IAQ In Large Buildings

Radon in Schools: What You Need to Know

Wednesday, August 24, 2011

2:00 to 3:00 PM (EDT)

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Note: To hear the audio portion of the Webinar, you must call the number below.

Dial: 1-877-887-8949
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Using the Webinar Technology

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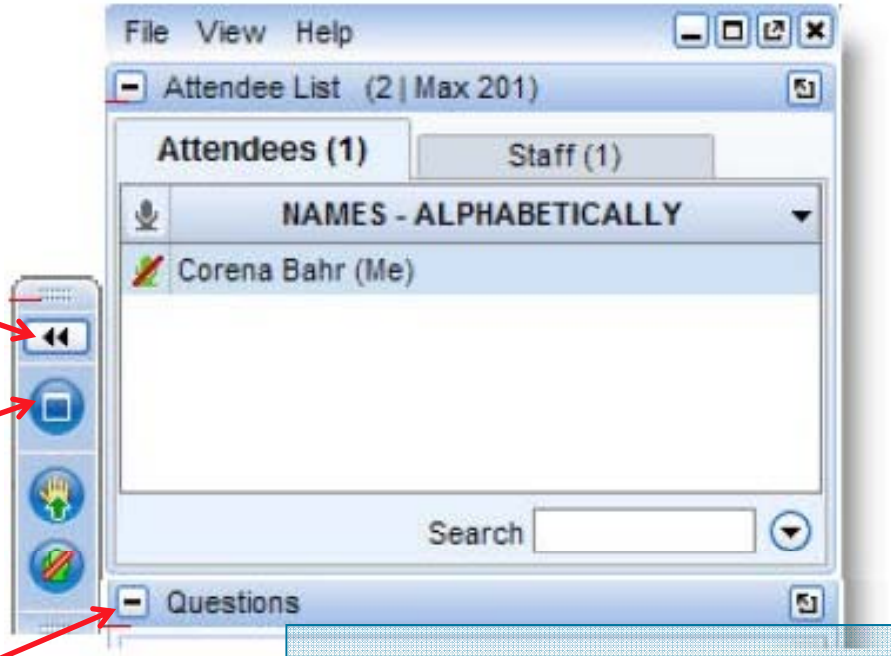

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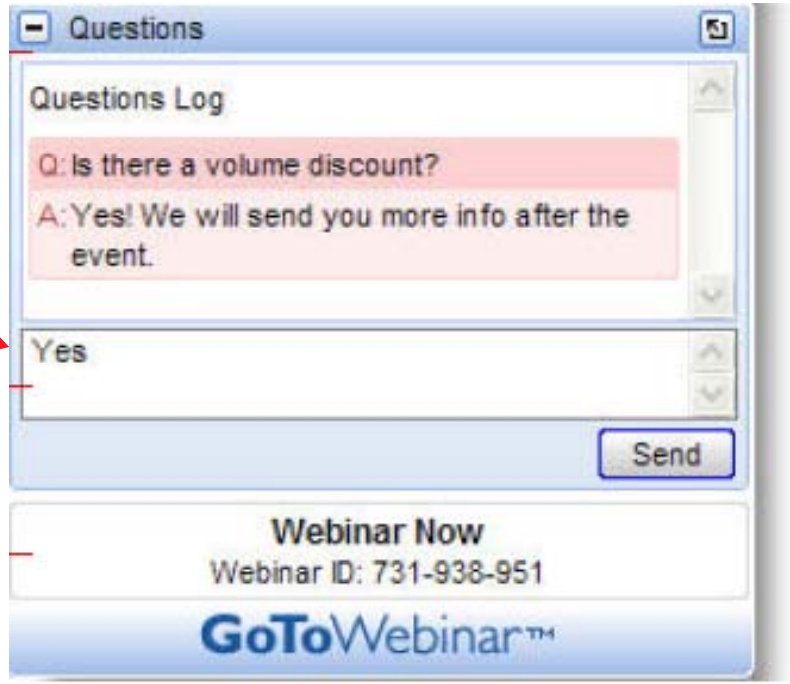

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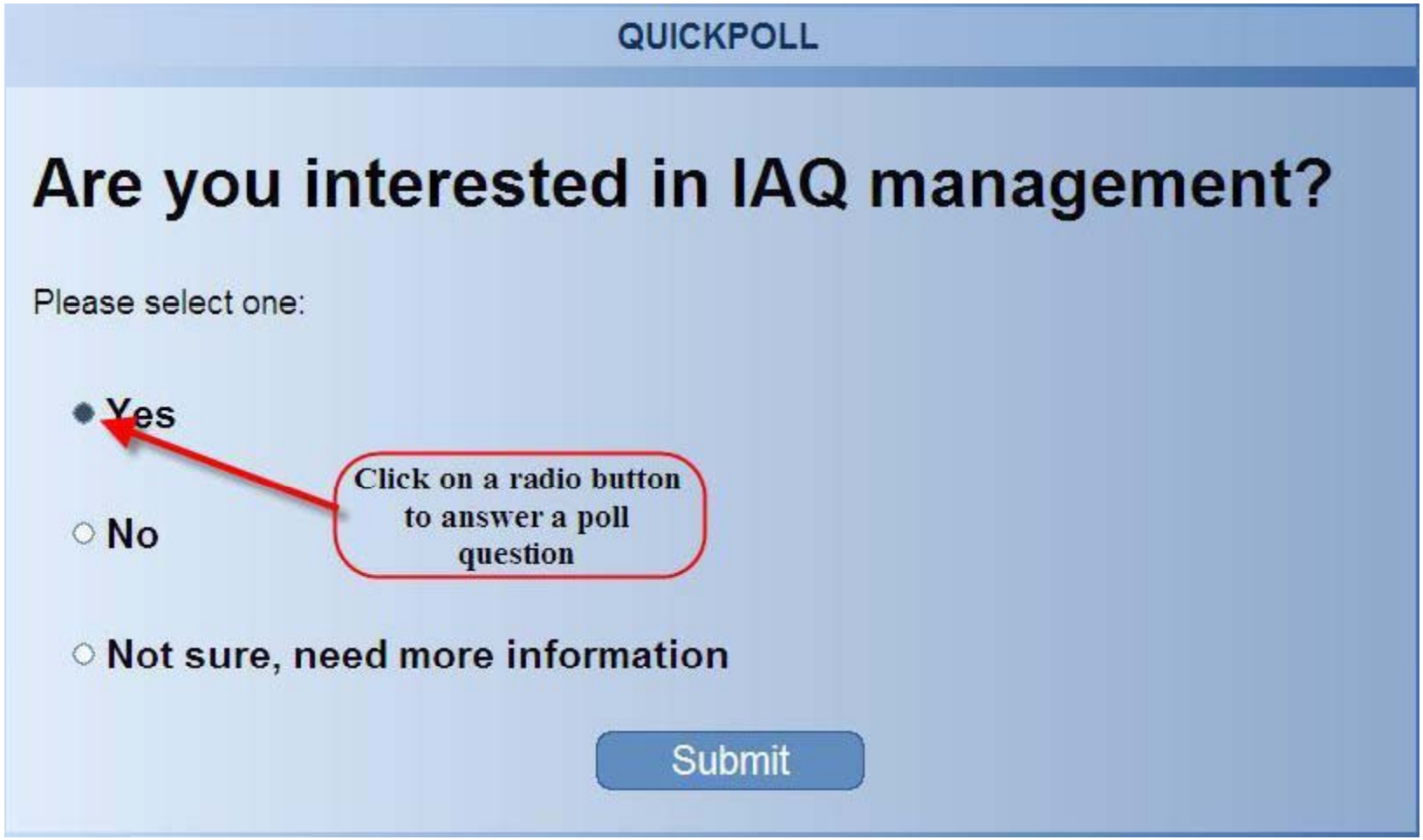

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Using the Phone Lines

- As an attendee, your line will be muted to minimize background noise. To access the operator, please dial *1.
- To ask a question, please use the Questions Pane.
- If you need assistance, please contact me using the Questions Pane.

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Today's Webinar Presentation and Materials

- PowerPoint slides, a Questions and Answers document and a list of resources will be available to you in a few weeks on the *IAQ Tools for Schools* website.

- www.epa.gov/iaq/schools/webconferences.html

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Indoor Environments Division: Mission

Protecting the public's health from indoor environmental concerns where they live, learn, work and play.

(or in other words)

Healthier buildings, healthier people.

Primary Focus Areas

- Healthier Buildings
  - Homes.
  - Schools.
  - Commercial & other indoor spaces.

