Any Identified Problem	46.3%	-	56.5%	-	**57.4%**	39.7%	60.5%	-

No Place Like Home!

Page 1.13

Resident Overall Opinion of Structure, American Housing Survey – National 2015						
	Worst					Best
Type of resident	**1**	**2-4**	**5-7**	**8**	**9**	**10**
All	0.7%	2.0%	24.1%	25.8%	14.6%	32.7%
Renters	1.3%	4.0%	35.8%	26.6%	11.7%	20.5%
Below Poverty	1.7%	4.2%	29.2%	21.2%	10.0%	29.4%

Real World is Complex

Page 1.13

- Current knowledge
- Economic factors
- Social and cultural
- Political and legal factors
- “Do No Harm”

Will Things Change?

Homes With "No Smoking" Rule

- 43% in 1992-1993
- 72% in 2003
- 82% in 2009-2010

HUD and smoke-free public housing

When

No later than 8.3.18

Who

All public housing communities

What

Bar the use of prohibited tobacco products

Where

All public housing units

Interior common areas

Outdoor areas within 25 feet

Healthy Homes Interventions

Page 1.14

2008 Expert Panel

Convened by CDC and NCHH

Categories

- Effective
- Needs More Field Evaluation
- Needs Formative Research
- No Evidence or Ineffective

Healthy Homes Interventions

A	Controlling asthma symptoms and reducing asthma morbidity
B	Reducing asthma triggers and exposure to asthma triggers
C	Reducing Exposure to pests and pesticides
D	Reducing exposure to pesticide residues
E	Reducing exposure to radon in air less than 4 pCi/L
F	Reducing exposure to environmental tobacco smoke
G	Reducing children's blood lead levels, deteriorated lead-based paint and dust lead
H	Reducing death and injuries from residential fires
I	Preventing drowning
J	Reducing scald burns

Summary of Intervention Findings

Review panelists found that:

11	interventions had sufficient evidence of effectiveness.
15	required more field evaluation.
19	needed formative research.
7	either had no evidence of effectiveness or were ineffective.

Sufficient evidence now shows that specific housing interventions can improve certain health outcomes. Click on the link below to view the full article.

https://journals.lww.com/jphmp/Fulltext/2010/09001/A_Systematic_Review_of_Housing_Interventions_and.3.aspx

Until effective standards for the domestic environment are devised, it is likely that children will continue to be employed as biological indicators of substandard housing.

Codes Related to Healthy Homes

- Health / Sanitation Codes
- Housing / Property Maintenance Codes
- Landlord-Tenant Laws
- Product Standards
- Hazard Management Laws

Housing v. Building v. Zoning Codes

Page 1.15

Does this violate the IPMC?

Key Provisions of Codes

Page 1.15

- Structural Integrity
- Weatherproof
- Maintenance
- Cracks & Holes
- Loose or Rotting Materials
- Dampness & Deterioration
- Peeling Paint
- Ventilation / Windows
- Infestation
- Sanitation & Trash
- Cleanability
- Clothes Dryer
- Space Heater

Model Codes for Housing

Page 1.15

Model Codes for Housing	
Building Construction	Internat'l Building Code
Residential Construction	Internat'l Residential Code
Rehab	Internat'l Existing Building Code
Electrical	ICC Electrical Code
Fire	Internat'l Fire Code and National Fire Protection Association
Ventilation	Internat'l Mechanical Code
Plumbing	Internat'l Plumbing Code
Sewage	Internat'l Private Sewage Disposal Code
ALL BUILDINGS	**Internat'l Property Maintenance Code**

Page 1.16

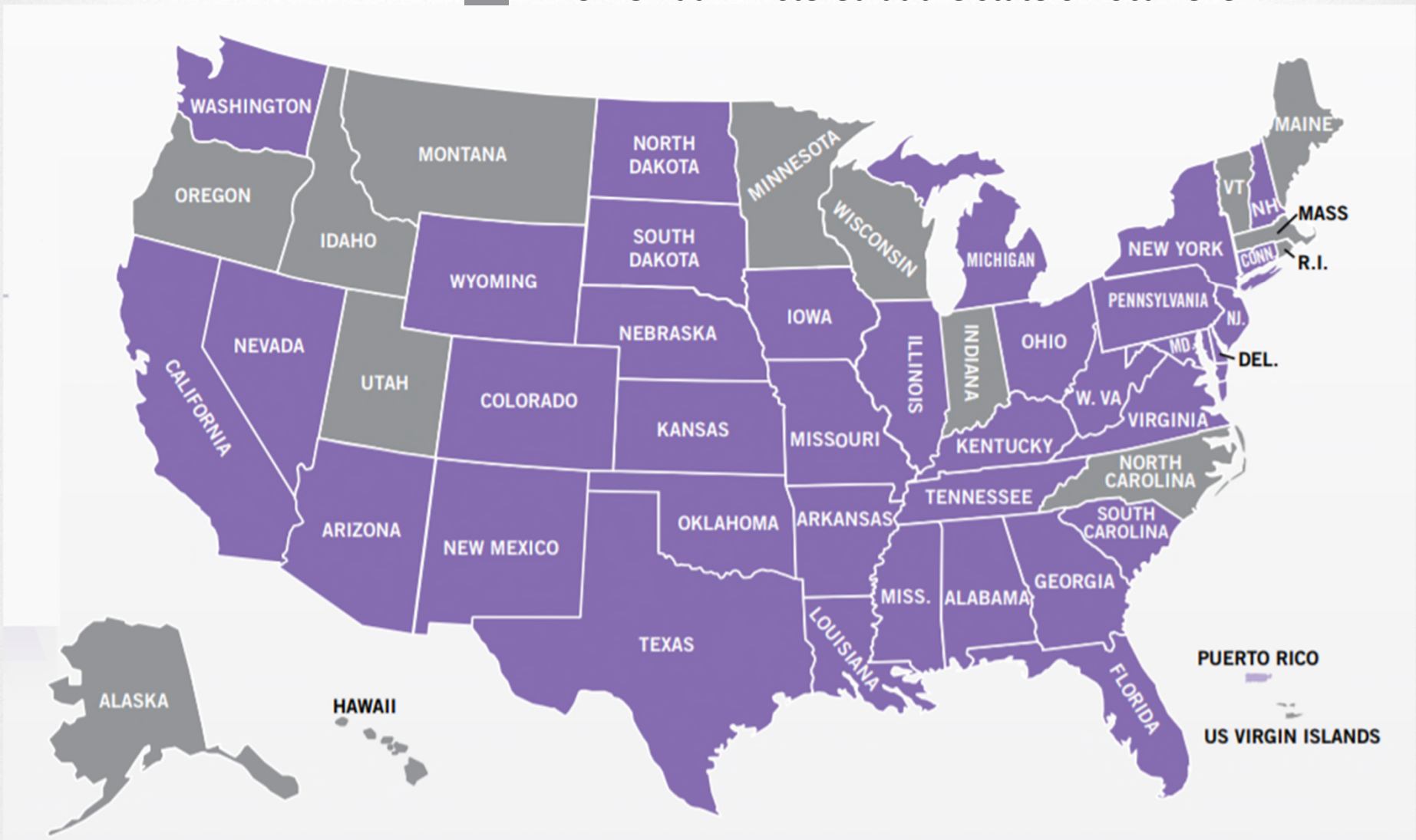
Int'l Property Maintenance Code

- Adopted by more than 600 communities
- Adopted or in use in 40 states and the District of Columbia
- **Applicability**
  - Existing Buildings
  - Rental and Owner Occupied Homes
  - Local Variations
- **Enforced by Code Officials**

Int'l Property Maintenance Code

IPMC administered at the state or local level

IPMC NOT administered at the state or local level



Landlord-Tenant Laws

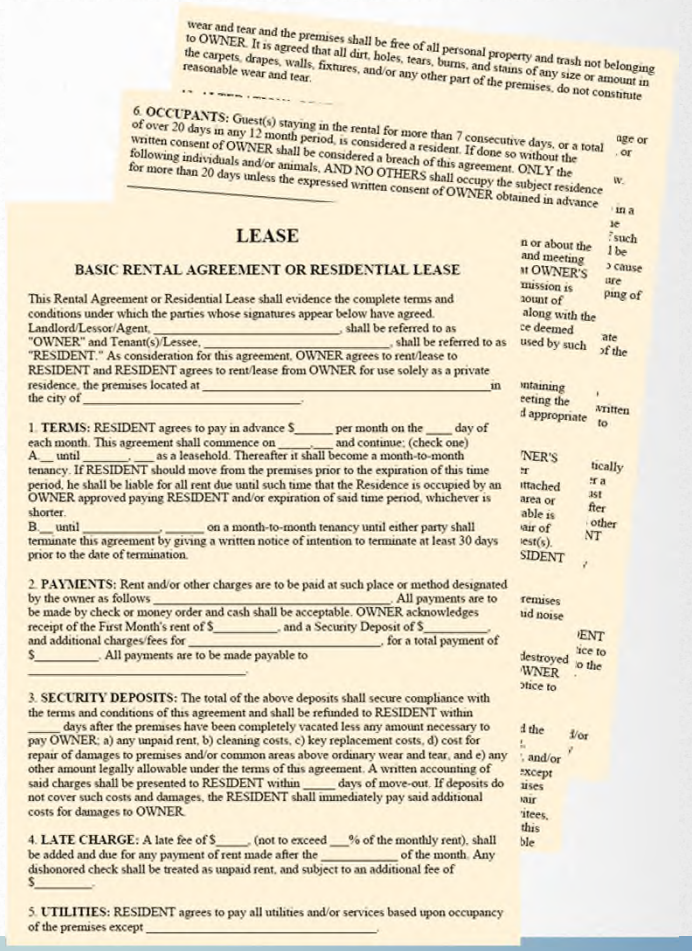
Page 1.16

Rights and Responsibilities

Common Requirements

- **Certificate of Occupancy**
- **Duty to Pay Rent**
- **Withholding Rent to Make Repairs**
- **Retaliation**

Eviction and Enforcement



wear and tear and the premises shall be free of all personal property and trash not belonging to OWNER. It is agreed that all dirt, holes, tears, burns, and stains of any size or amount in the carpets, drapes, walls, fixtures, and/or any other part of the premises, do not constitute reasonable wear and tear.

6. **OCCUPANTS:** Guest(s) staying in the rental for more than 7 consecutive days, or a total of over 20 days in any 12 month period, is considered a resident. If done so without the written consent of OWNER shall be considered a breach of this agreement. ONLY the following individuals and/or animals, AND NO OTHERS shall occupy the subject residence for more than 20 days unless the expressed written consent of OWNER obtained in advance

LEASE

BASIC RENTAL AGREEMENT OR RESIDENTIAL LEASE

This Rental Agreement or Residential Lease shall evidence the complete terms and conditions under which the parties whose signatures appear below have agreed. Landlord/Lessor/Agent, _____, shall be referred to as "OWNER" and Tenant(s)/Lessee, _____, shall be referred to as "RESIDENT." As consideration for this agreement, OWNER agrees to rent/lease to RESIDENT and RESIDENT agrees to rent/lease from OWNER for use solely as a private residence, the premises located at _____ in the city of _____.

