

“It Pays to be Healthy”

HUD Energy Efficiency Webcast
September 18, 2007

By
Rebecca Morley
Executive Director
National Center for Healthy Housing

Presentation Outline

- Is green also healthy?
- Seven principles of healthy housing:
Why we care about housing conditions
- Design do's and don'ts.
- Case study

It's Green, but is it healthy?

Which one contains 5 milligrams of mercury?

LED



CFL



Key Principles of Healthy Housing

- Make the house:
 - Dry
 - Clean
 - Pest free
 - Ventilated
 - Contaminant-Free
 - Safe
 - Maintained

National Green/Health Guidelines

- Green Communities – Enterprise Community Partners
- LEED H – US Green Building Council
- NAHB Green Home Building Guidelines
- Energy Star Indoor Air Package – US EPA
- Health House – American Lung Association

Summary Analysis

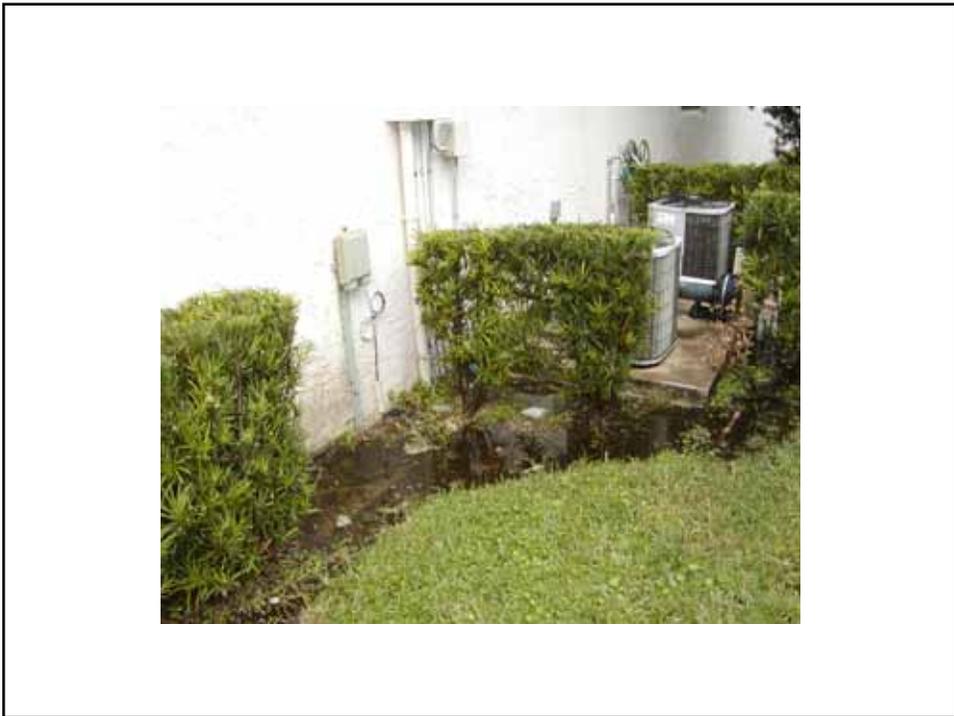
Healthy and Affordable Building Principles	LEED-H Points	NAHB Green Home Building Guidelines	Green Communities	ALA Health House	EPA Air Plus
KEEP IT DRY	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
KEEP IT CLEAN	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
KEEP IT WELL VENTILATED	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
KEEP IT SAFE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
KEEP IT FREE OF CONTAMINANTS	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
KEEP IT PEST FREE	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
KEEP IT WELL MAINTAINED	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

all criteria included
 75% of criteria included
 less than 75% of criteria included

Take Home

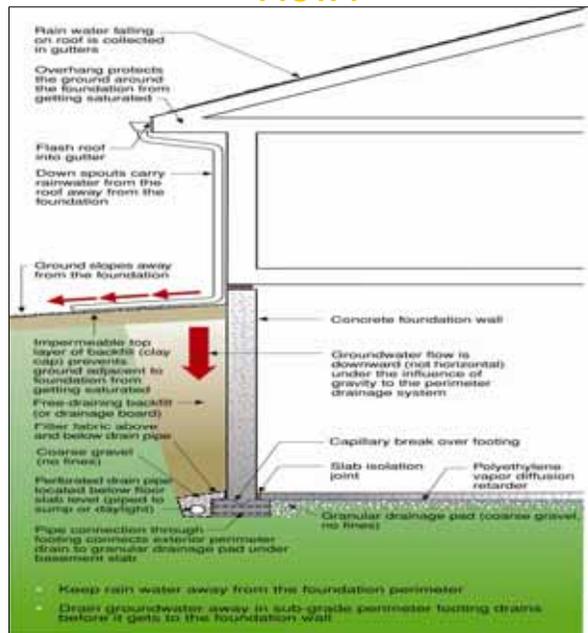
- Low Cost – For Example ...
 - Shoe storage/walk off systems (Clean)
 - Better bath and kitchen fans (Ventilated)
 - No paper faced gypsum/carpet in wet areas (Dry)
 - Seal holes/cracks (Pest-Free)
 - CO alarms (Safe)
 - No smoking policies (Clean)
- Some Cost
 - Radon controls (Contaminant-Free)
 - Moisture controls: overhangs, grading, flashing, control below grade moisture (Dry)
 - ASHRAE 62.2 (Ventilated)