- Asthma
- Radon
- Children's Health
- EJ and Tribal Communities
- Indoor Air Plus
- Technical Specifications
- International Cookstoves

Radon in Schools

- You Need To Know
  - Radon is a serious, widespread health threat
  - The *Key Drivers* provide a proven approach
  - The basics of Testing & Mitigation
  - What resources are available

Radon – A Primer

Jani Palmer
EPA Scientist
202-343-9921
palmer.janise@epa.gov

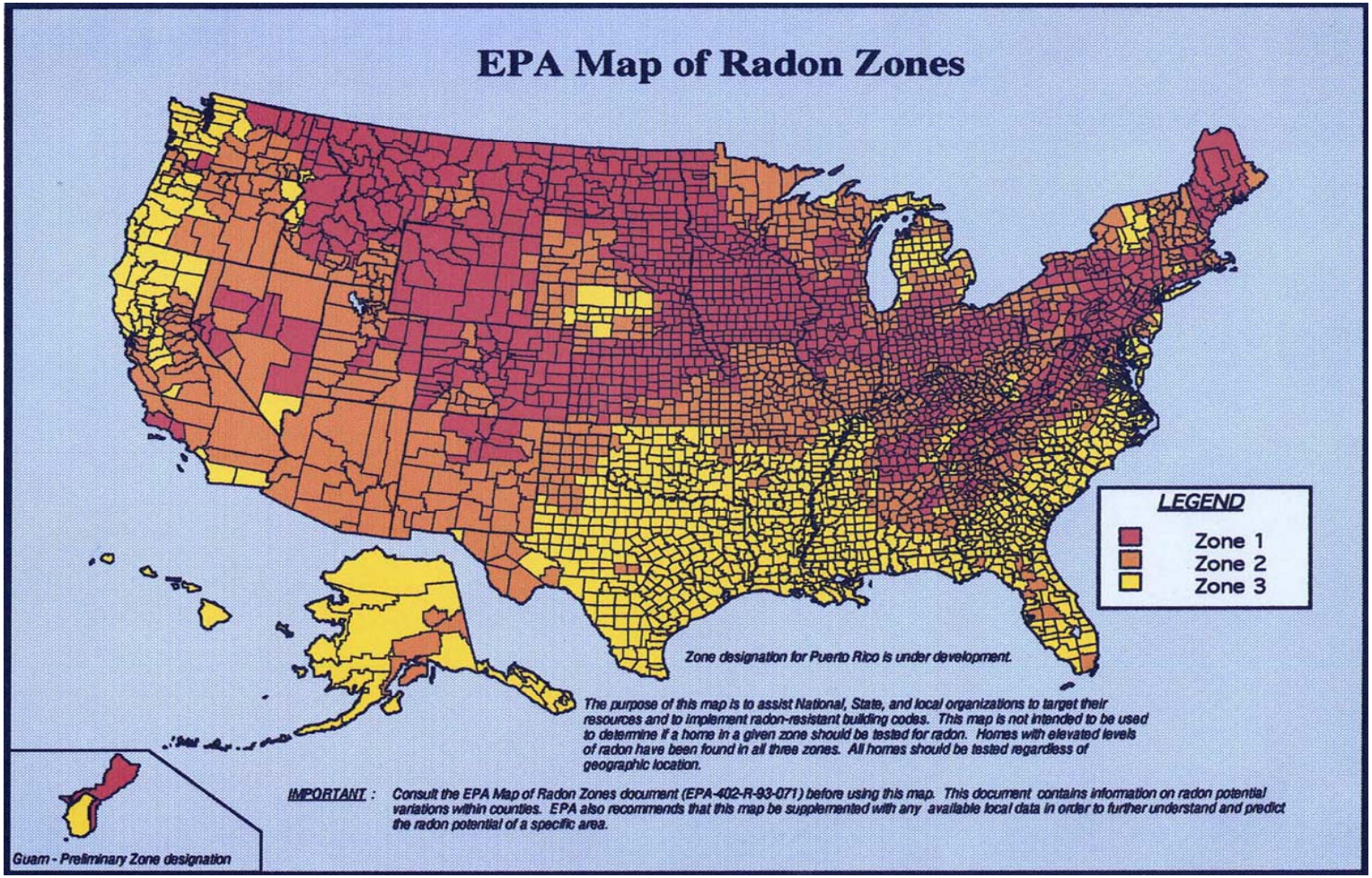

Rn
Radon
Atomic Number: 86
Atomic Mass: (222)

What we know about radon & schools

EPA United States Environmental Protection Agency

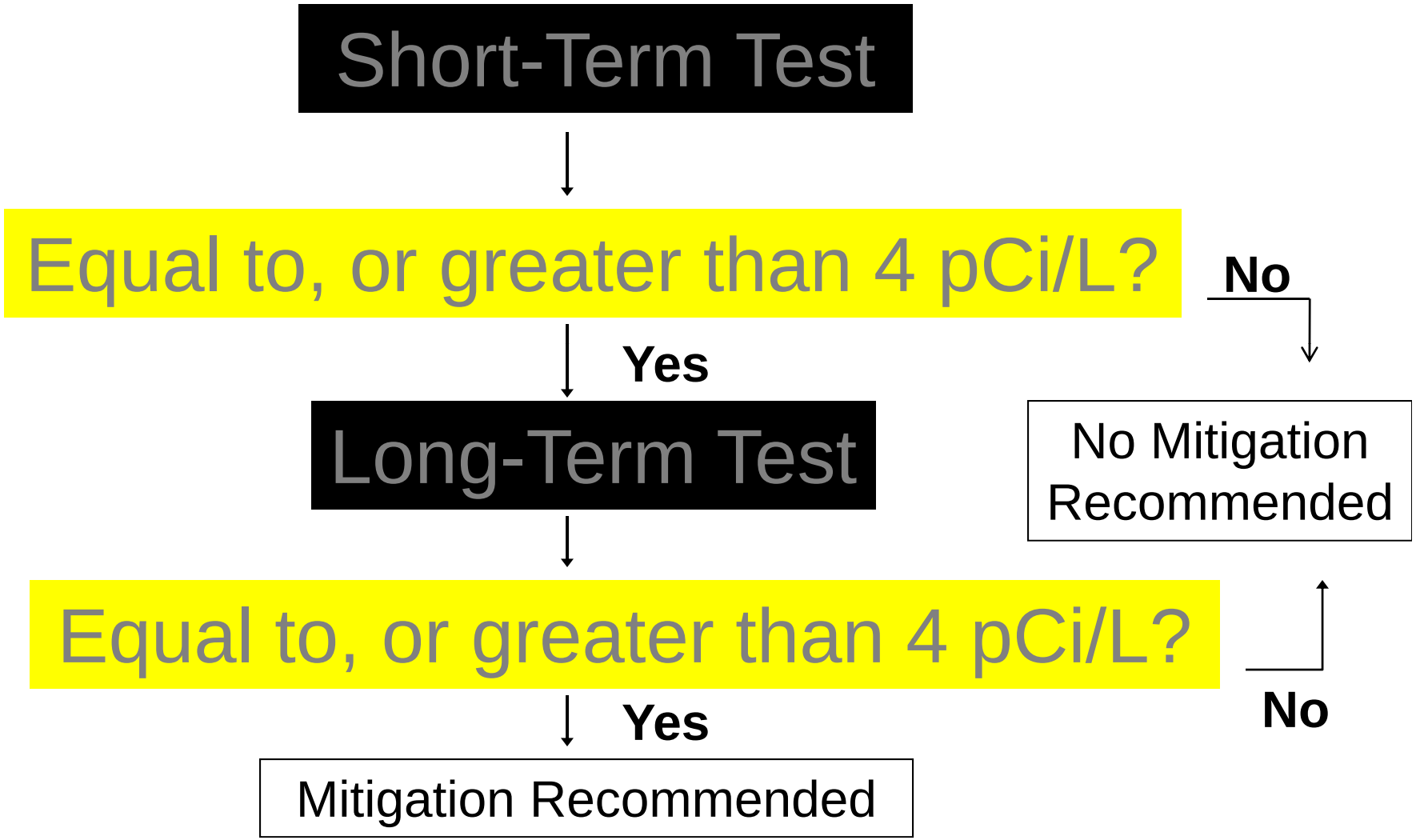
Should you test for radon in Pennsylvania and Louisiana?