1. **TERMS:** RESIDENT agrees to pay in advance $_____ per month on the ____ day of each month. This agreement shall commence on _____ and continue; (check one)
A.__ until _____ as a leasehold. Thereafter it shall become a month-to-month tenancy. If RESIDENT should move from the premises prior to the expiration of this time period, he shall be liable for all rent due until such time that the Residence is occupied by an OWNER approved paying RESIDENT and/or expiration of said time period, whichever is shorter.
B.__ until _____, _____ on a month-to-month tenancy until either party shall terminate this agreement by giving a written notice of intention to terminate at least 30 days prior to the date of termination.

2. **PAYMENTS:** Rent and/or other charges are to be paid at such place or method designated by the owner as follows _____. All payments are to be made by check or money order and cash shall be acceptable. OWNER acknowledges receipt of the First Month's rent of $_____, and a Security Deposit of $_____, and additional charges/fees for _____, for a total payment of $_____. All payments are to be made payable to _____.

3. **SECURITY DEPOSITS:** The total of the above deposits shall secure compliance with the terms and conditions of this agreement and shall be refunded to RESIDENT within _____ days after the premises have been completely vacated less any amount necessary to pay OWNER; a) any unpaid rent, b) cleaning costs, c) key replacement costs, d) cost for repair of damages to premises and/or common areas above ordinary wear and tear, and e) any other amount legally allowable under the terms of this agreement. A written accounting of said charges shall be presented to RESIDENT within _____ days of move-out. If deposits do not cover such costs and damages, the RESIDENT shall immediately pay said additional costs for damages to OWNER.

4. **LATE CHARGE:** A late fee of $_____ (not to exceed ___% of the monthly rent), shall be added and due for any payment of rent made after the _____ of the month. Any dishonored check shall be treated as unpaid rent, and subject to an additional fee of $_____.

5. **UTILITIES:** RESIDENT agrees to pay all utilities and/or services based upon occupancy of the premises except _____.

Federal Health Priorities

Page 1.16

Healthy People 2020 Objectives

- ↓ blood lead levels in children
- ↓ pesticide exposures
- ↓ indoor allergen levels
- ↑ homes with operating radon mitigation system
- ↑ new single family homes with radon-reducing features
- ↓ lead-based paint or related hazards in homes
- ↓ units with moderate or severe physical problems

Green Building Priorities

- NCHH Comparison – February 2009
- Major National Programs
  - Green Communities
  - Leadership in Energy and Environmental Design for Homes (LEED for Homes)
  - National Green Building Standard
  - Energy Star with Indoor Air Package

National Healthy Homes Training Center & Network

Page 1.18

- Brings together public health and housing practitioners
- Forum for exchanging information on new research and best practices.

Funded through a contract with the U.S. Department of Housing & Urban Development , and with support from the U.S. Environmental Protection Agency and the U.S. Centers for Disease Control & Prevention

Purpose of the Course

- Training on housing related health hazards
- Cross training of practitioners.
- Exchange of practical guidance about healthy housing
- Mechanism for introduction of new research findings
- Opportunity for networking, collaboration and partnerships.

Course Outline

- Overview
- Start with People
- House as a System
- **Keep It:**
  - Dry
  - Clean
  - Pest-Free
  - Ventilated
  - Safe
  - Contaminant-Free
  - Maintained
  - Keep it Climate Controlled
- Making It Work

Key Messages

- Link between housing and health
- Vulnerable groups
- Basic public health and housing principles
- Holistic approach
- Codes and regulations

Learning Objectives

Describe four housing conditions and their associated health problems.

Identify three populations at higher risk for housing related disease and injury.

Identify three types of codes used to enforce remediation of housing-related hazards.

Steps to Healthier Homes

START WITH PEOPLE

- Start with People
- House as a System
- Keep It:
  - 1. Dry
  - 2. Clean
  - 3. Pest-Free
  - 4. Ventilated
  - 5. Safe
  - 6. Contaminant-Free
  - 7. Maintained
  - 8. Climate Controlled
- Making it Work

Learning Objectives

Page 2.1

EXPLAIN how to work with people to get important information from them about potential hazards in the home.

IDENTIFY key routes of exposure and their relationship to housing hazards.

Why do you go into houses?

Why Start with People?

Page 2.1

What good are they?

What's difficult about people?

How can you deal with people?

Open v. Closed Questions

Open-Ended or Indirect

- How
- What
- Tell me about
- Describe for me

Closed-Ended or Direct

- Are
- Is
- Do

Bracketing

Page 2.2

Method to:

- Stay Calm and Non-Judgmental
- Keep Ability to Listen

Page 2.3

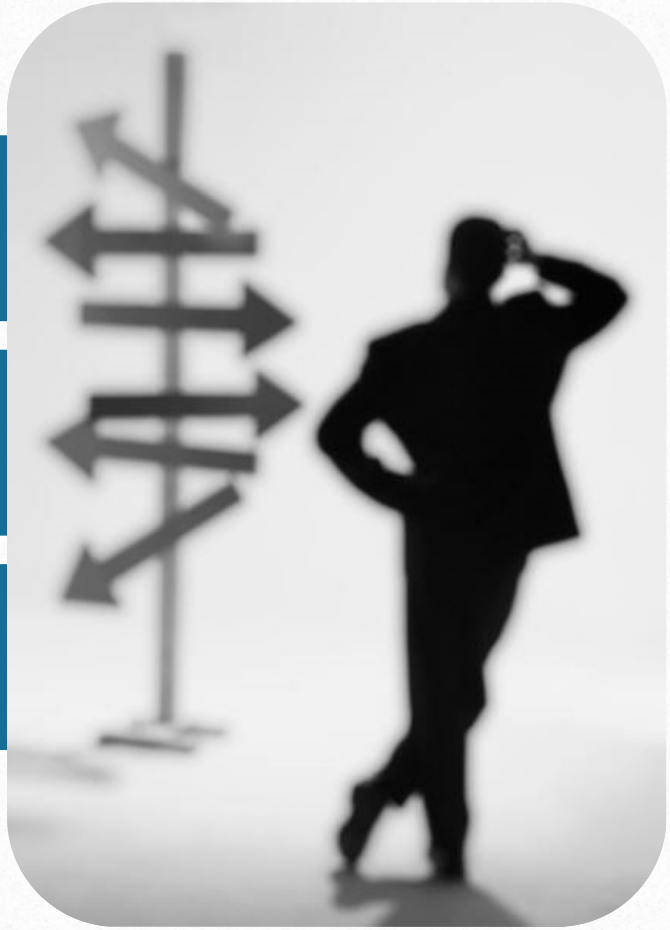
Special Communication Issues

Page 2.3

- Language
- Cultural
  - Shoes in the Home
  - Men and Women
- Responding to Problems
  - Hoarding
  - Tolerance for Clutter and Pests

Resident Choices

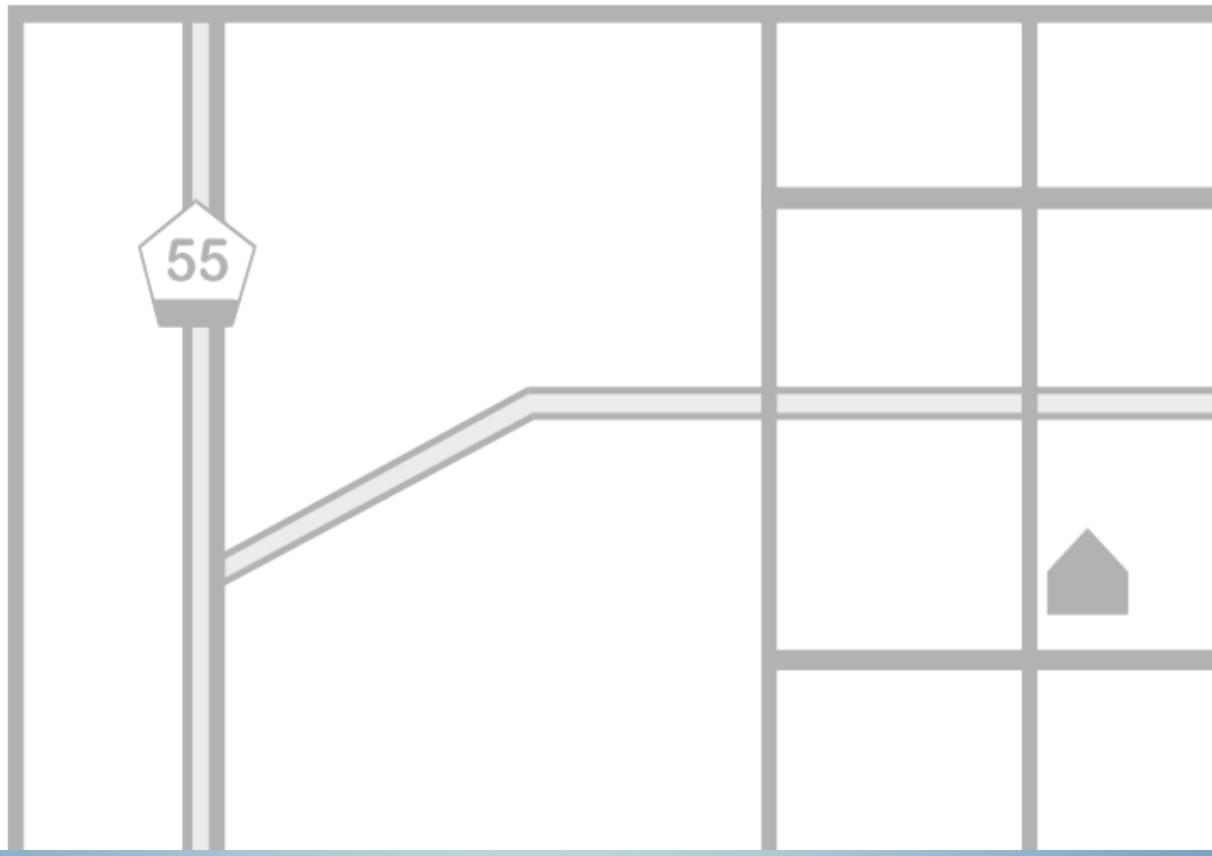
- Health
- Comfort
- Cost



What's going on in the neighborhood?

Page 2.4

- Land use
- Zoning
- Services
  - Water
  - Sewer
  - Solid waste
- Water supply



Routes of Exposure

- Inhalation
- Ingestion
- Skin Absorption
- Injection
- Built-In Protection Mechanisms

Risk = Hazard x Exposure

Page 2.5

Housing Related Disease

Signs and Symptoms

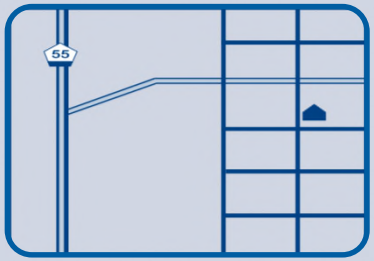
- Signs are objective
  - Blood pressure, heart rate, peak flow
  - Bloody nose, rash
- Symptoms are subjective
  - Back pain, fatigue, headaches
- Some can be a combination
  - Shortness of breath

Housing Related Disease

Page 2.5

Signs and Symptoms

Timing



Location

Corroboration

Mental health

Page 2.5

- Poor housing conditions
- Poor-quality multifamily homes
- Lack of light
- Dampness or mold and depression
- Bed bugs

Page 2.5

Don't overlook or ignore housing conditions that may affect health.

Often Overlooked

Page 2.6

Sources of health problems

Lead

- Was your home built before 1978? 1950?

Radon

- Was your home ever tested for radon?

CO (Carbon Monoxide)

- Do you have a carbon monoxide detector?