Dry





How?



Proper Window Flashing



www.buildingsciencecorp.com

Costs when things go wrong?

- Plumbing repairs and leaks are the most frequent tenant complaint and work order request according to Boston CDCs and the Boston PHA.
- New York City* - 150 families filed suit against housing complex owner claiming failure to eliminate mold. 5 are wrongful death suits.
- California* - \$33,000 settlement regarding roof leaks.

Clean

How?

- Install dust walk-off systems at entryways
- Provide smooth, cleanable surfaces
- Provide effective storage space (to help avoid clutter)
- Use vacuums with good filtration

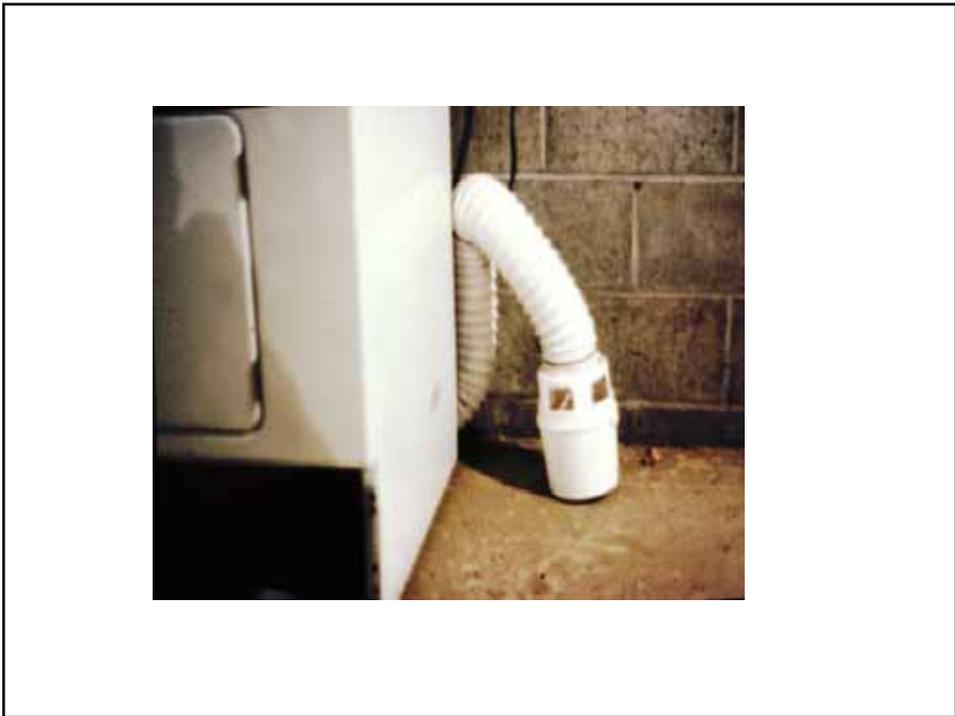
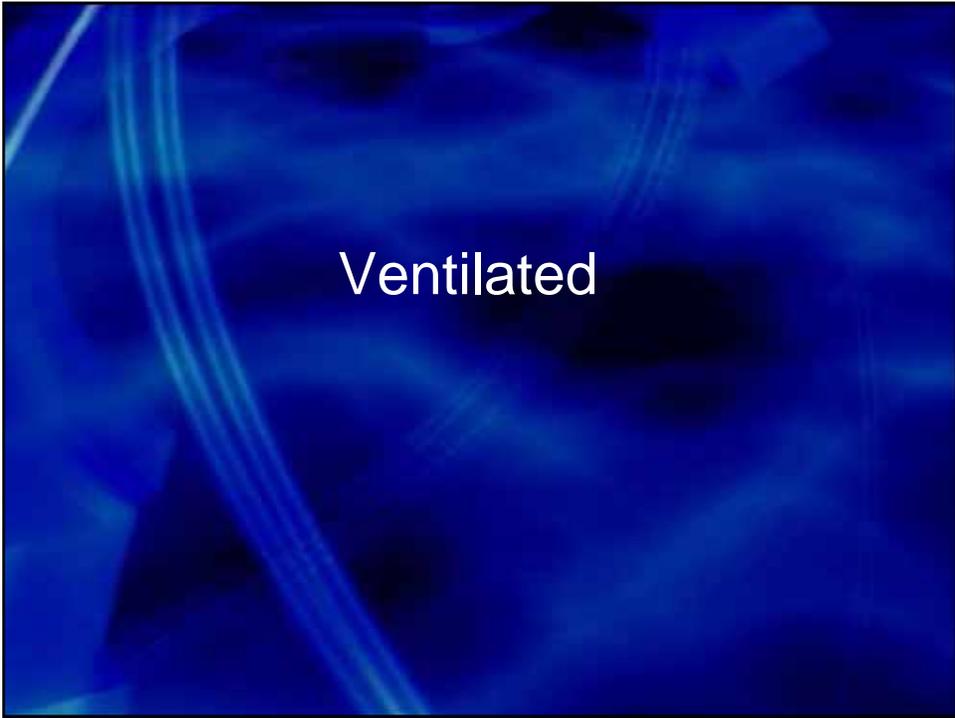
Pest-Free