www.epa.gov/iaq



EPA Suggested Testing Protocol

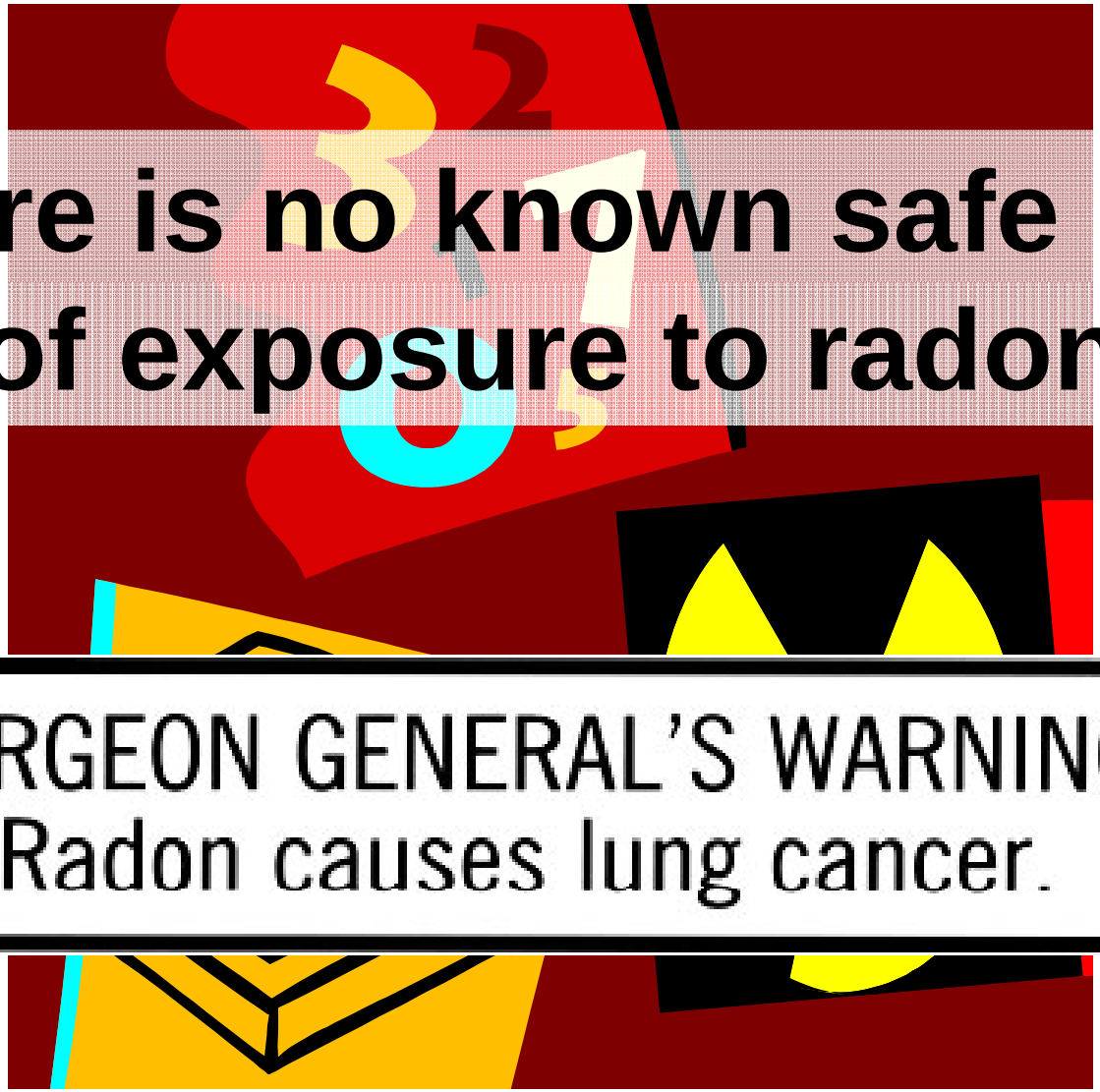
www.epa.gov/iaq



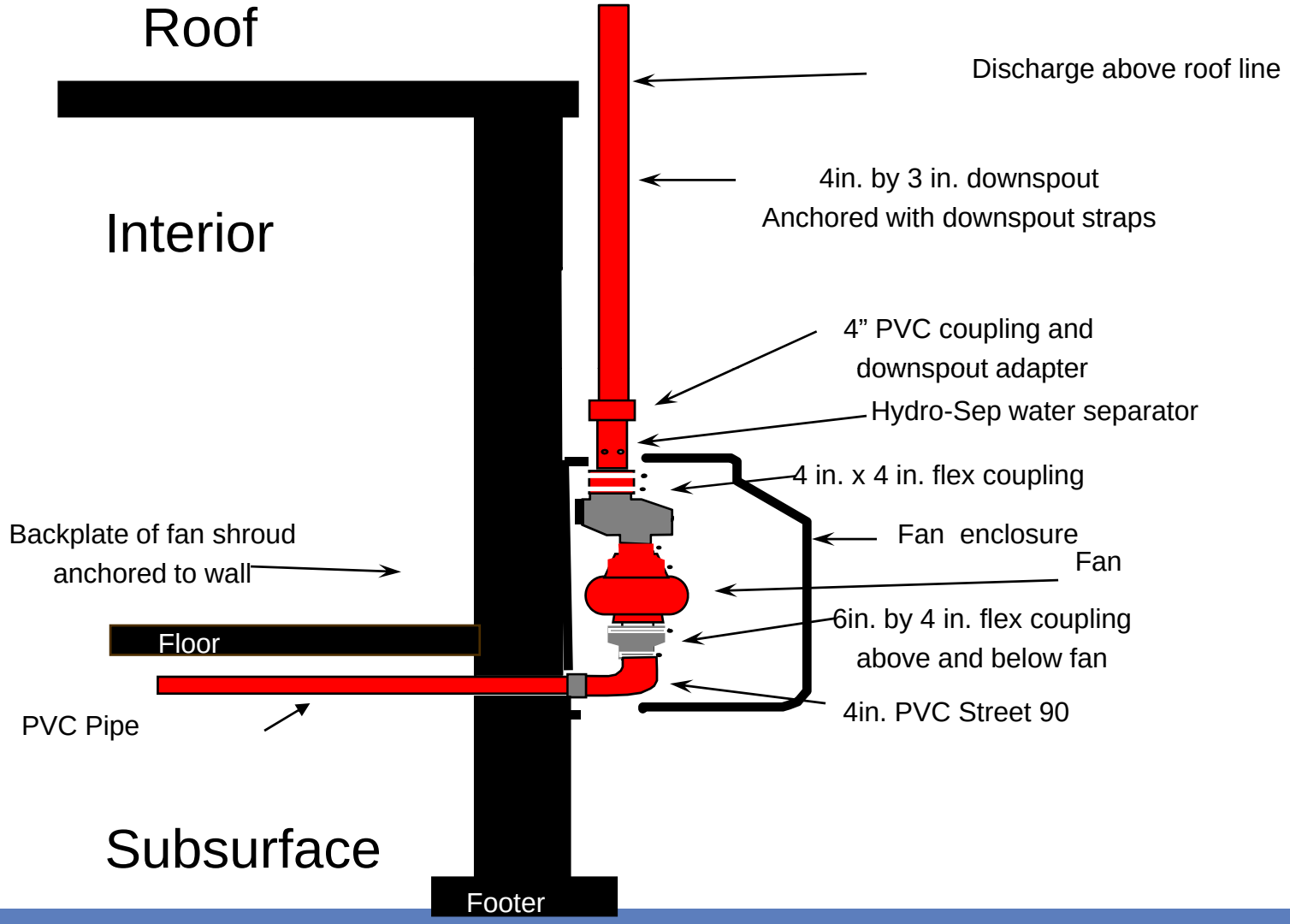
How do you know if a classroom in your school has high radon levels?

What is a safe level of radon?

There is no known safe level of exposure to radon.



Basic Concept of Mitigation



United States Environmental Protection Agency

Active Soil Depressurization

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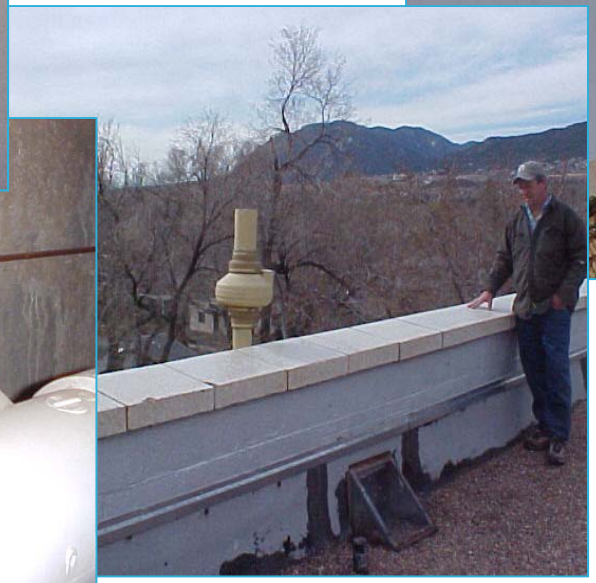
Active Soil Depressurization



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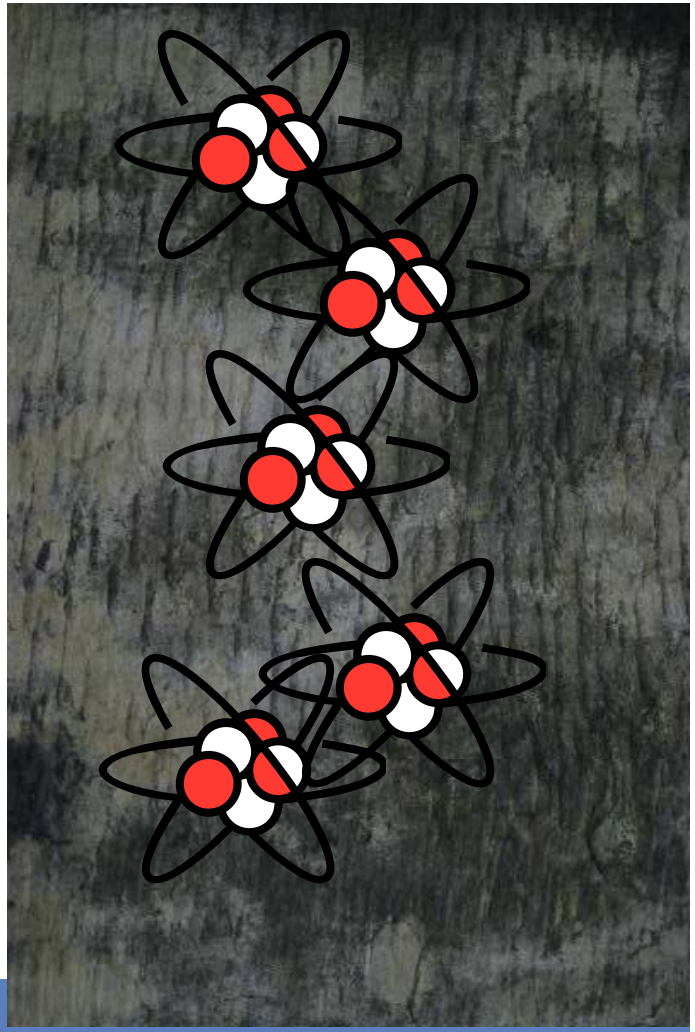
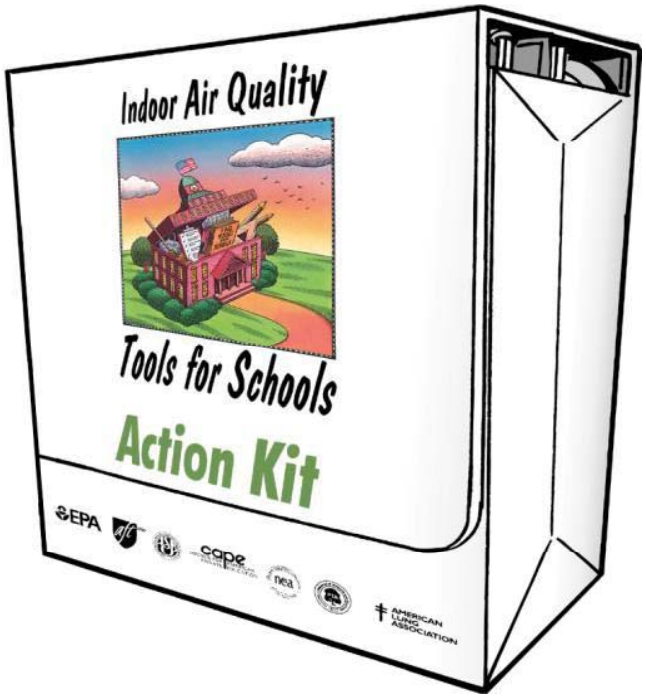
A blueberry is to the Grand Canyon as a radon molecule is to WHAT?