Often Ignored

Page 2.6

Sources of health problems

Environmental Tobacco Smoke

- Does anyone in the family smoke?
- Do they want help quitting?

Consumer chemicals

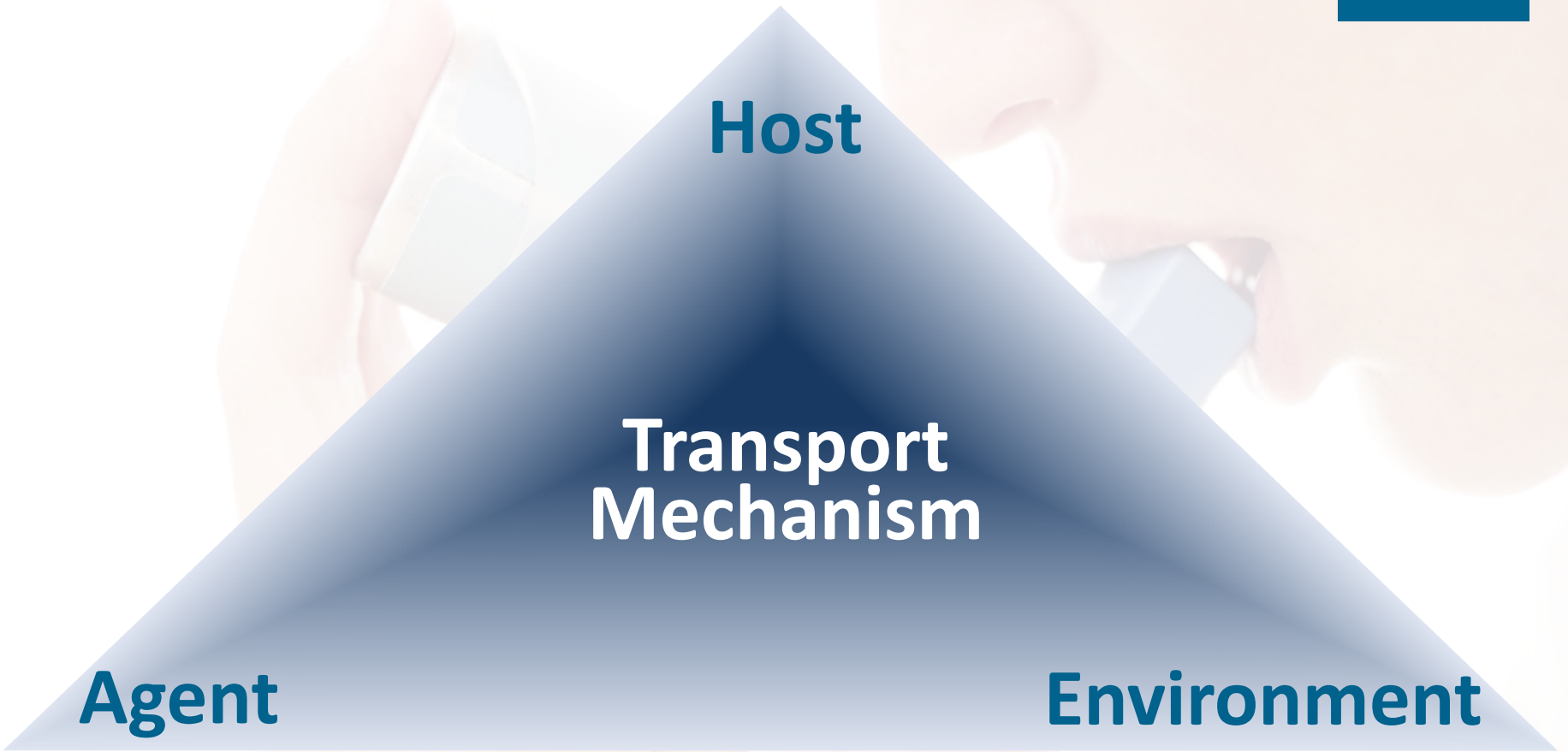
- What cleaning chemicals do you use?
- Where do you store them?

Pesticides

- Any Pesticides used?
- Which ones?

Epidemiologic Triangle of Disease

Page 2.7



Learning Objectives

Page 2.7

EXPLAIN how to work with people to get important information from them about potential hazards in the home.

IDENTIFY key routes of exposure and their relationship to housing hazards.

Steps to Healthier Homes

HOUSE AS A SYSTEM

Start with People

House as a System

Keep It:

1. Dry

2. Clean

3. Pest-Free

4. Ventilated

5. Safe

6. Contaminant-Free

7. Maintained

8. Climate Controlled

Making it Work

NATIONAL HEALTHY HOMES TRAINING CENTER & NETWORK | making homes healthier

Learning Objective

Page 3.1

IDENTIFY three important housing systems that contribute to a comfortable living space.

What's a house?

Page 3.1

Homes Shelter Us From:

Page 3.2

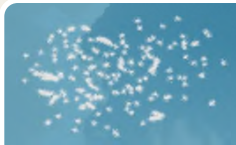
Animals and insects

Wind

Sun

Rain (sleet, snow)

Cold or hot air



Dust

Anchorage

Saint Paul

Marquette

Bangor

Billings

Seattle

Cleveland

Boston

Salt Lake

Denver

DC

Nashville

San Francisco

Saint Louis

Phoenix

Atlanta

Los Angeles

Miami

Tulsa

New Orleans

Saint John

Honolulu

Houston

Wichita

Most of Us are Comfortable:

Air temperature:
65° F(active) – 80° F (bathing)

Air relative humidity:
30% – 70%

Air motion:
20 – 40 feet per minute

Surrounding surface temperatures:
within 10 – 15° F of room air

Page 3.3

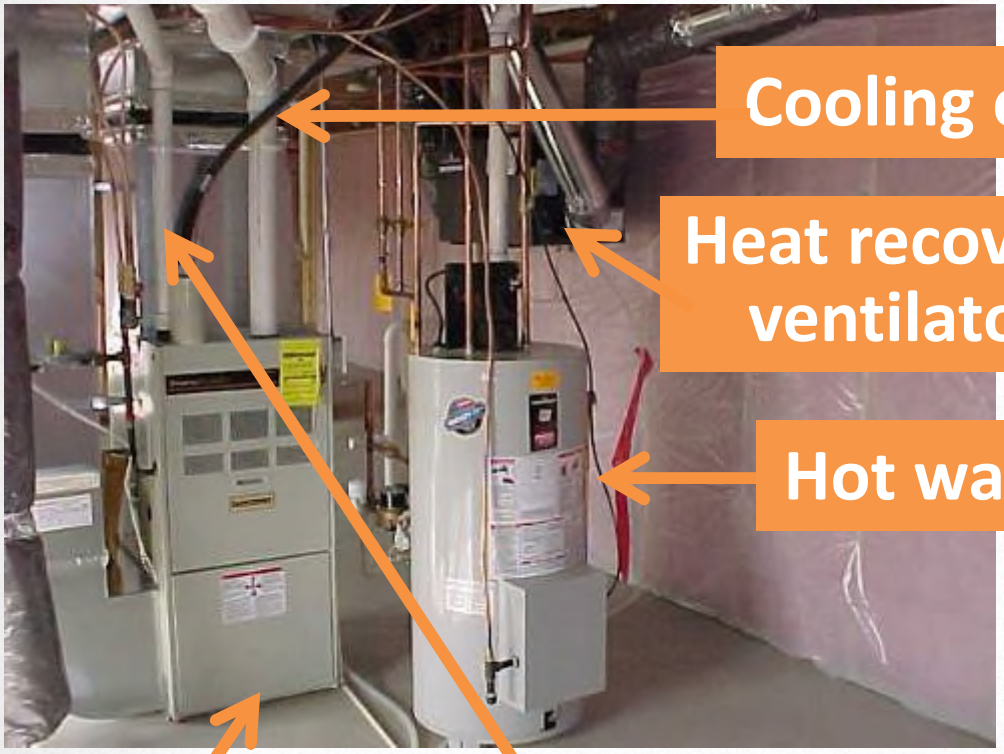
We have Systems to:

- Add heat
- Remove heat
- Ventilate
- Maybe add or remove humidity

Heating Systems

Page 3.3

- Fuel – gas, oil, wood, electric
- Distribution
  - Hot water, steam, warm air, space heaters
  - Radiators, baseboard, ducts
  - Radiant floors and ceilings
- Chimneys, sealed combustion, fan powered
- Temperature Controls

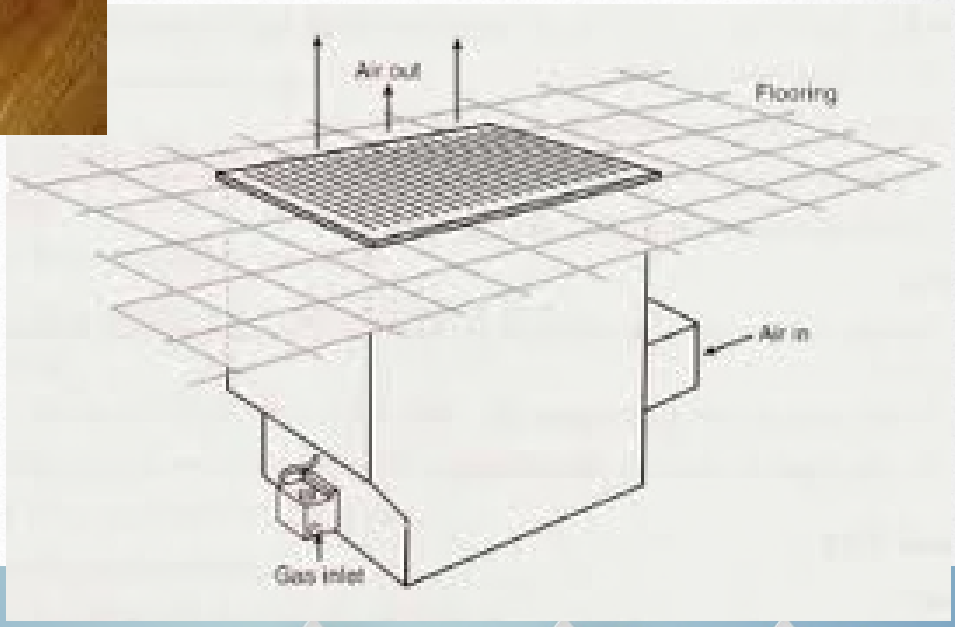

Cooling coil
Heat recovery ventilator
Hot water heater
Furnace
Intake for furnace