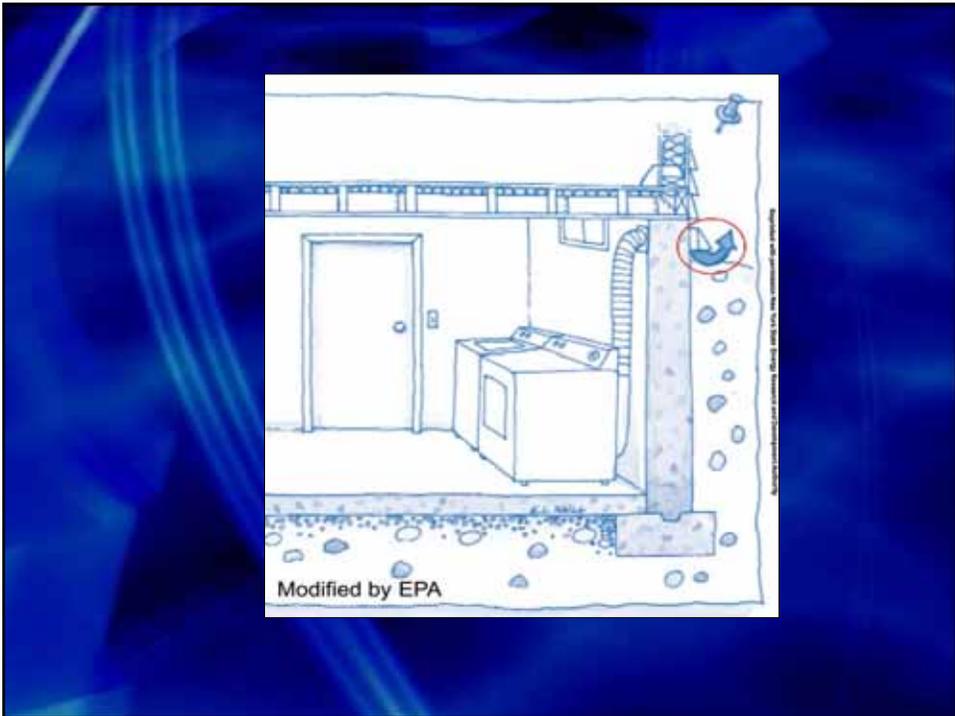


How?

- HUD guidance regarding IPM
- Sample Integrated Pest Management Contract Language
- IPM Training for residents and property maintenance staff through National Healthy Homes Training Center