A Proven Approach

Applying the Six Key Drivers



The Framework for Effective School IAQ Management: Six Technical Solutions

www.epa.gov/iaq

United States Environmental Protection Agency

Quality HVAC

- Inspect HVAC systems regularly
- Establish a maintenance plan
- Change filters regularly and ensure condensate pans are draining
- Provide outdoor air ventilation according to ASHRAE Standard or local code
- Clean air supply diffusers, return registers, and outside air intakes
- Keep unit ventilators clear of books, papers, and other items

Control of Moisture/Mold

- Conduct routine moisture inspections
- Establish mold prevention and remediation plan
- Maintain indoor humidity levels between 30% and 60%
- Address moisture problems promptly
- Dry wet areas within 24-48 hours

Strong Integrated Pest Management (IPM)

- Inspect and monitor for pests
- Establish an IPM plan
- Use spot treatments and baits
- Communicate with occupants prior to pesticide use
- Mark indoor and outdoor areas treated with pesticides

Effective Cleaning & Maintenance

- Conduct routine inspections of school environment
- Develop a preventative maintenance plan
- Train cleaning/maintenance staff on protocols
- Ensure material safety data sheets (MSDS) are available to staff
- Clean and remove dust with damp cloth
- Vacuum using high-efficiency filters

Smart Materials Selection

- Maintain products inventory
- Develop low-emitting products purchasing and use policies
- Use only formaldehyde-free materials
- Use only low-toxicity and low-emitting paint
- Select products based on product rating systems
- Use least toxic cleaners possible (only those approved by the district)

Aggressive Source Control

- Conduct regular building walkthrough inspections
- Test for radon; mitigate if necessary
- Implement a hazardous materials plan (use, label, storage and disposal)
- Implement Smoke-Free policies
- Establish an anti-idling school bus policy
- Use walk-off mats at building entrances
- Conduct pollutant-releasing activities when school is unoccupied

Effective Radon Management - Remember the Six Key Drivers

www.epa.gov/iaq/schools/pdfs/kit/framework.pdf

District Profile

- School District 11 serves the Colorado Springs metropolitan area
- 62 Schools + 15 Support Buildings
- 4.5 million square feet
- 28,000 students with 3,500 staff
- School age range: 3 to 109 yrs old
- Mean = 46.4 years Median = 43 years

Background -- 1990

- District hired consultant to assess radon problem
- Consultant trained facility staff to deploy/retrieve devices
- All buildings were tested using short-term procedures
- Results concluded that 15 schools required long-term testing
- Long-term results determined that 5 schools required mitigation
- District hired mitigation system consultant to design and install systems in the 5 schools

Background -- 2006

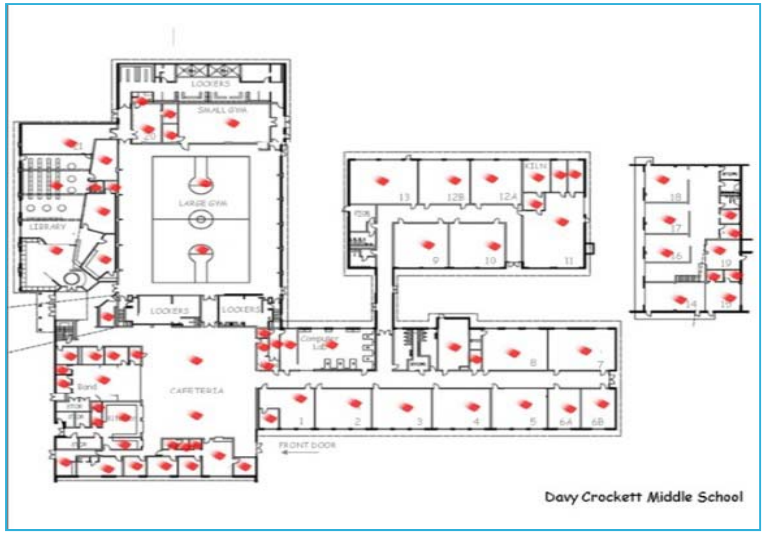
- District receives state grant to retest radon levels
- Historical long-term measurements > 3.5 pCi/L conducted in 1990 were proposed to be retested in the same 15 buildings (over 300 locations) 17 years later.

ORGANIZE for Success

- Analyze previous historical data
- Compare current floor plans to original test plans
- Review deployment locations
- Assemble deployment/retrieval team

ASSESS Your Environment

- Determined test kits to use
- Determine placement of test kits
- Survey building structure & HVAC for possible radon entry



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ASSESS HVAC Equipment

- Broken belt on Air-Handler found.
- The effect is reduced air circulation as well as no fresh air make-up to this room.
- Monthly inspections include:
  - Inspect fan indicator
  - Fan operation
  - Visible pipe connections

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COMMUNICATE with Stakeholders

Announcement of Short-Term Radon Survey
Main High School

Several ground floor rooms within this building are being surveyed to find out if there may be elevated concentrations of radon gas. Personnel certified by the National Environmental Health Association trained in the EPA radon testing methods are conducting this survey. **Your cooperation is needed to make this a meaningful survey.**

It is not known at this time if a radon problem exists in this building or in any other building in the vicinity. However, the work being done in this building could benefit the health and welfare of all of its occupants.

Radon is a naturally occurring gas that, in some cases, can enter a building and build up to concentrations which can cause a health concern if a person breaths it for many years. Through surveys such as this, we can determine if such a concern exists in this building and, if so, determine how it can be fixed.

These tests will be conducted from May 12 – 15, 2009

The test kits are harmless. The test kits will be placed in several rooms throughout the building on Monday and picked up on Thursday afternoon, with activities occurring after normal class hours. Please do not disturb the device or do anything else that could restrict good air movement around it. If, by accident, a test kit is moved or damaged in any manner, please inform Ms. Mary Smith at Smart School District at 555-1105.

Radon Test Kit Hanging from Ceiling

IMPORTANT: During the testing time, do not prop open exterior doors and windows. You may certainly go in and out of the building, but do not leave doors and windows standing open.

Your cooperation is very much appreciated.

Sincerely,
Mary Smith

- **Extremely Important**
- Proactive
- Indicate what will happen
- Reviewed plan for implementing tests with principals and building managers
- Distribute communication plan

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News Travels Fast

Metro

'YOU LEARN VERY FAST'
Entire freshman class at AFA is in glider training program
Military Monday, Page 4

MONDAY November 13, 2006 /// 719-636-0221 /// citydesk@gazette.com gazette.com

District 11 plans extensive radon testing

DETAILS
The following Colorado Springs

Levels will be measured for 6 months in 15 schools

Colorado has just one radon regulation, which requires that schools test at least once for the

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Presenters

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Colorado Springs School District No. 11

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Environmental Specialist

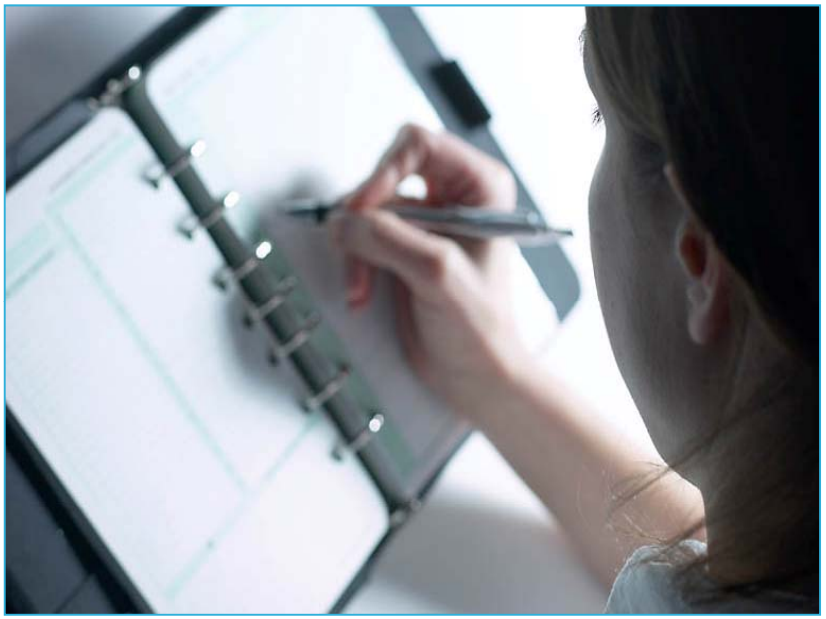
Colorado Springs School District No. 11

719-477-6023 www.moorsdw@d11.org

PLAN Long-Term Activities

- With consultant, identify action plan and set schedule for testing 15 schools based on historical elevated levels
- Consultant instructed facilities staff on deployment & retrieval of kits

Planning the Survey – When?