Page 3.4

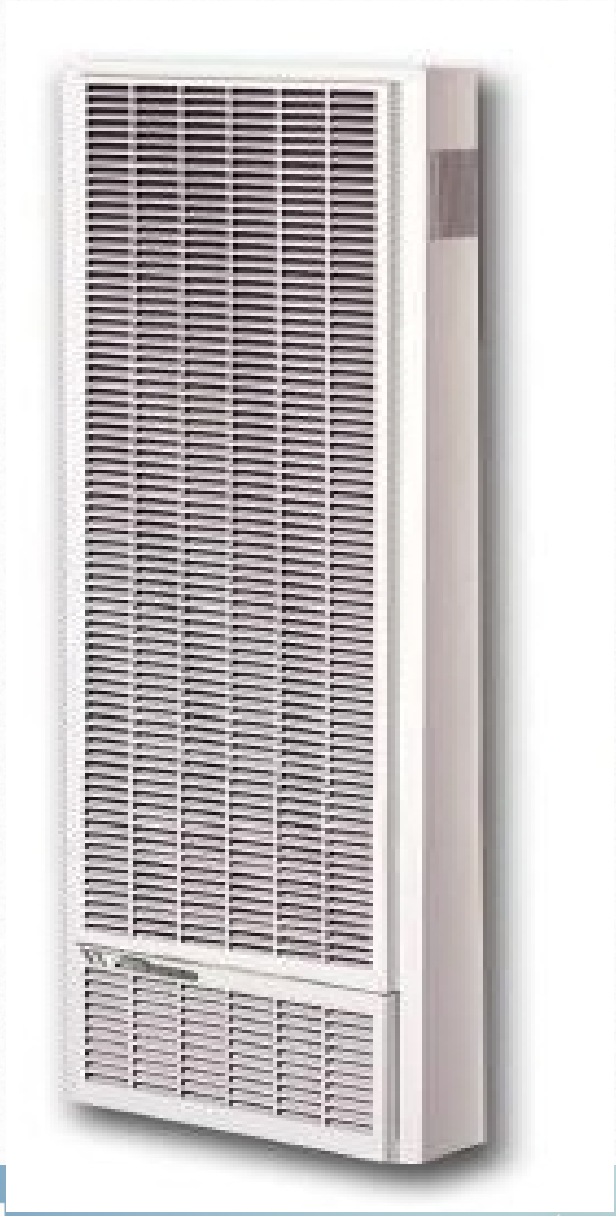
Octopus heating system

Page 3.5

Floor furnaces

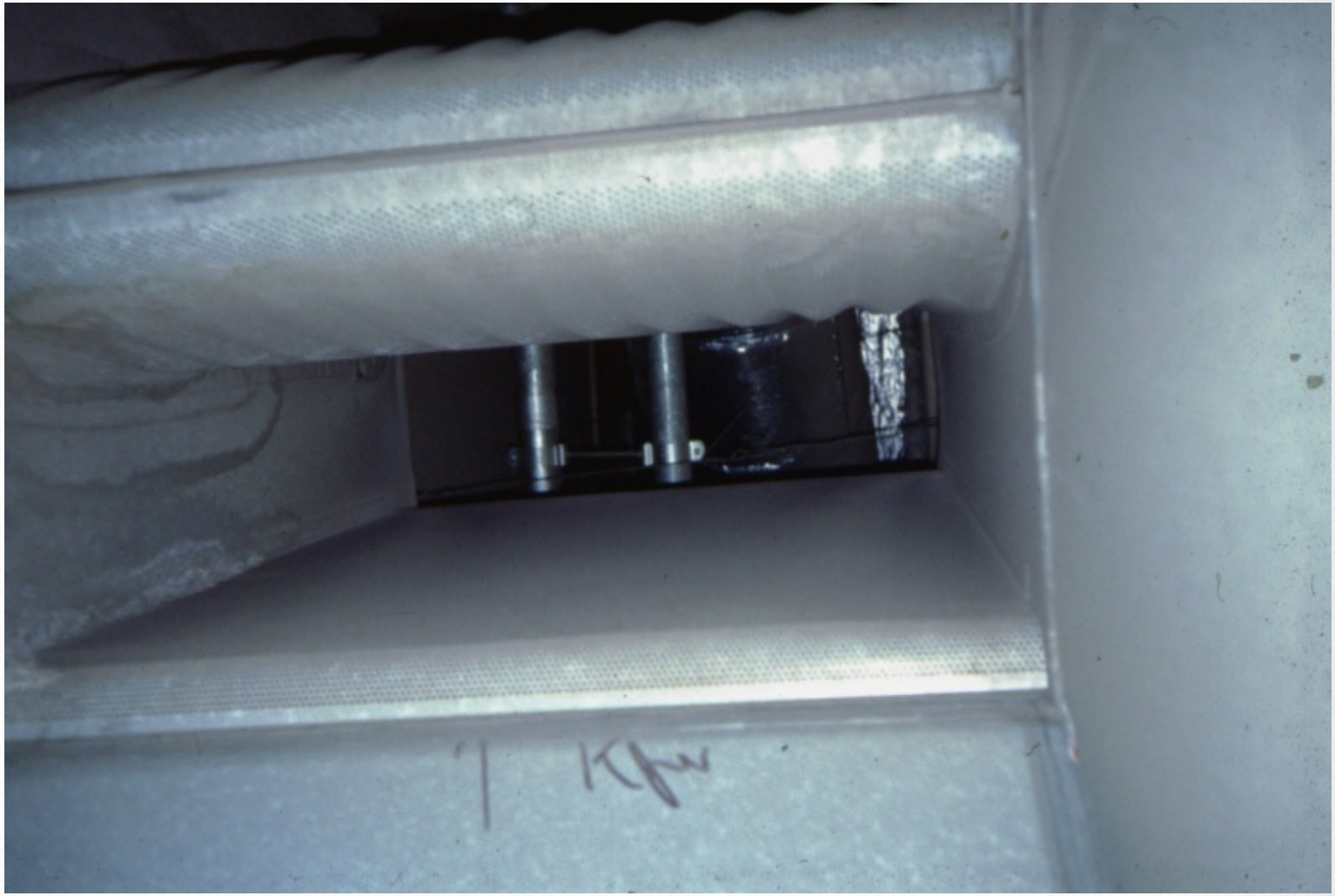


Gas-fired wall furnace



Page 3.5

Page 3.6



Heat Exchangers

Page 3.6

Cooling Systems

- Fuel – electric
- Windows, fans and shades
- Distribution
  - Central air
  - Through the wall
  - Duct-less splits
- Dehumidification
  - Air conditioners/part-load
  - Dehumidifiers
- Control – thermostat, humidity

Page 3.7

Page 3.7

Internal and Solar Gains:

Page 3.8

Good when cold out; bad when hot out

- Heat from people
- Heat from appliances
- Solar through windows
- Average US house
  - 23% of heating is done by these gains
  - 59% of cooling is caused by these gains

Other Factors

Page 3.8

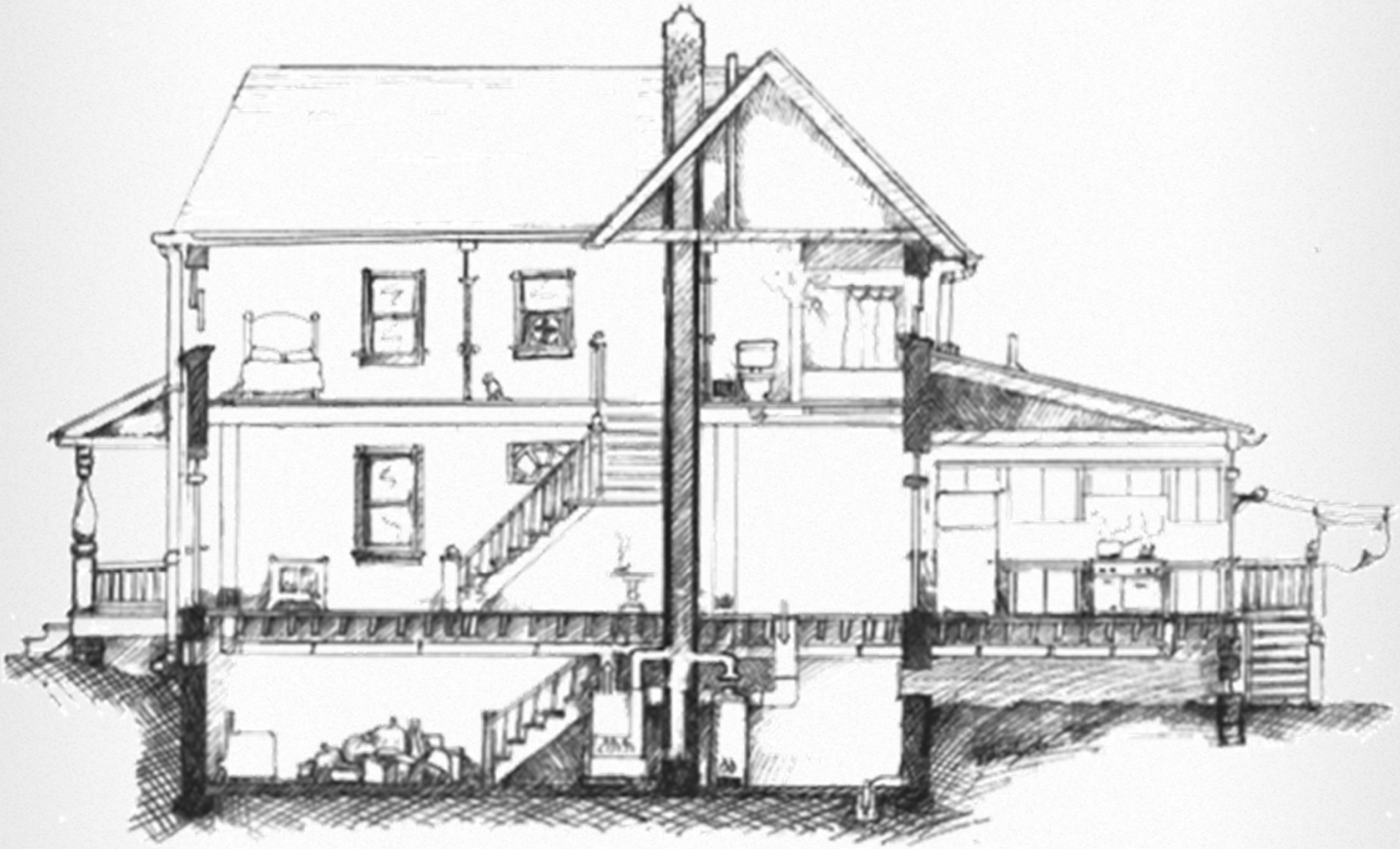
Water
- drinking
- cooking
- washing
- toilets