www.healthyhomestraining.org/ipm/index.htm





Energy Star Fans

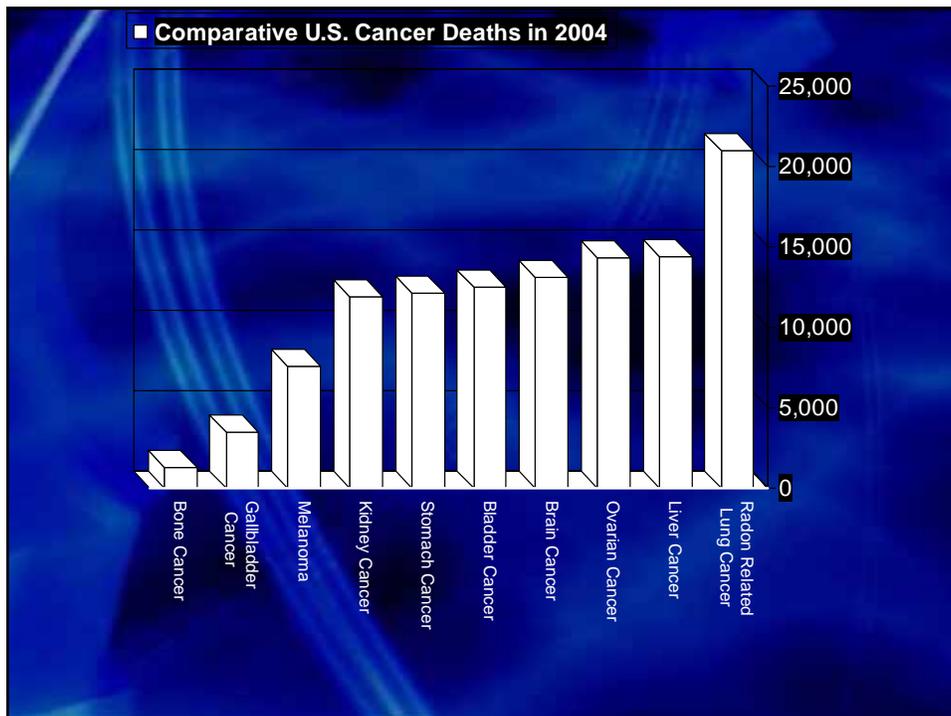


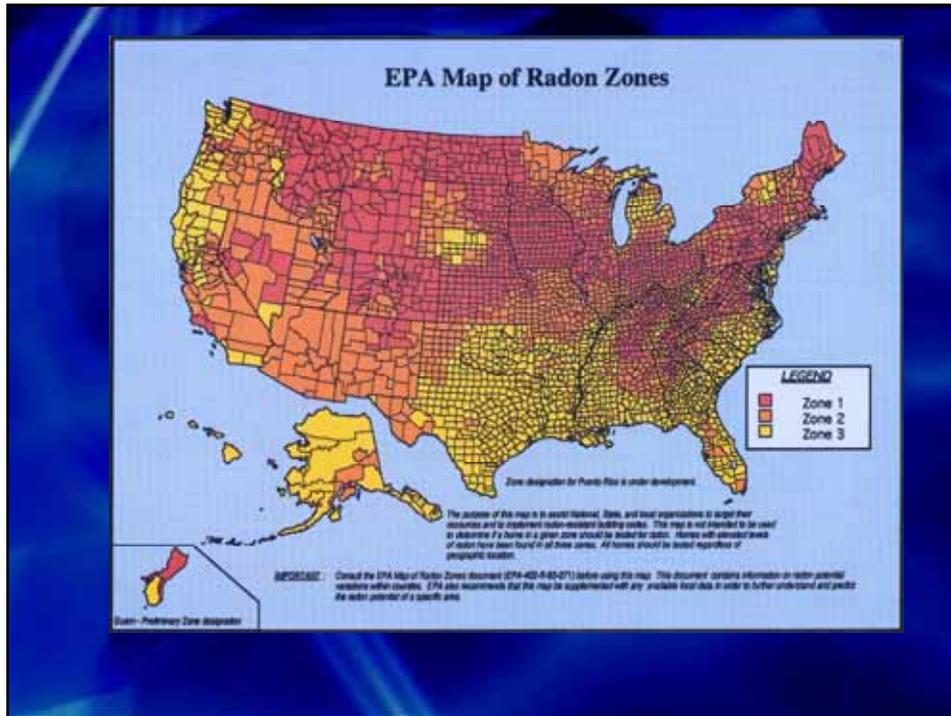
Contaminant-Free

Reprinted with permission: Home Energy Magazine Online. See www.homeenergy.org.



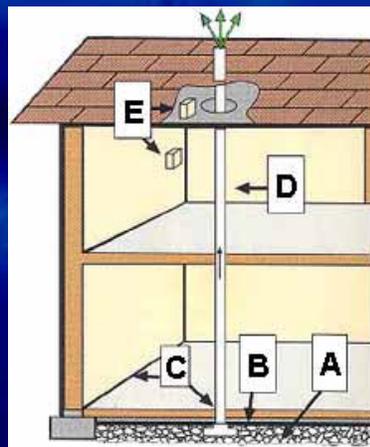
This direct-vent sealed combustion high-efficiency furnace is installed correctly. Note the plastic discharge pipe and sealed plastic air intake pipe. Being completely sealed, they can work independently of any air pressures within the home.