- When school is in session
- HVAC System
  - When operating normally
  - When economizers are not typically in use
  - After major building or HVAC modifications

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Determine the Final Number of Devices Needed

Building Total

Regular:	Number of occupied ground floor rooms	Reg =	_____
Duplicates	Multiply the number of locations by 0.10*	Dup =	_____
Blanks	Multiply the number of locations by 0.05*	Blank =	_____
Bldg Total	Sum of Regular, Duplicates, and Blanks	Bldg Total	_____

Survey Total

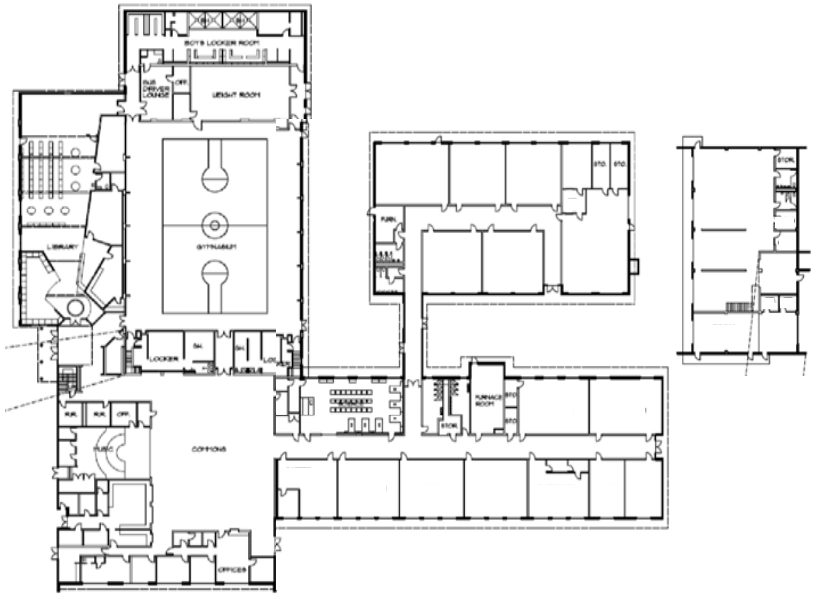
Spikes	Multiply total number of locations by 0.03*	Spikes =	_____
Total	Add all Bldg Totals to number of Spikes	Total:	_____

* Round up to nearest whole number

CERTI table under CSSD 11 contract

Planning the Survey – Where to Test

- All frequently occupied rooms
  - In contact with soil and above crawlspaces
- No need to test upper floors
  - Provided a test is conducted in room beneath it



A fire escape plan is a great tool

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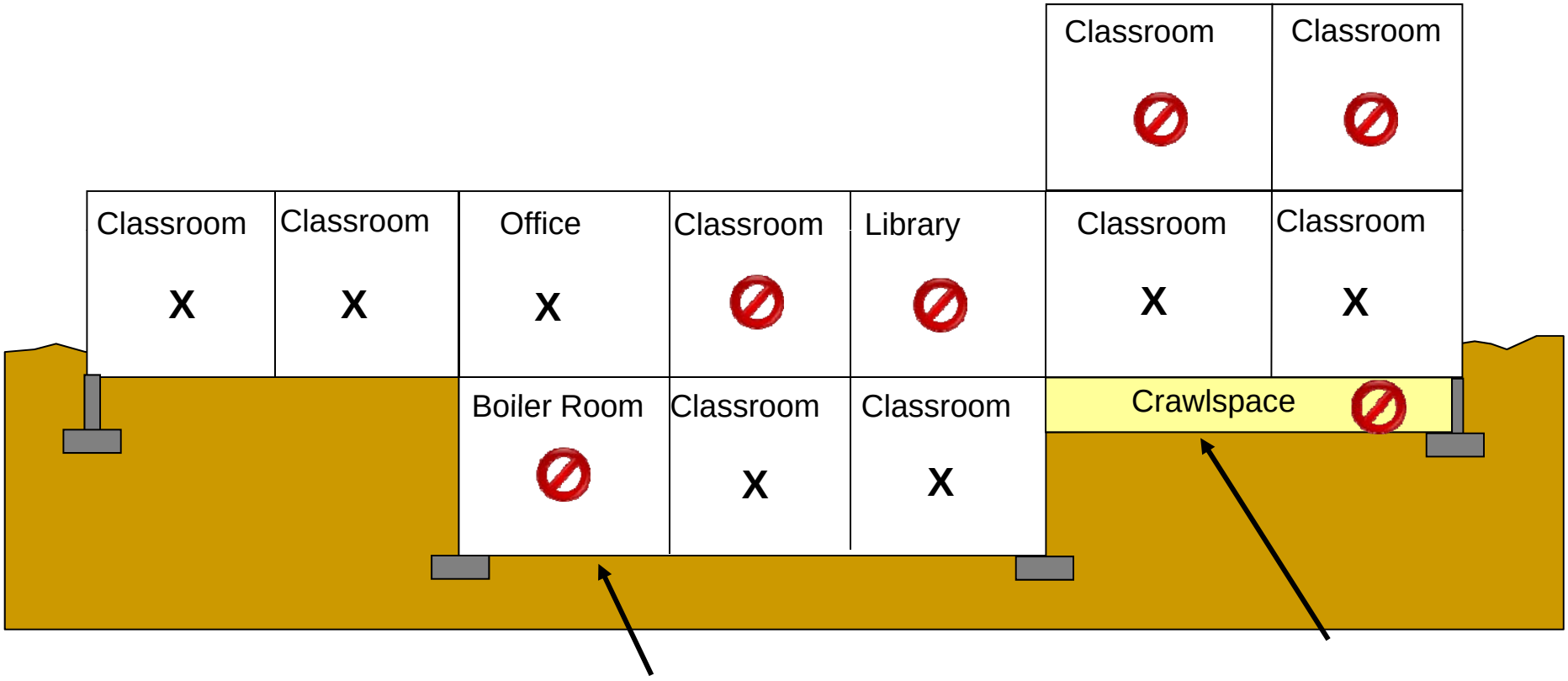
Lowest Location in Contact with Soil



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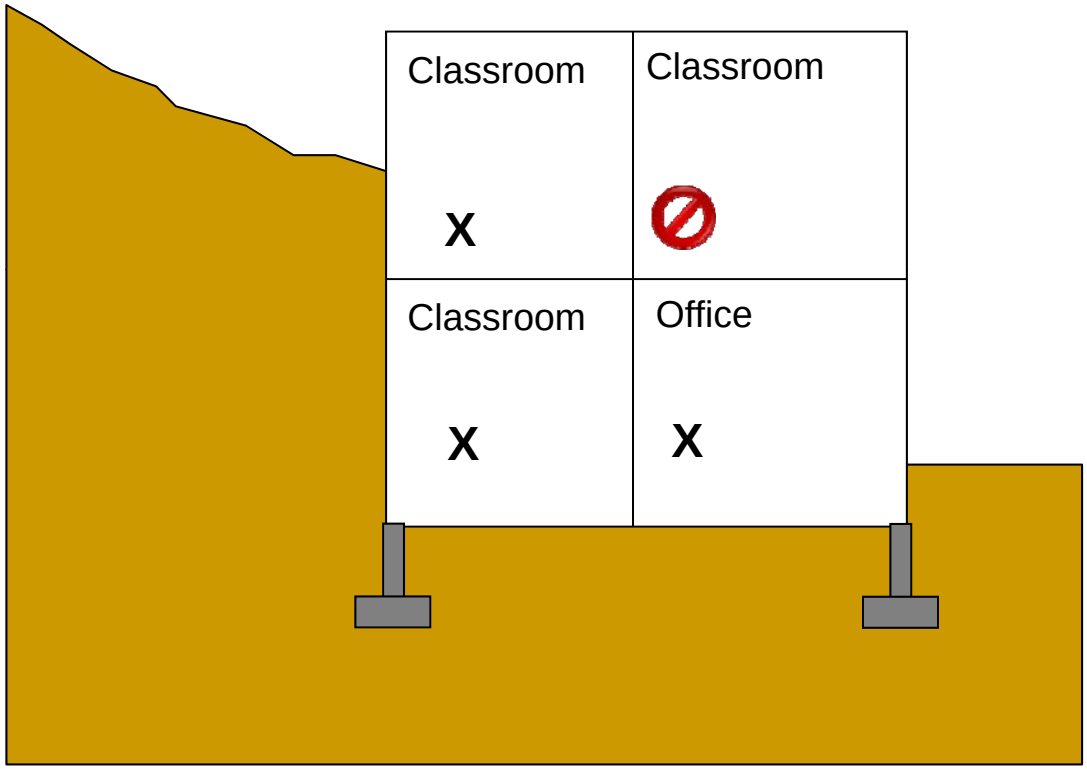
Rooms in Contact with Soil