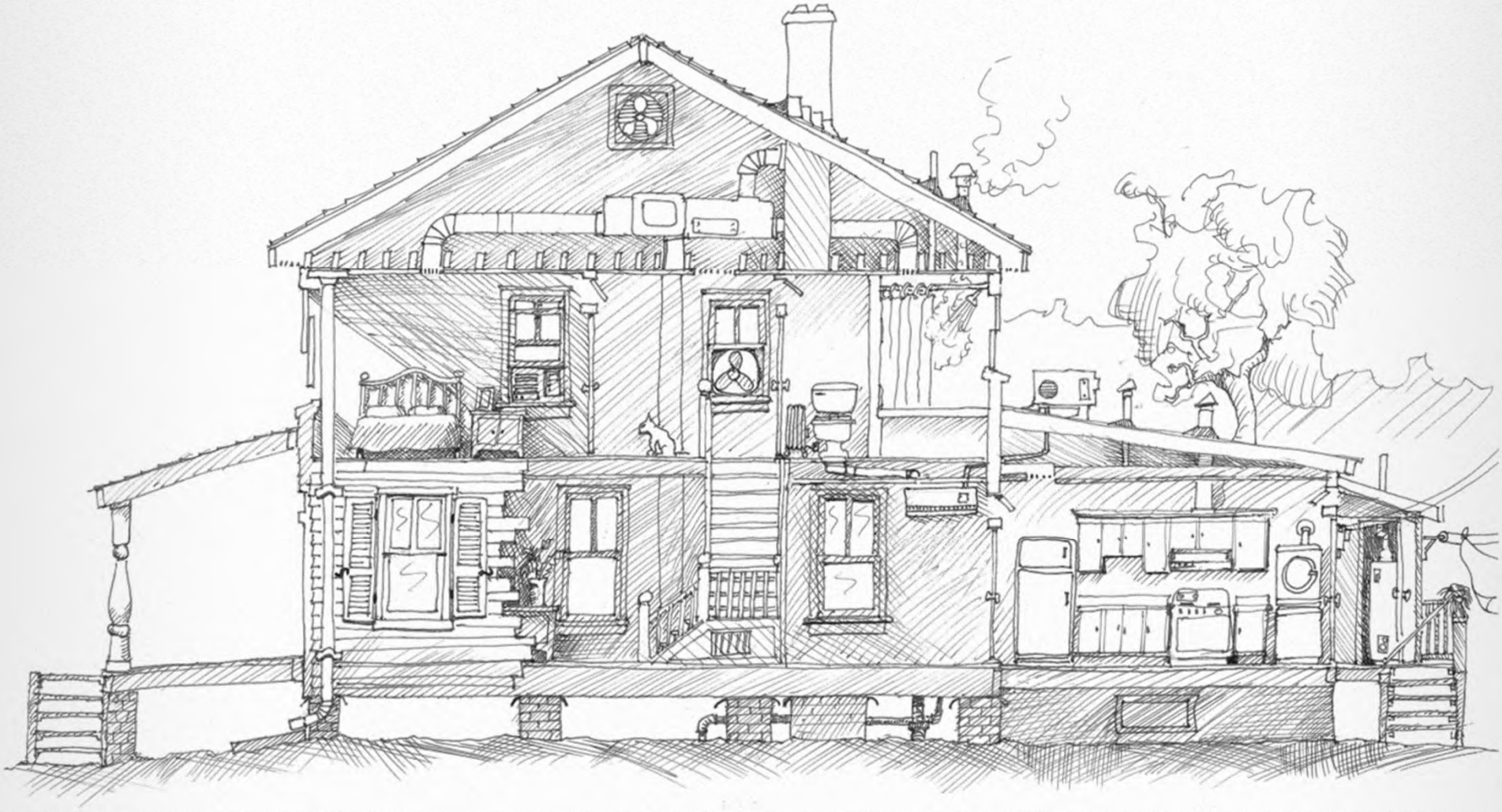
Cooking and storing food

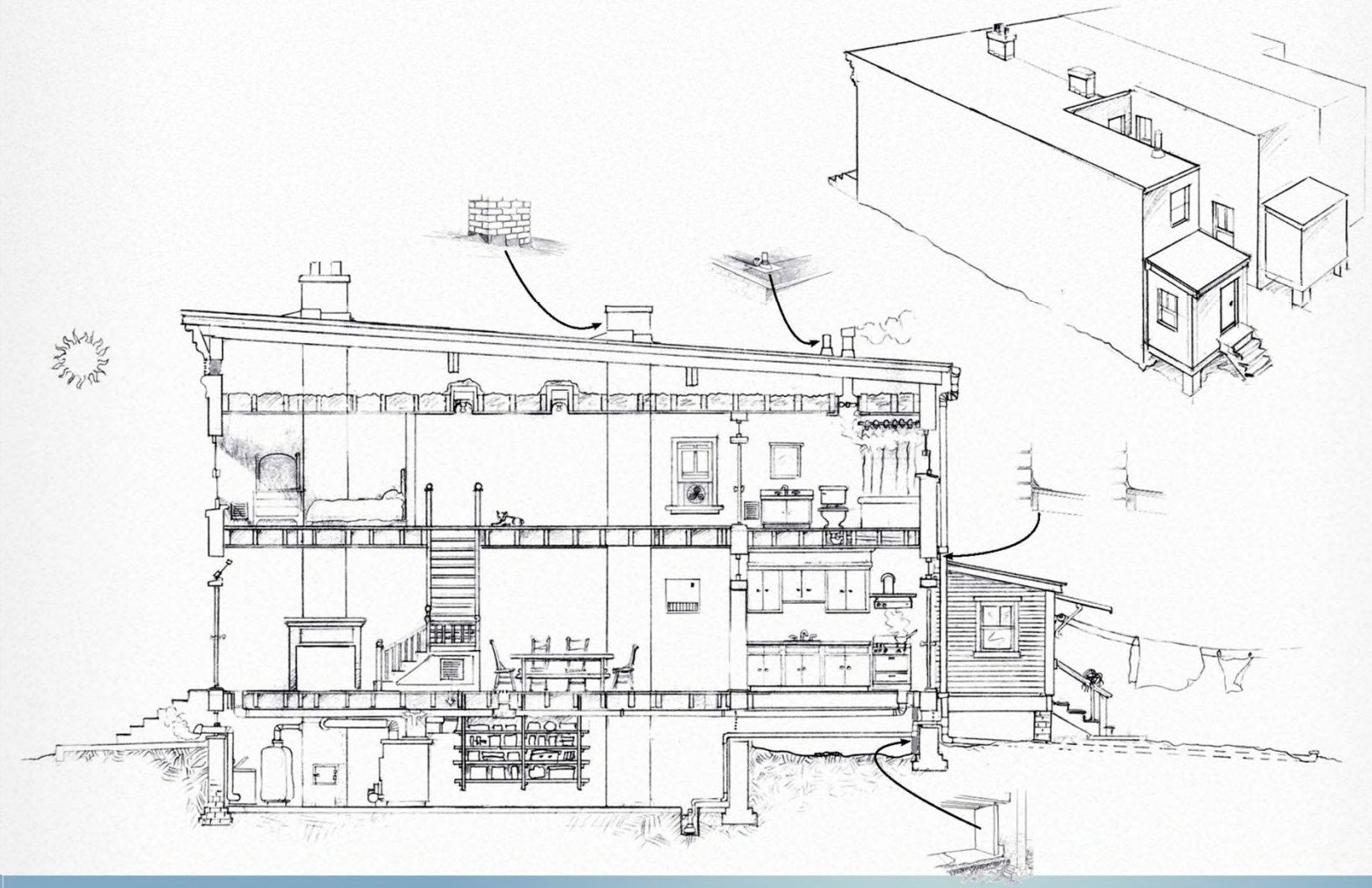
Ventilating fans

Lighting

Computers, stereos, hair dryers, razors







Learning Objective

Page 3.8

IDENTIFY three important housing systems that contribute to a comfortable living space.

Keep it dry

Steps to Healthier Homes

Page 4.1

Learning Objectives

1	2	3
• Name three health hazards in the home that are related to excessive moisture.	• Identify four sources of moisture in the home.	• Describe five strategies for controlling moisture in the home.

Mold & Moisture Health Effects

Page 4.1

- Upper respiratory tract symptoms
- Coughing
- Wheezing
- Asthma symptoms
- Hypersensitivity pneumonitis

Does water drain AWAY from the house?

Page 4.1

Page 4.2

Moisture Sources

- Poorly managed rainwater/groundwater
- Plumbing leaks
- Condensation on surface
- Construction moisture

Interior Water Leakage

Page 4.2

Sources of interior water leakage, 2015 American Housing Survey

8.5 % Interior Water Leak	
Source of interior leak	**% among total # of units**
Leaking pipes	3.9%
Fixtures	2.0%
Broken water heater	0.9%
Other or unknown	2.3%

Exterior Water Leakage

Sources of exterior water leakage, 2015 American Housing Survey

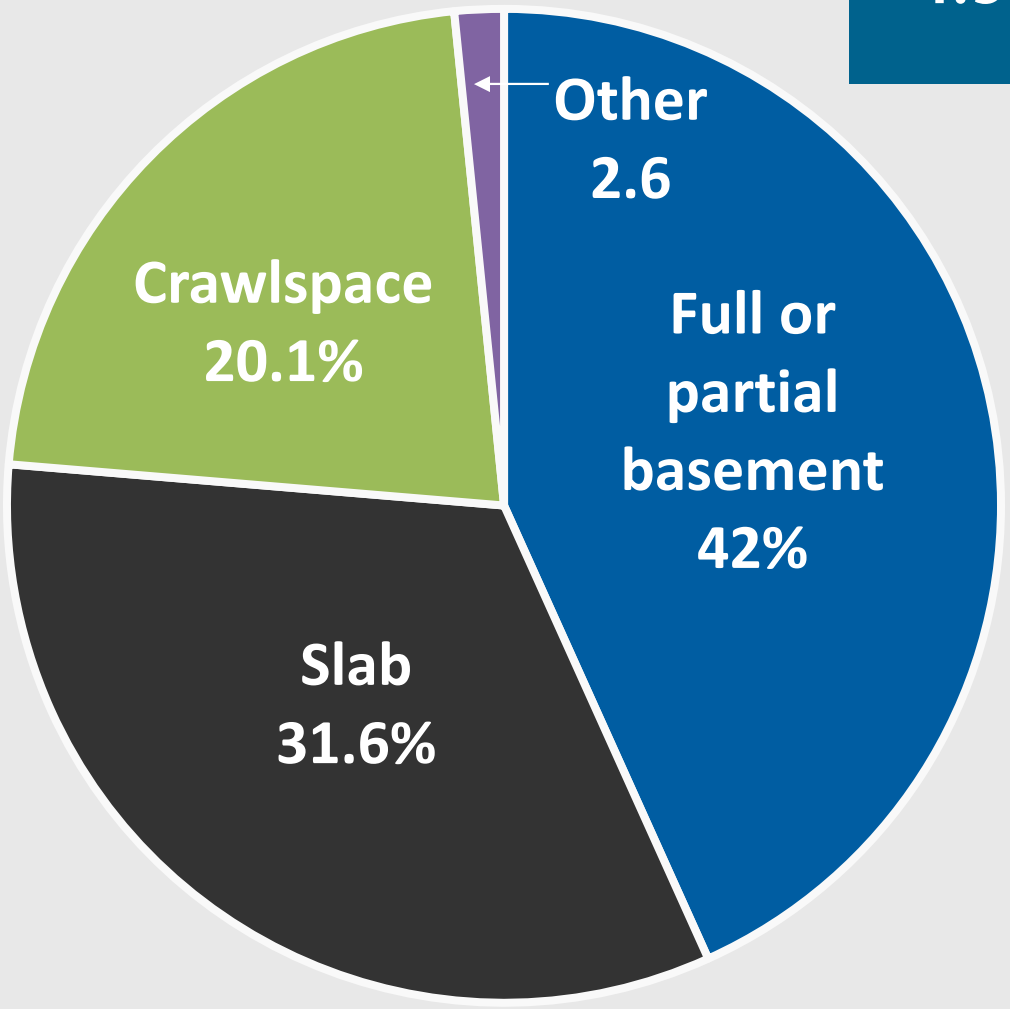
Page 4.2

9.9% Exterior Water Leak	
Source of exterior leak	**% among total # of units**
Roof	5.6%
Basement	2.2%
Walls/windows/doors	2.0%
Other/unknown	1.0%