Five Elements to Passive Radon Mitigation System

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



Safe

**Place of Injuries for US Children
Hospital Emergency Room Visits/year**

Place	Total Injury Visits/yr
Home	4,010,000
School	811,000
Public	2,210,000
Other	841,000
Unknown	2,341,000

Phalen KJ et al. Pub Health Rep 120: 63-70 2005

How

- Ensure adequate lighting
- Maintain stairs in proper condition and ensure appropriate height
- Install mixing valves on faucets to avoid scald burns
- Install double handrails in stairways
- Install CO alarms

Maintained

Viking Terrace Apartments

Worthington, Minnesota



- Southwest Minnesota Housing Partnership
- Minnesota Green Communities
- Greater Minnesota Housing Fund
- Center for Sustainable Building Research
- Enterprise Community Partners
- National Center for Healthy Housing



Baseline Data Collection Complete

- 30 of 60 families enrolled to date
- Visual assessment of dwelling
- Resident health and quality-of-life questionnaire
- Resident training
- Radon testing
- Building performance testing

Radon Testing Results

- 2 Rounds of Pre-Renovation 3-Day Tests (1/06 & 3/06):
 - Round 1: 29 kits, Range 1.0-6.8 pCi/L, 9 Results at or above 4 pCi/L
 - Round 2: 8 kits, Range 2.3-4.0 pCi/L, 1 Result at 4 pCi/L
- Post-Renovation 90-Day Tests in 2 Buildings (1/07-4/07):
 - 22 test kits placed, 17 recovered (9 units, 8 common areas).
 - Range 0.6 to 4.5 pCi/L
 - 2 results at or above 4 pCi/L

Building Performance Testing

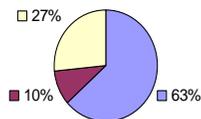
- 1 building, before occupancy.
- Ventilation System: Inlet air flow during operation of air handler, bathroom fan, and kitchen range hood.
- Building Envelope: Calibrated blower door to measure total shell leakage.
- Unit-to-Unit Connectivity: Air leakage between units.
- Air handling systems: Duct blaster test to measure total system tightness.

Ventilation Testing Preliminary Results

- Ventilation System:
 - With air handler on, system operated at 70% of required ASHRAE std or 40% of MN single family rate.
 - Exhaust fan in kitchen operating 48% below rating, bathroom fan 18% below.
- Building Shell: Fairly tight, 0.38 cfm/ft² at 50 pascals.
- Unit-to-Unit Leakage:
 - 3.5 to 3.8 Times greater than leakage from unit to outdoors.
 - Very high positive pressures in bedrooms.
 - Under any exhaust fan operation, units expected to draw air from central hall to inside unit.
- Duct System: High duct leakage: 71% duct leakage at 25 pascals, 105% at 50 pascals.

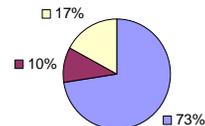
Quality of Life Indicators-Baseline

Ease of Cleaning
Compared to Old Home



■ Easier ■ Harder ■ About the Same

Comfort in Apartment
Compared to Old Home



■ More Comfortable ■ Less Comfortable ■ About the Same

Future Activities

- 1-year follow-up visual assessment
- 1-year follow-up quality-of-life questionnaire
- Long-term temperature and relative humidity to begin in fall 2007
- Long-term CO₂ monitoring in subset of units
- TVOC monitoring in subset of units.
- Radon testing in third building.
- Radon mitigation measures in Buildings 1 and 2.
- Training of property managers and contractors.

Recap

- Low Cost – For Example ...
 - Shoe storage/walk off systems –Clean
 - Better bath and kitchen fans - Ventilated
 - No paper faced gypsum/carpet in wet areas - Dry
 - Seal holes/cracks – Pest Free
 - CO alarms - Safe
 - No smoking policies - Clean
- Some Cost
 - Radon controls – Contaminant-Free
 - Moisture controls: overhangs, grading, flashing, control below grade moisture - Dry
 - Ventilation: ASHRAE 62.2 - Ventilated

Conclusions

- Unhealthy housing is not affordable or green
- Healthy living specifications exist and can be incorporated with minimal upcharge

Contact

Rebecca Morley
National Center for Healthy Housing
10320 Little Patuxent Parkway
Suite 500
Columbia, MD 21044

Phone: 877-312-3046
www.centerforhealthyhousing.org
rmorley@nchh.org