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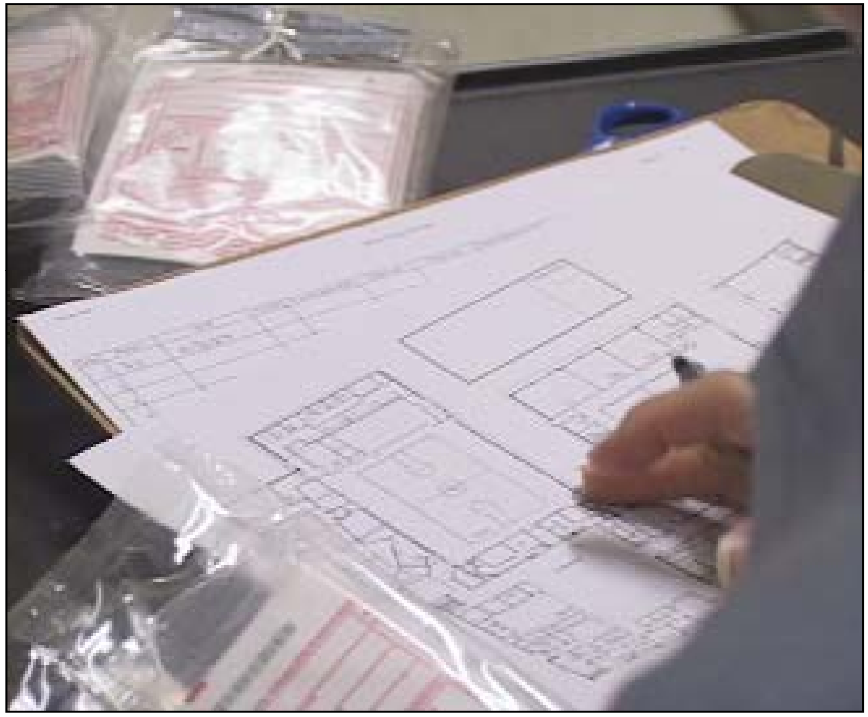
ACT - Structural & HVAC Issues

- Testing - Refer to "Radon Measurement in Schools: Revised Edition," EPA 402-R-92-014
- Repair structural & HVAC issues
- Train for deployment of test kits

Conducting the Survey – Deployment Record Keeping



- Log Sheet
  - Sequence. #
  - ID#s
  - Location
  - Type
- Fire Escape Plan
  - Sequence #

Use for Deployment and to verify device numbers at retrieval

CERTI photo under CSSD 11 contract

Long-Term, High Precision Devices Utilized

- Deployed Mid November to Mid April
- Deployed by District personnel
  - Trained
  - QA/QC procedures in place
  - Notices to staff as being part of a study
  - Affixed to walls with advice and contact information
  - Excellent return rate

Notices Posted

Deployed Device

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Example of Deployment

- Out of drafts
- 3 feet from exterior walls
- Minimum 20 inches from floor
- Away from hot surfaces
- Where it will not be disturbed!

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Large Rooms (1/2000 Sq.Ft.)

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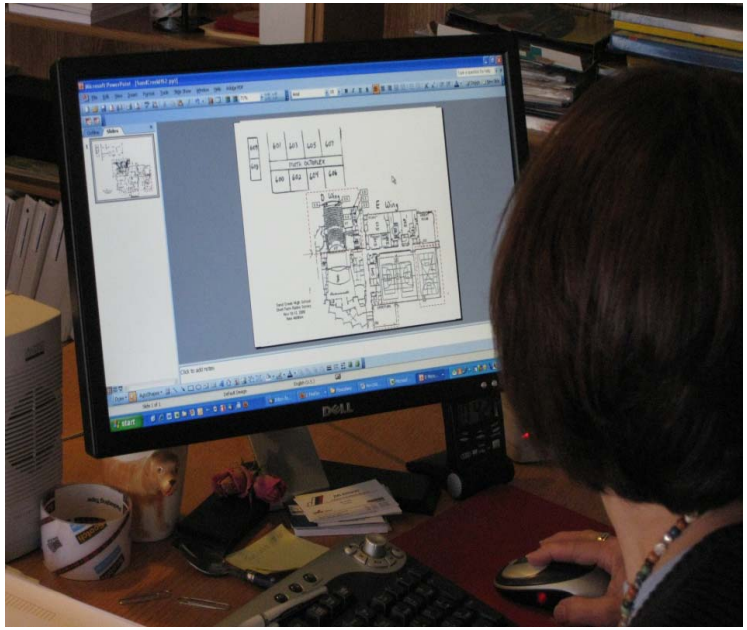
EVALUATE Data for Improvement

- Retrieve test samples
- Compared 2006 data to 1990 data
- Determine additional testing needs & follow-up

Enter Results on Floor Plan



- Allows for clear interpretation of location of results
  - Room designations change over time.
  - Useful for visualizing problem areas
  - Great tool for response follow-up

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Understanding Radon Entry into Large Buildings

Roof Top HVAC Unit with Fresh Air Make-Up

- Pressure differences
  - Stack (chimney) effect
  - HVAC Systems
    - Fresh air make-up can reduce radon
    - Unbalanced or poorly maintained systems can increase radon.

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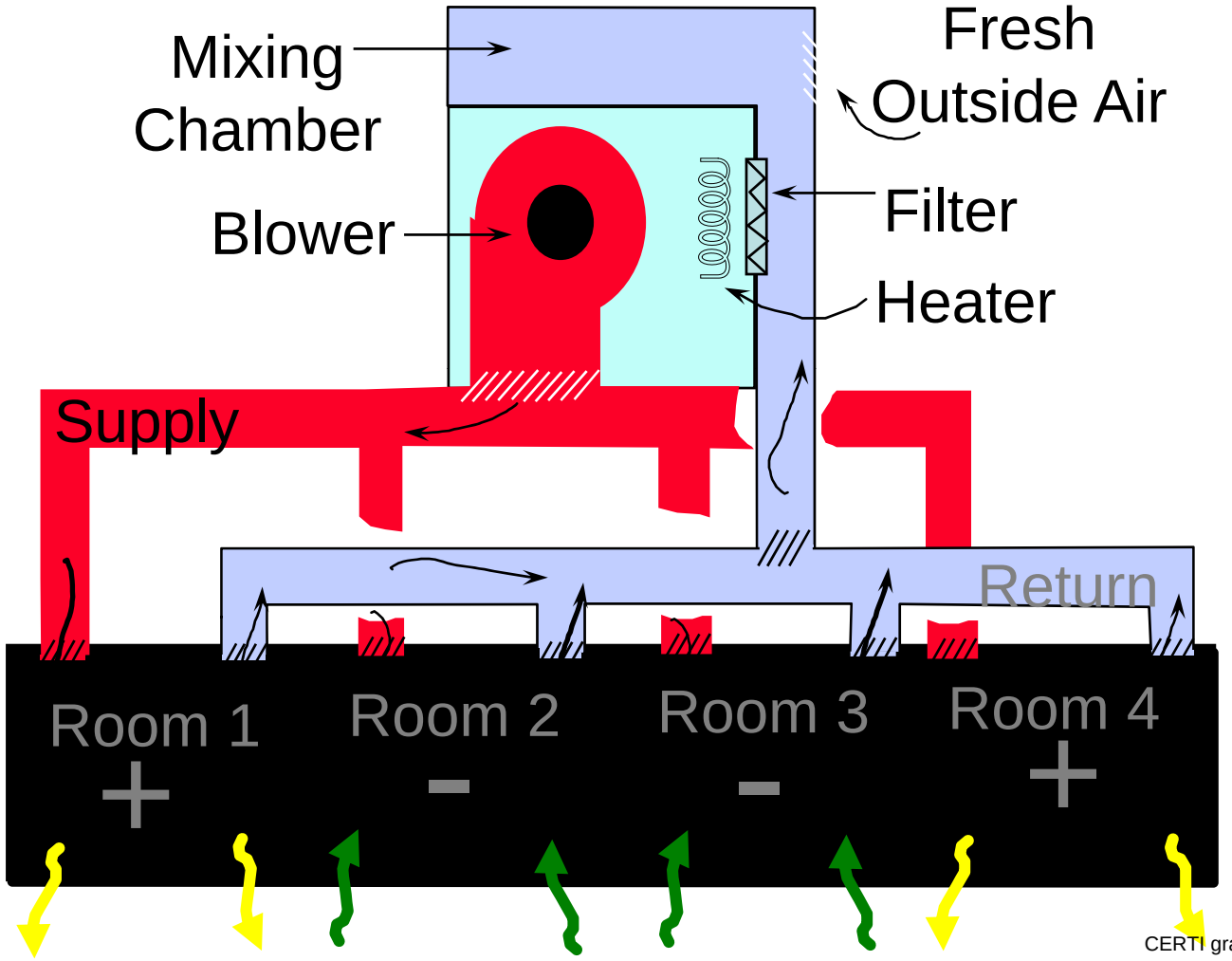
Building Pressurization