Construction Factors-Basement

Page 4.3

For Single Family Homes (excluding mobile homes) 2015 American Housing Survey



Exterior Physical Condition

Page 4.3

Occupied housing units, 2015 American Housing Survey

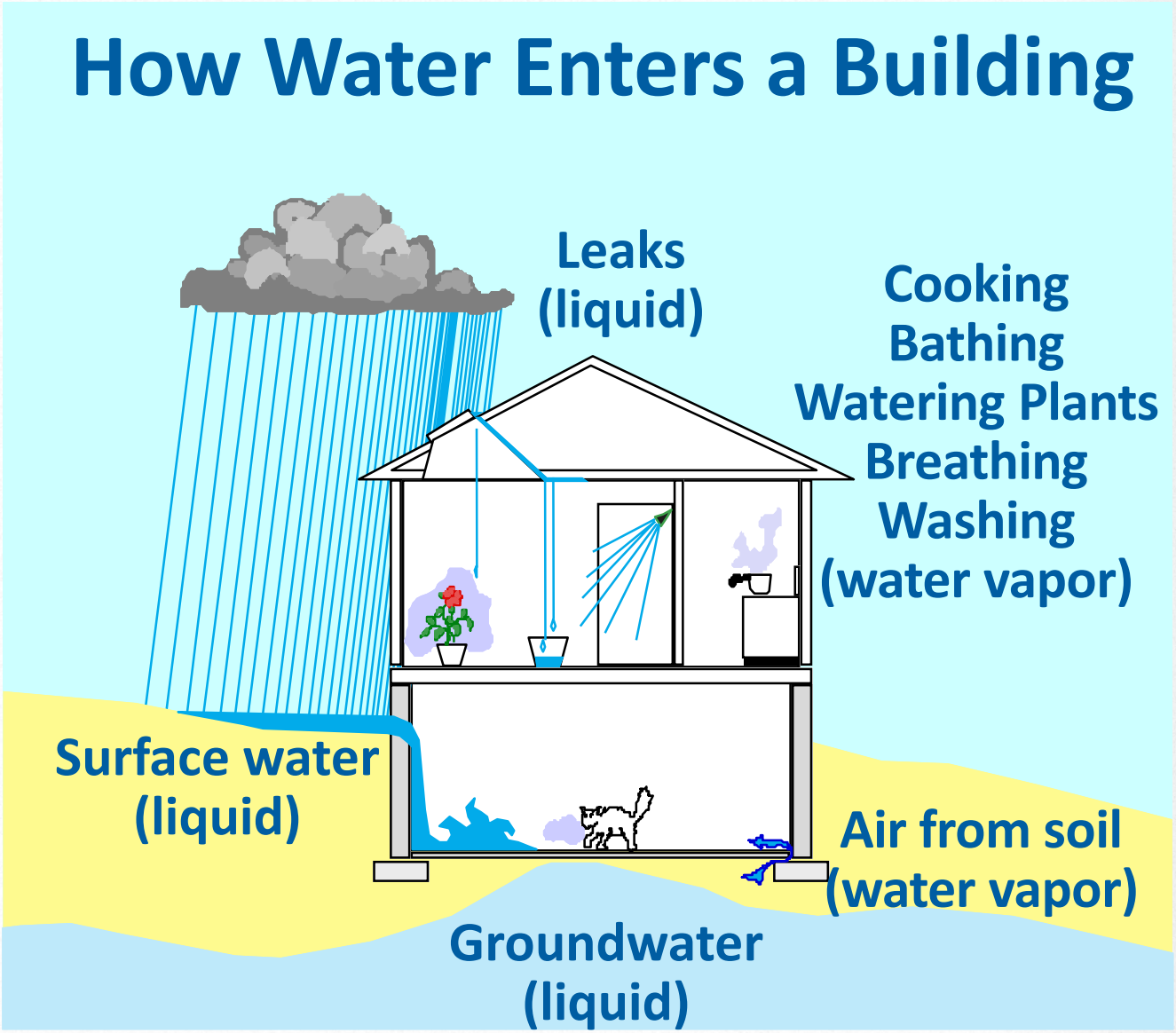
19% One or More Exterior Problems	
Exterior condition	**% among total # of units**
Foundation crumbling/open crack/hole	5.1%
Broken windows	3.7%
Missing roofing material	2.8%
Missing outside wall material	2.2%
Sagging roof	1.8%
Hole in roof	1.3%
Sloping outside walls	1.1%
Boarded up windows	1.0%

Comfort Levels

Air temperature:	• 65°F - 80°F
Air relative humidity:	• 30% – 70%
Air motion:	• 20 – 40 feet per minute
Surrounding surface temperatures:	• within 10 – 15°F of room air

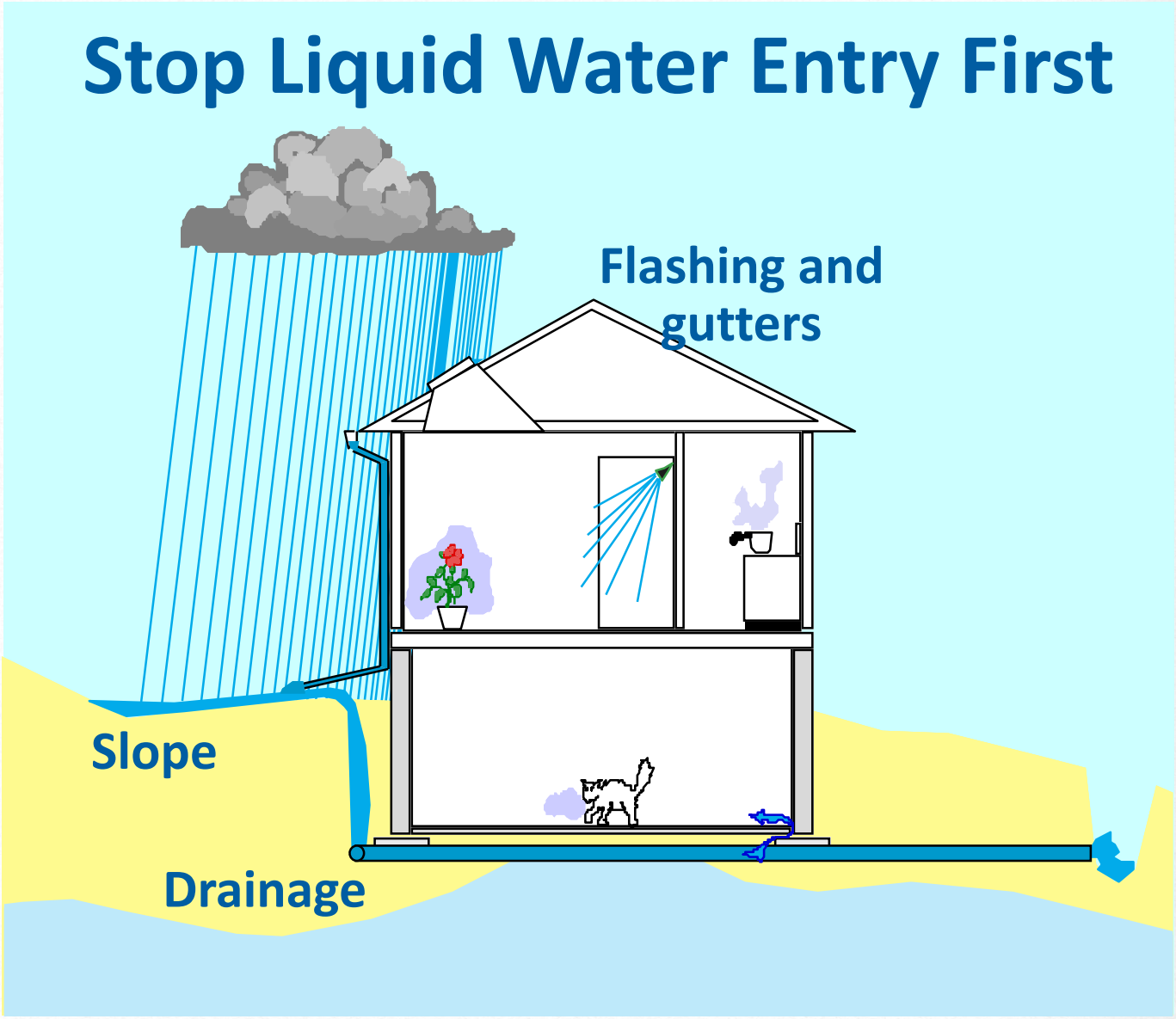
Page 4.4

How Water Enters a Building

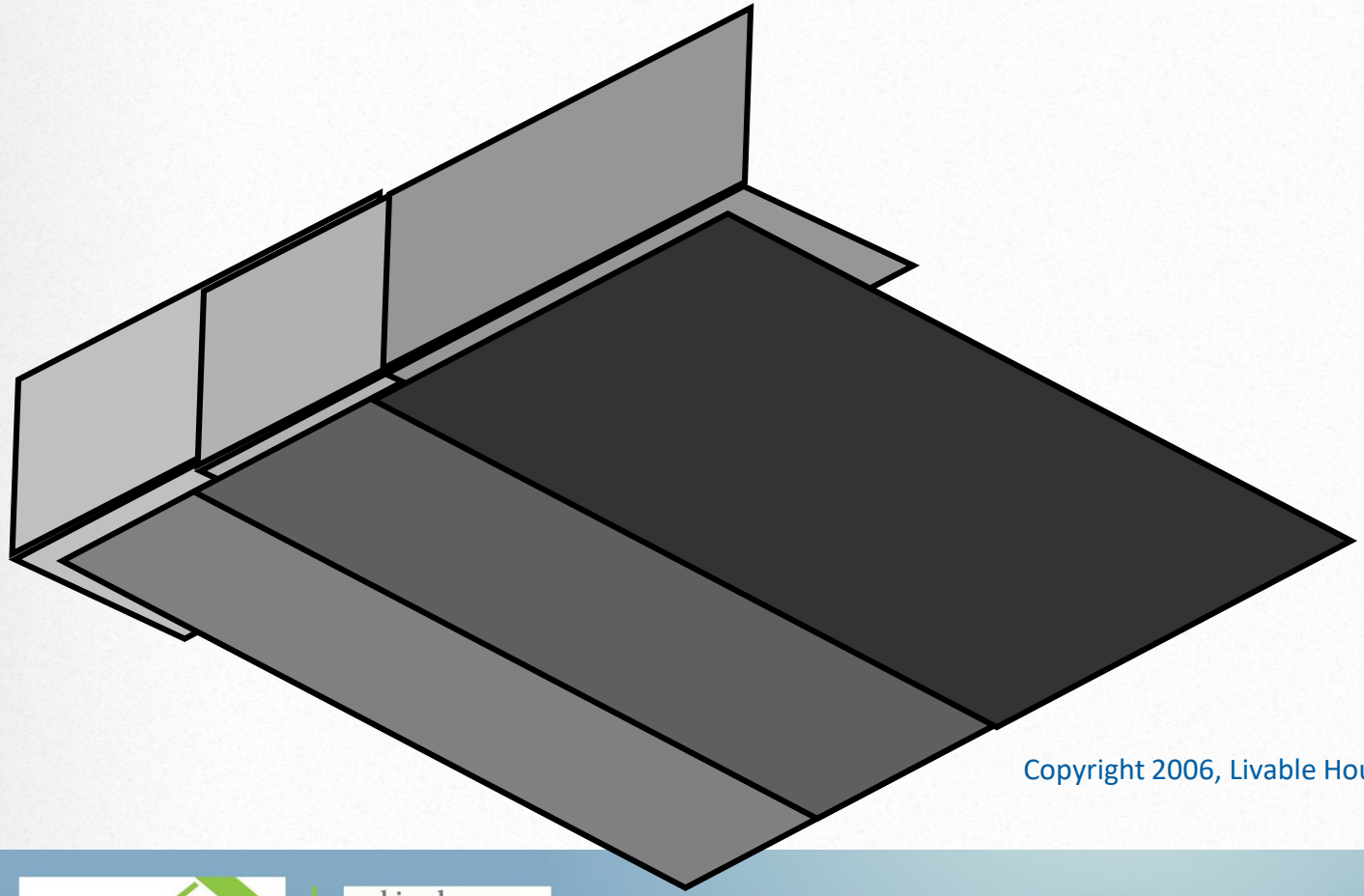


Page 4.4

Stop Liquid Water Entry First



Step Flashing



LIVABLE HOUSING INC.
Affordable. Healthy. Sustainable.