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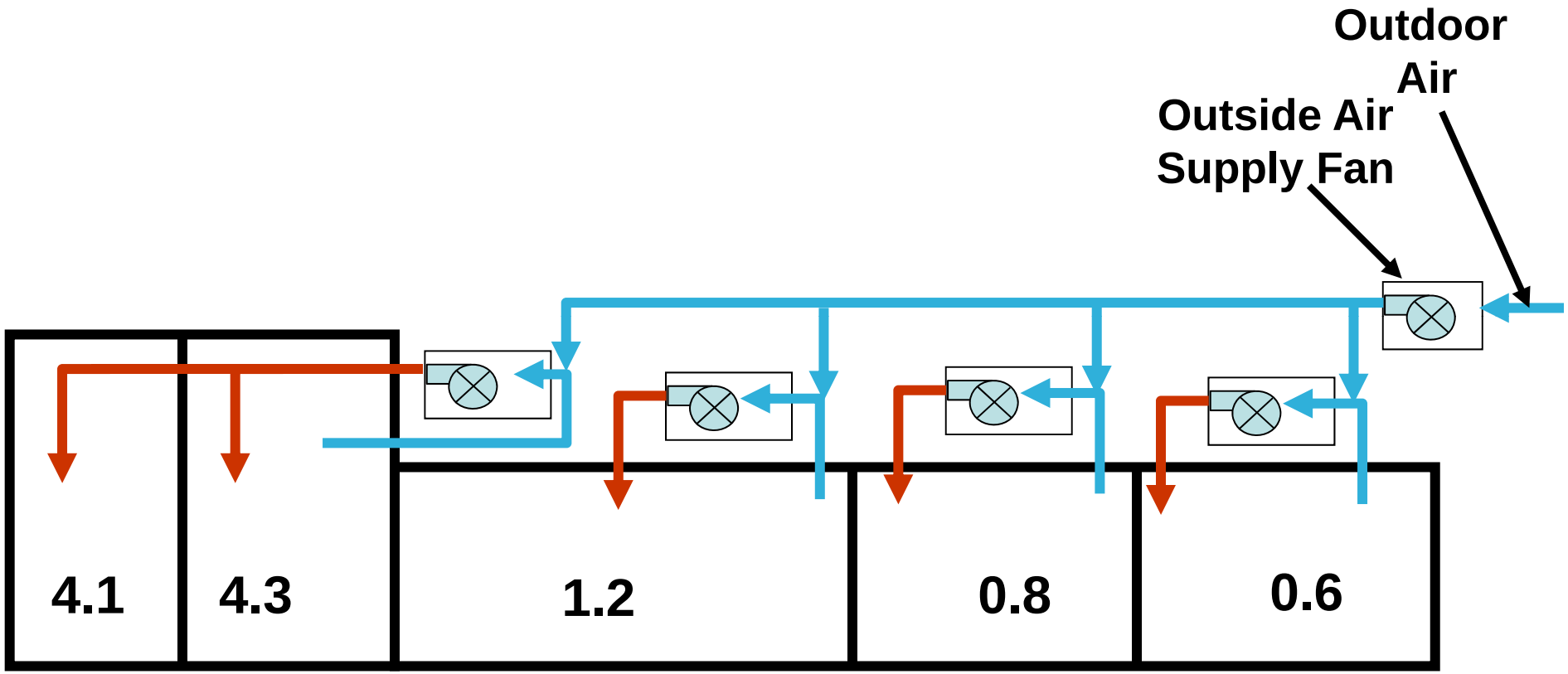
Effect of Unbalanced Systems



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Follow-Up - CRMs

- **C**ontinuous **R**adon **M**onitors
  - Record hourly
  - Run for 2+ days
  - Provide insight into conditions during occupancy

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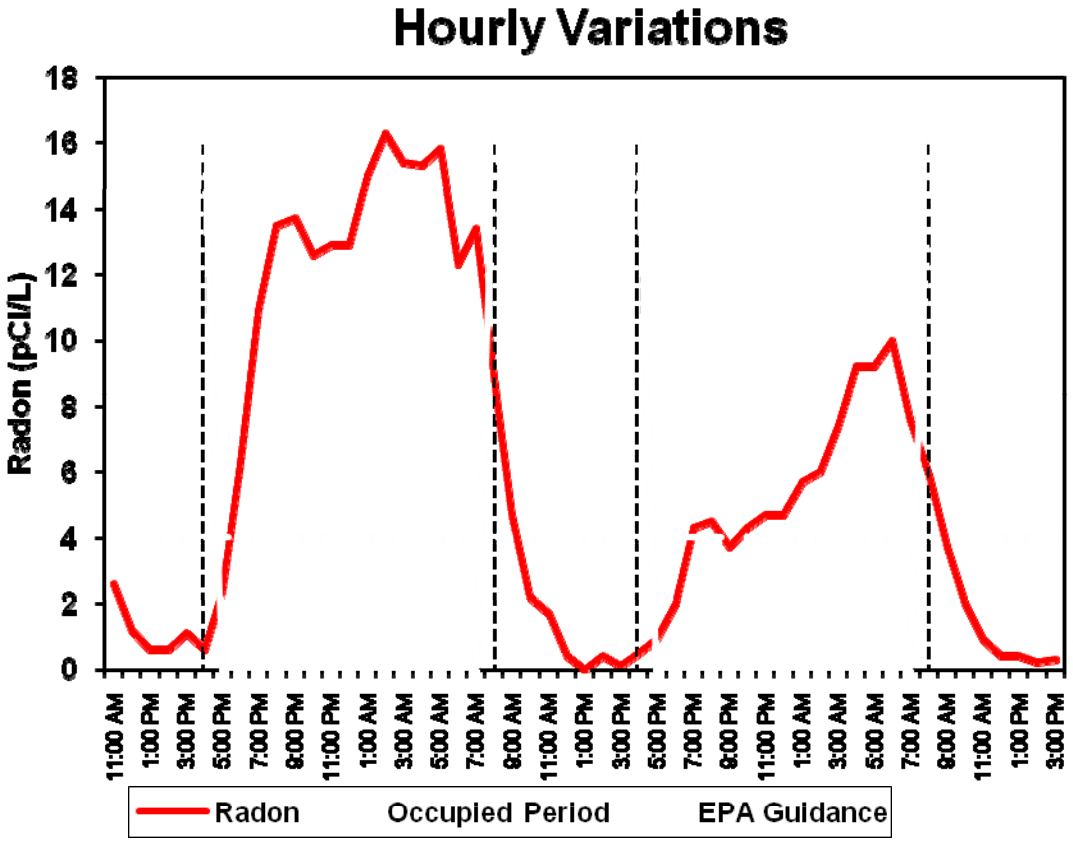
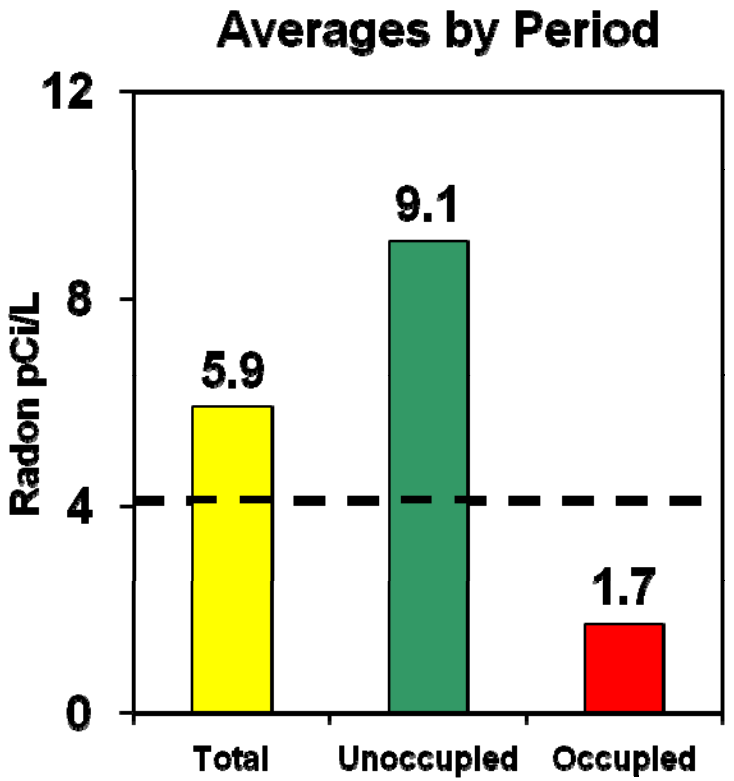
Follow-up Data with Continuous Radon Monitor