Page 4.5

Page 4.6

Retrofit rainwater protection

Windows leak?

Page 4.6

Clues on the outside shape your indoor inspection

Masonry + rain & sun + air conditioning + vinyl wallpaper

= mold

Page 4.7

Air conditioner condensate drains into building

Page 4.7

Porous material can wick water from outside

Page 4.8

GROUND SLOPES TOWARD HOUSE

Page 4.9

Moisture meters

- Is material wet?
- Source of water?

Page 4.10

Crawlspaces may contain:

- Mold
- Pests
- Pesticides
- Asbestos
- Lead paint
- Sewer gas
- Radon

What looks like a dry crawlspace can add excess water vapor

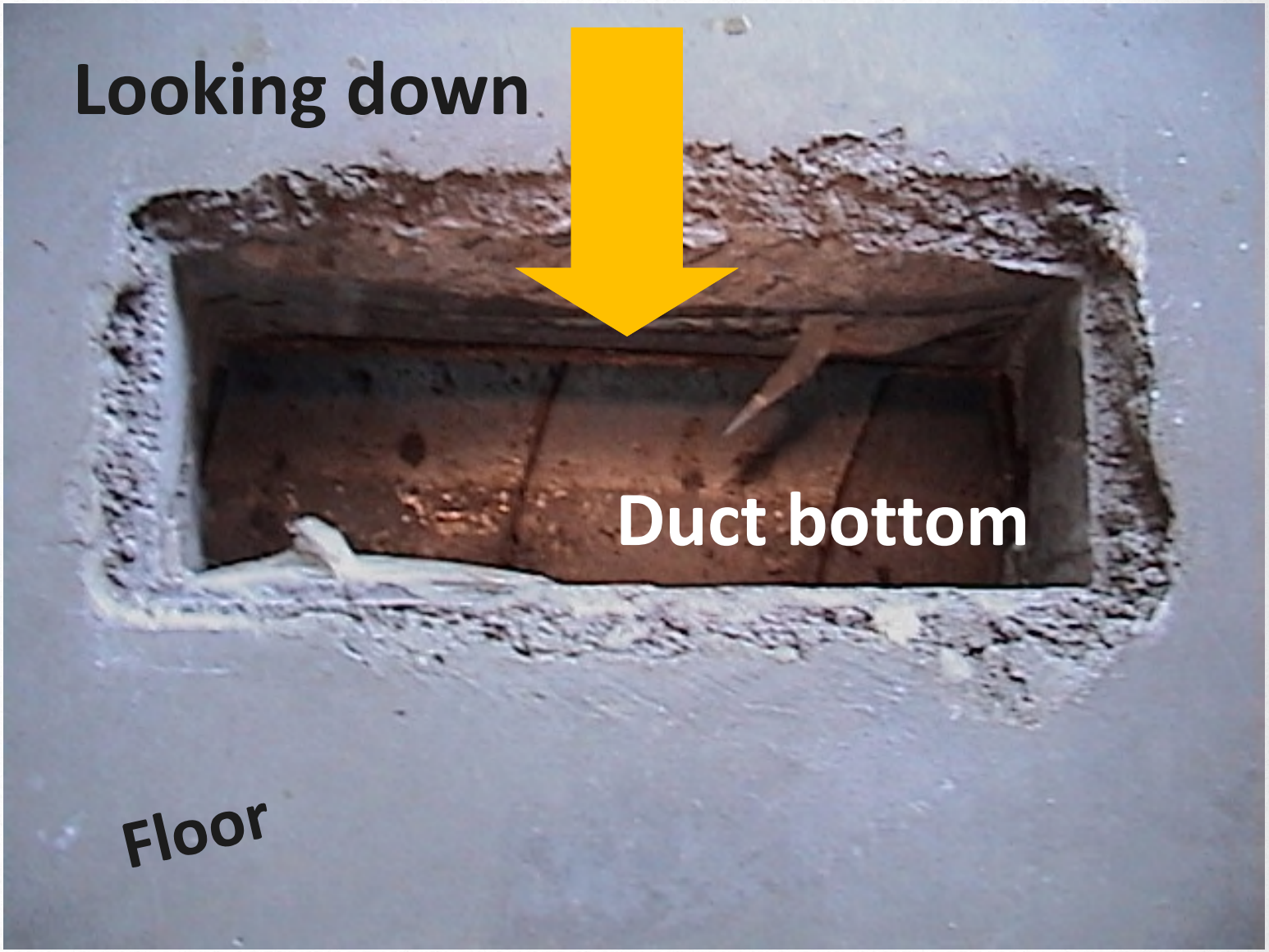
Page 4.11

Good Sealed Crawlspace

Page 4.11

Failed drainage systems

Page 4.12



Page 4.12

Are there floor drains?

A dehumidifier?

Steps to Dry Basements

Page 4.12

- Drain, drain, drain
- No paper or wooden materials in contact with foundation
- Keep warm humid air away from earth chilled surfaces
- Dehumidify

Page 4.13

Plumbing problems

Page 4.13

Page 4.13

Drain pan in the event of heater leak

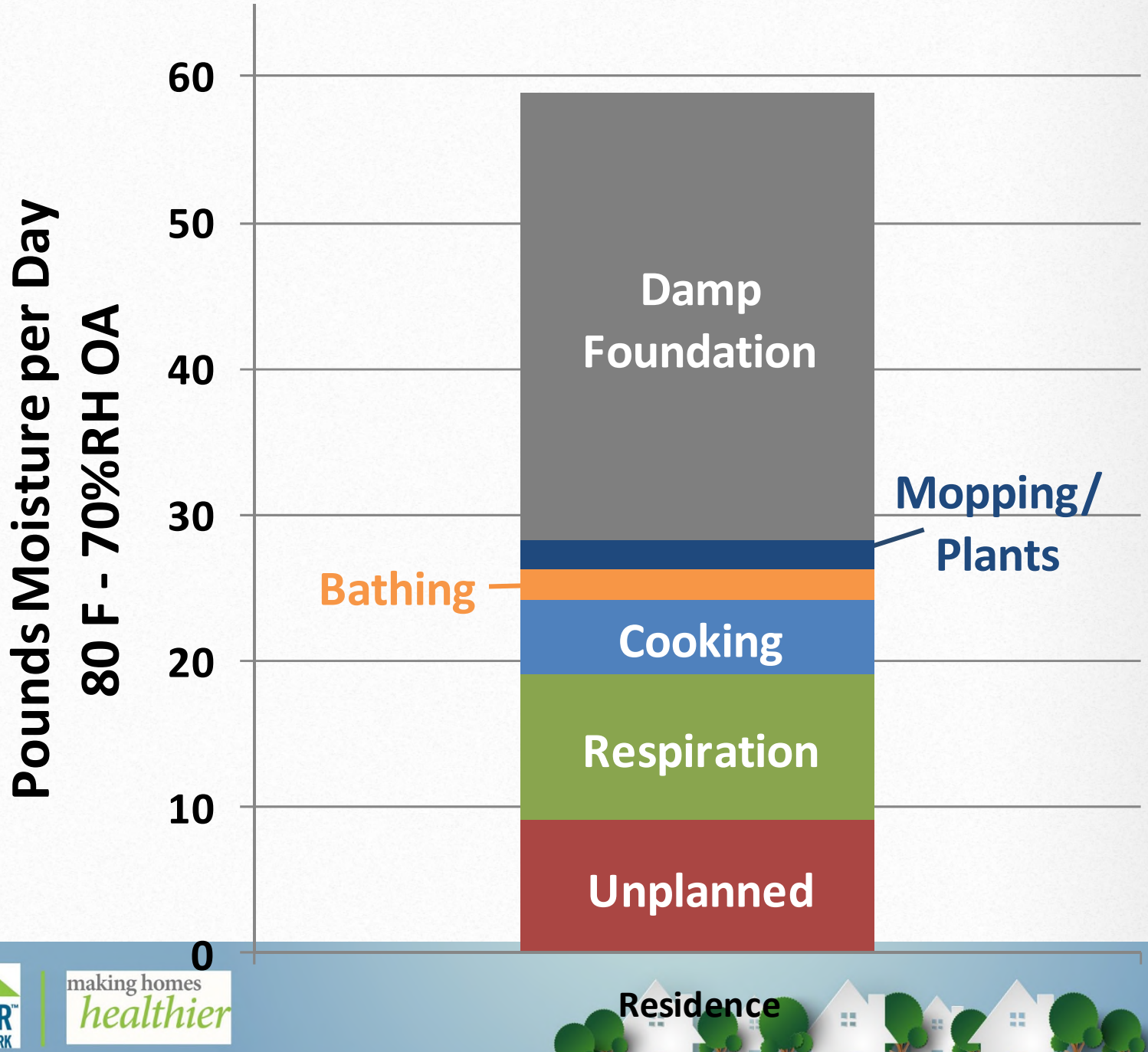
Page 4.14

Leaky refrigerator drip pan causes mold

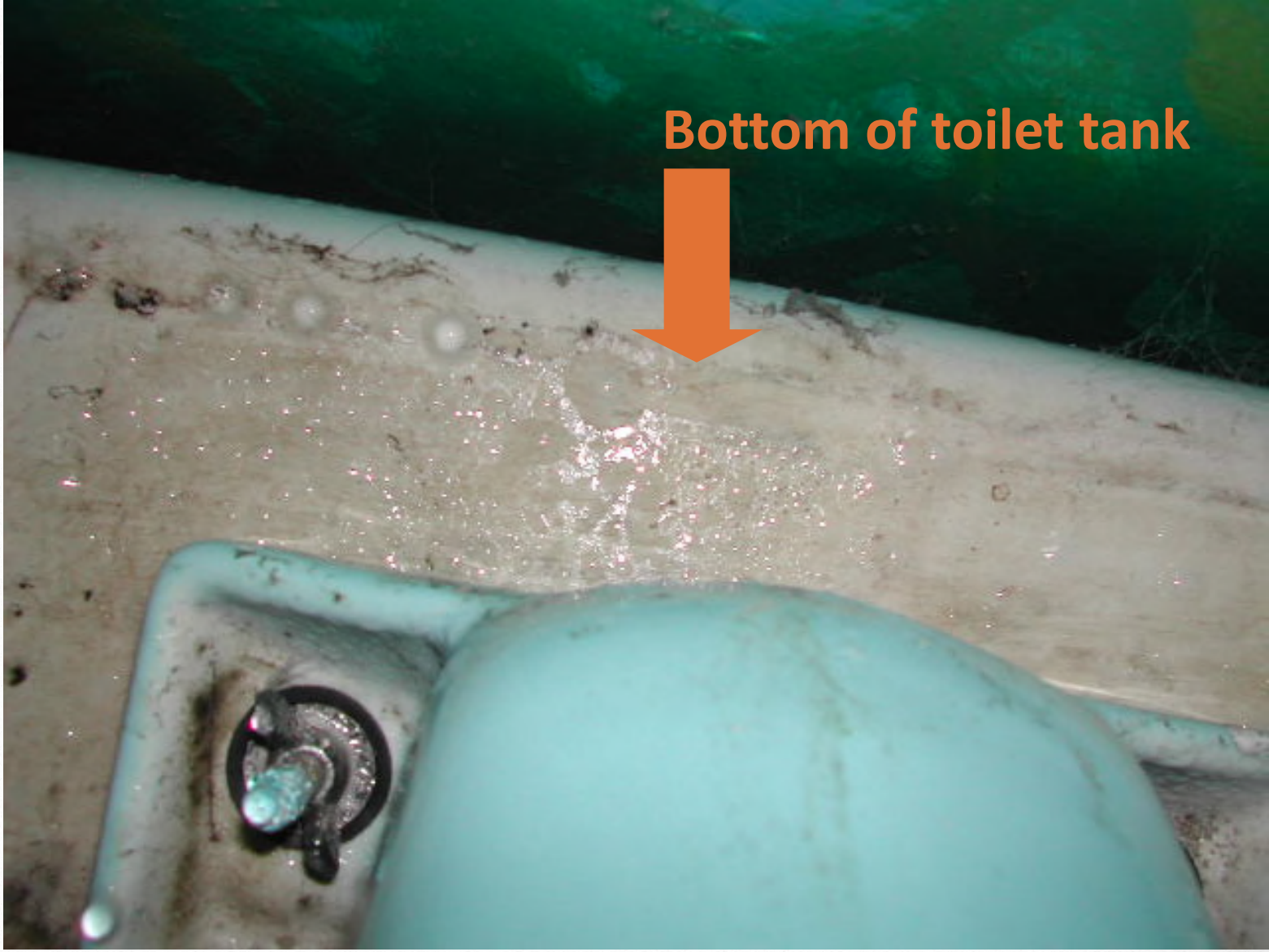
Vacuum bag with mold

If humidity levels are greater than 95% for three to six weeks…

Page 4.15


Pounds Moisture per Day
80 F - 70%RH OA
60
50
40
30
20
10
0
Damp Foundation
Mopping/ Plants
Bathing
Cooking
Respiration
Unplanned
Residence

Page 4.15



Mold can grow where we cannot see it

Page 4.16

Mold in the air conditioner?

Condensation when cold outside

Page 4.16

Mold due to poor insulation or wind blowing through insulation.

Mold around window where there is no insulation.

Page 4.17

Page 4.17

Unsealable recessed light allows warm, moist air into the unheated attic.

Page 4.18

DEHUMIDIFIERS

- Wattage
  - (Energy Star rated)
- Water removal rate
- Noise
- Drainage
- Icing
- Filter

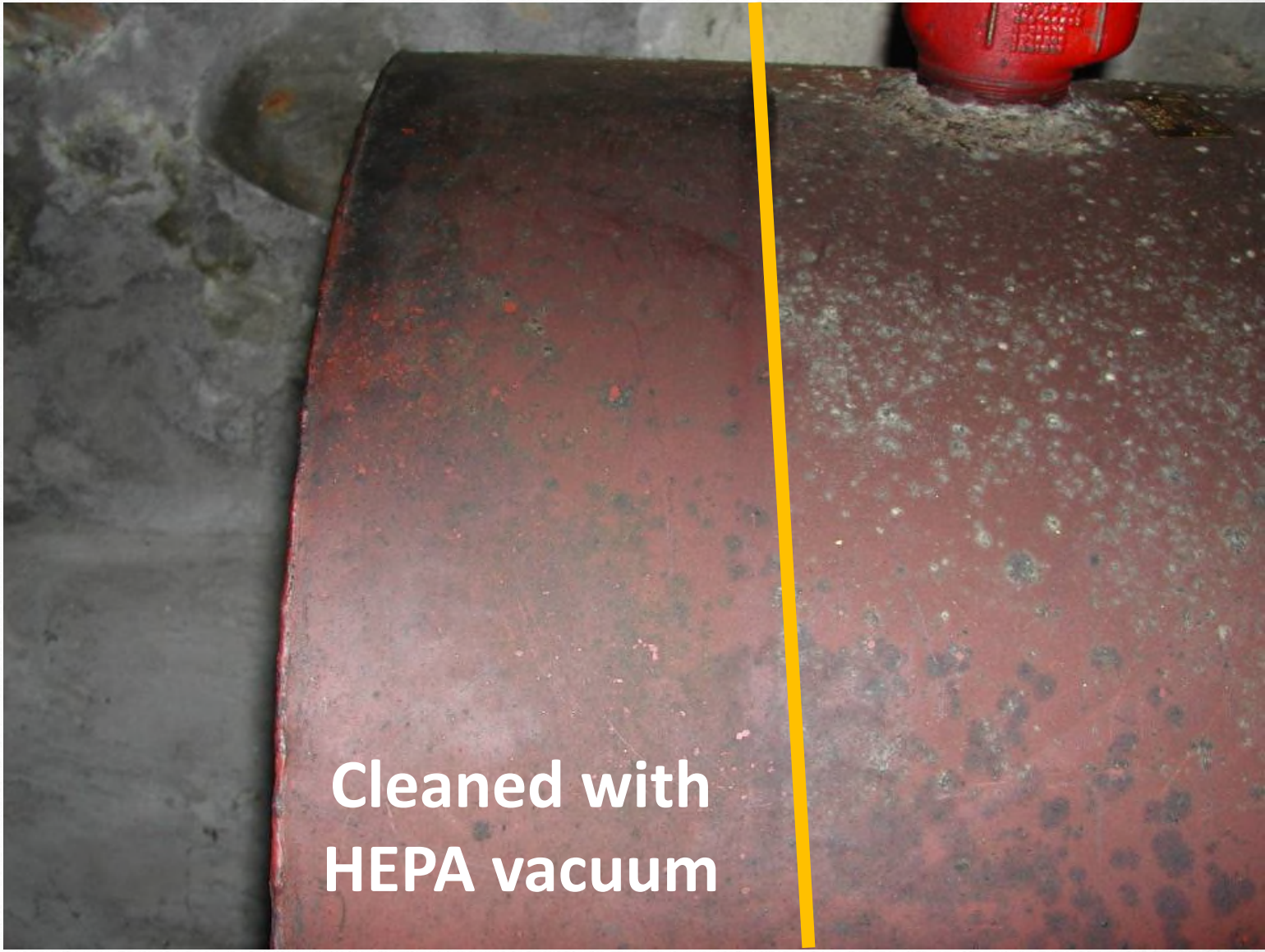
Response to Mold Problems

Page 4.18

- Identify
- Dry
- Design
- Discard or decontaminate
- Implement

Page 4.19

Page
4.19



Page
4.20

Page 4.20

Cleaning Solution

- Detergent and hot water

Assorted brushes, rags, mist spray bottles

Do not use high pressure sprayers

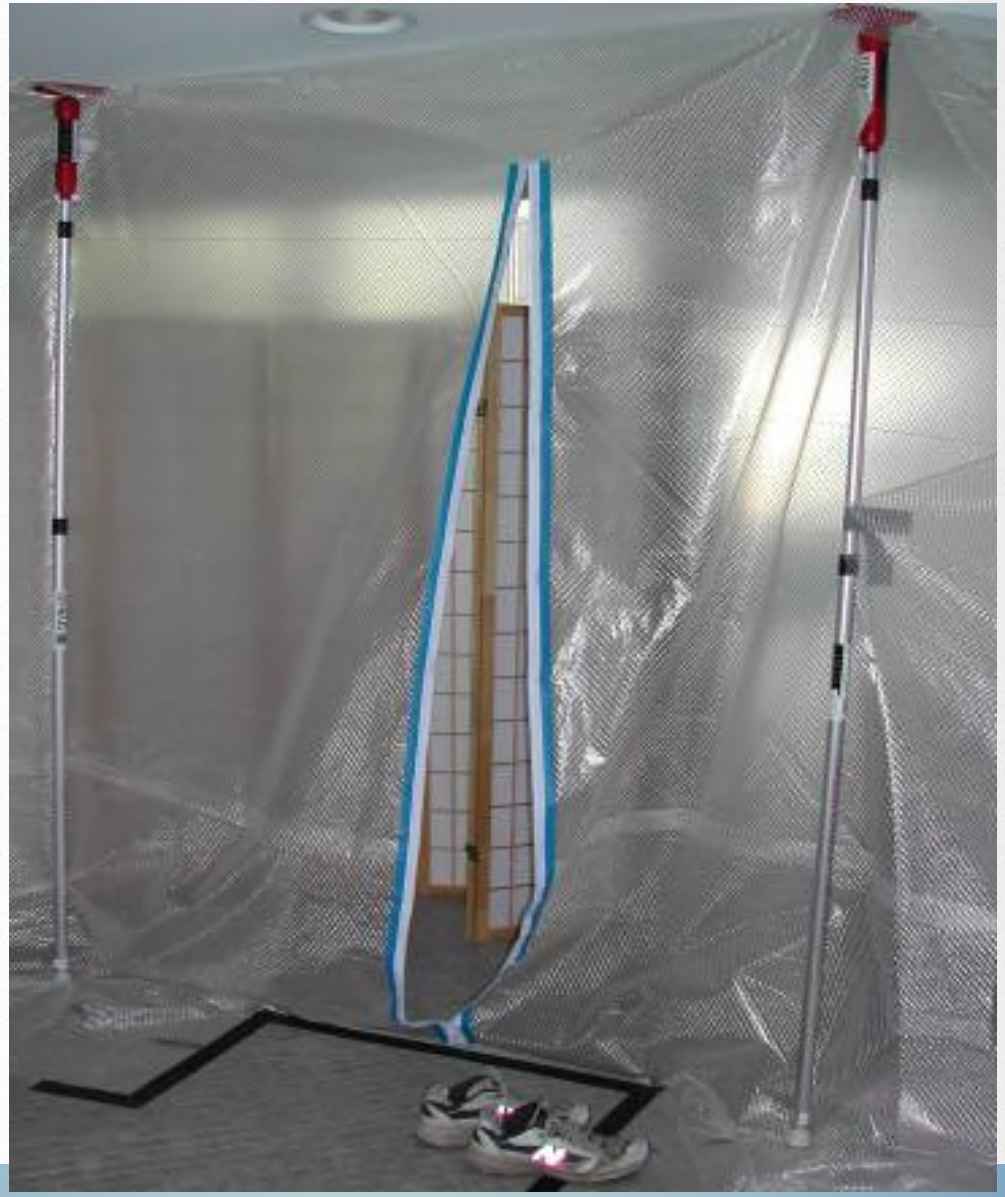
For Bigger Jobs

MUST HAVE:

- Adequate respirator
- Eye protection
- Rubber gloves
- Coveralls
  - Remove or bag protective gear before leaving work area

Page 4.21

Containment may be needed for bigger jobs. See EPA Guidance.



Code Requirements Related to Moisture

- 302.2 Grading and drainage.
- 304.7 Roofs and drainage.
- 304.6 Exterior walls
- 304.16 Basement hatchways
- 304.2 Protective treatment

Key Messages

Page 4.22

- Excess moisture creates conditions that can affect health.
- Moisture in the home comes from inside and outside.
- Excess moisture in the home should be prevented through appropriate construction methods and plumbing systems, temperature control, ventilation and proper maintenance.

Learning Objectives

Name three health hazards in the home that are related to excessive moisture.

Identify four sources of moisture in the home.

Describe five strategies for controlling moisture in the home.