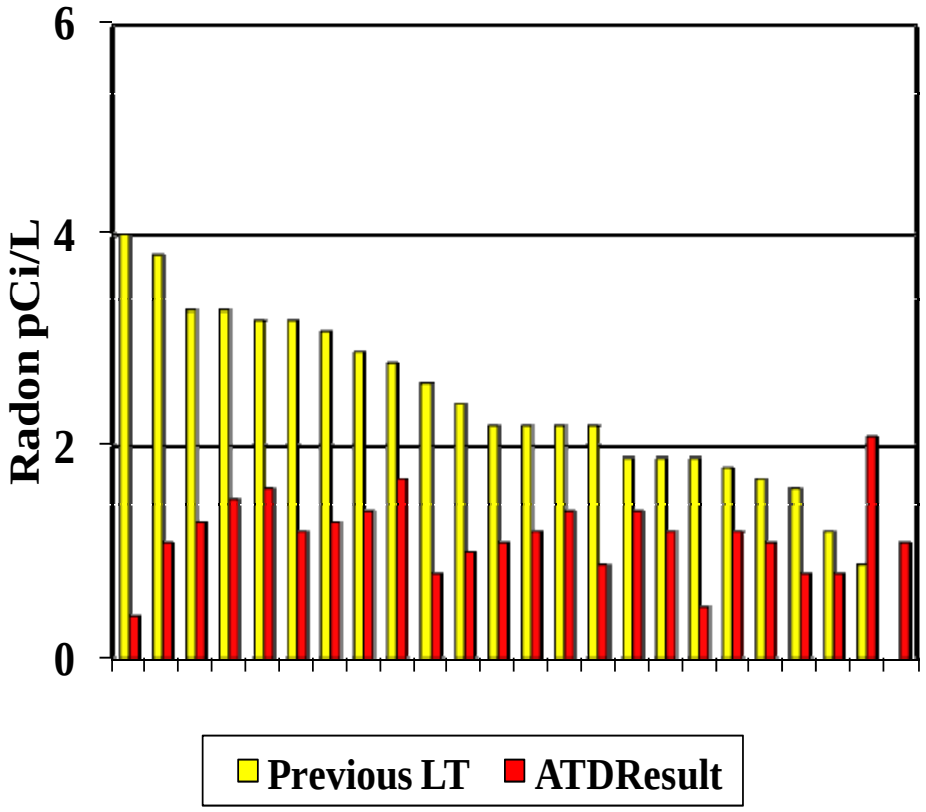


Occupied periods assumed to be: 7:30 AM to 3:30 AM
Hourly measurements are average for preceding hour
Test Period: April 18-20, 2007 Post HVAC adjustments
Pre-HVAC ST Measurement: 6.0 pCi/L overall

CERTI graphics under CSSD 11 contract

HVAC Modifications

- Improved IAQ
  - Happened in all buildings
- Paired comparison of current long-term to historic long-term.
- There is a statistical difference
  - Current exposures are lower
  - No levels were in excess of 4.0 pCi/L



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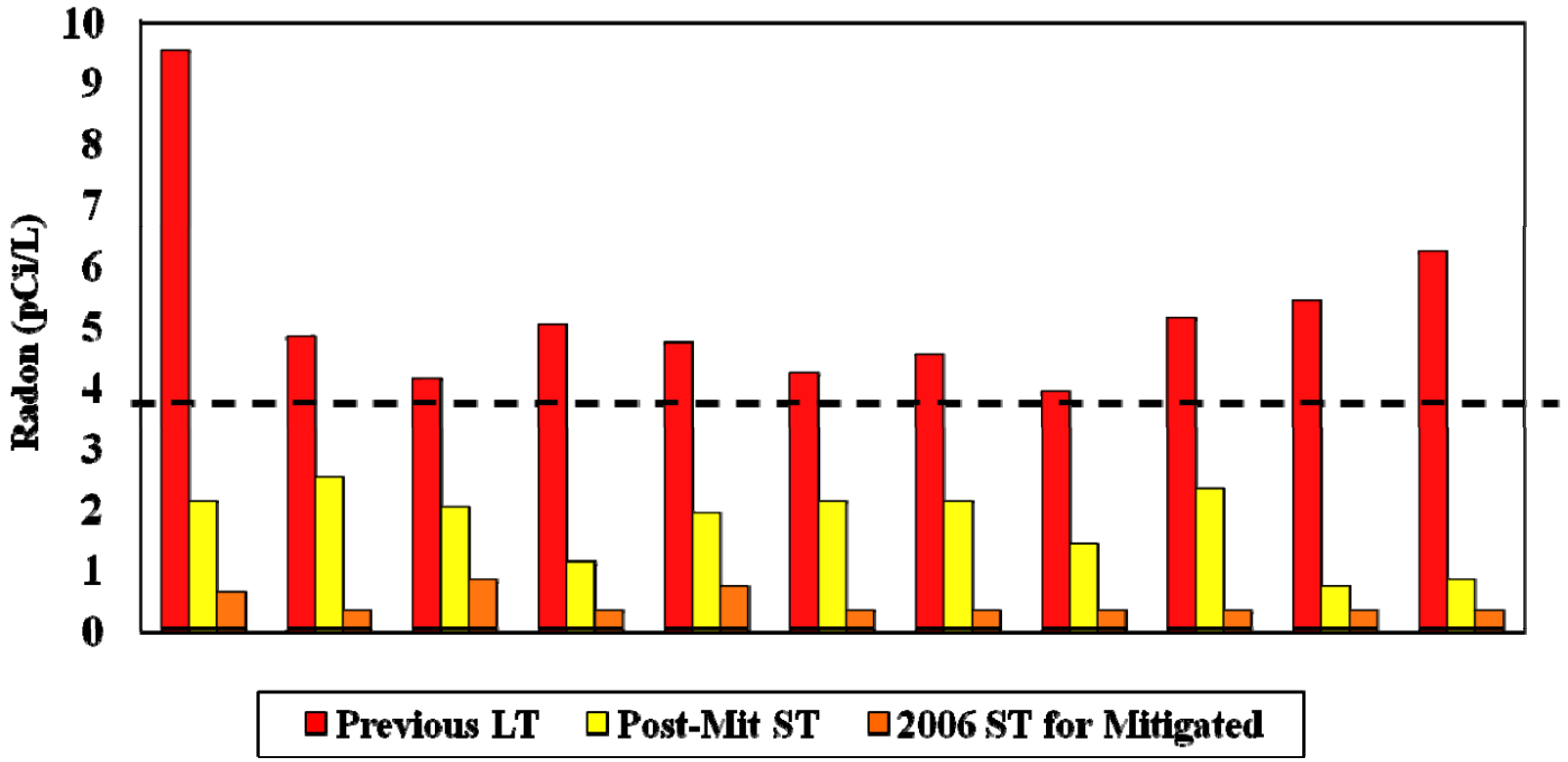
Retested Mitigated Locations



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Now You Know

- You have to test
- Test during school year when economizers are OFF
- Conduct short-term tests during school week
- Typically only a few rooms will be elevated
  - Usually associated with HVAC problems

Now You Know

- Response
  - Follow-up measurements and investigation
  - Mitigation works
- One elevated reading (if confirmed) exhibits potential for entire school
  - HVAC vigilance
  - Retesting?
  - Additions

QUESTIONS??

Schools Resources

- *IAQ Tools for Schools* Guidance:
  - www.epa.gov/iaq/schools
- *IAQ Tools for Schools* Connector E-newsletters and Emails:
  - Send an email to: IAQTfSConnector@cadmusgroup.com
  - View archives at: www.epa.gov/iaq/schools/bulletins.html
- Schools IAQ Connector Email Discussion List:
  - Send a blank email message to schools_iaq_connector-subscribe@lists.epa.gov. Then, check your email inbox for your confirmation and membership details.
- *IAQ Tools for Schools* Webinar Resources:
  - www.epa.gov/iaq/schools/webconferences.html

Radon Resources

State Radon Programs

- www.epa.gov/radon/whereyoulive.html

National Radon Program Services

- http://sosradon.org/2011-poster-contest

American Assoc. of Radon Scientists & Technologists

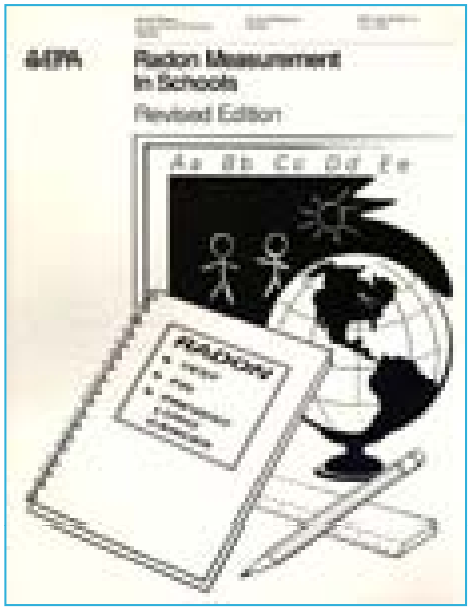
- www.aarst.org

Radon Leaders Savings Lives

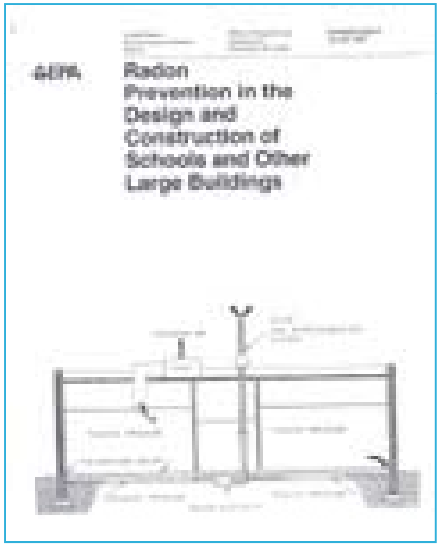
- www.radonleaders.org

www.epa.gov/radon/pubs/index.html

Managing Radon in Schools



Radon Measurement in Schools



Radon Prevention in the Design and Construction of Schools and Other Large Buildings

United States Environmental Protection Agency

CERTI
http://certi.info/

United States
Environmental Protection
Agency

Thank You!

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Lou Witt
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