Smart Materials Selection

- **John Sumlin, *Tandus Flooring***
- **Paula Vaughan, *Perkins+Will***

Tandus FLOORING

PERKINS + WILL

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)

Material & Resources

- Paula
  - Big Picture: The Impact of Schools
  - Why Green Schools?
  - Minimum Acoustical Performance
  - Mold and Allergens
  - The Precautionary Principle

Material & Resources

What is sustainable building?

'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'
(*Our Common Future – The Brundtland Report*)

Material & Resources

Impact of Schools:

20%

of the US Population

- 55 Million Students
- 5 Million Faculty
- $35 Billion in tax dollars annually

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Impact of Schools:

- Ave. lifespan of a school bldg: 42 years
- Ave. age of schools in 2009: 50 years
- Schools considered substandard or dangerous to occupant health:25%

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Thousands of schools have air considered "unfit to breathe."

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Why Green Schools?

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Consensus-Based Standards
USGBC has four levels of LEED:

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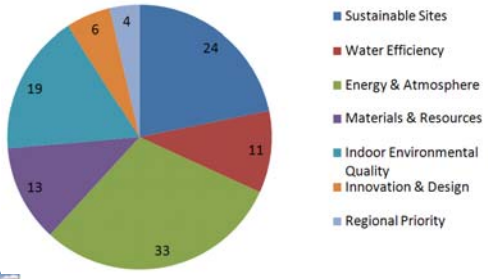
Material & Resources

LEED Schools 2009



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Minimum Acoustical Performance

- ✓Students can effectively communicate with each other and the teacher
- ✓Teachers can speak to the class without straining their voices
- ✓Students can learn without straining to hear

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Minimum Acoustical Performance

- Auditory learning makes up a significant portion (up to 75%) of a child's day in school.
- Students in today's classrooms are unable to understand 25 to 30 percent of what their teacher said because of excessive noise and reverberation.

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Minimum Acoustical Performance

- 14.9% of U.S. school children, (8 million students), have a **hearing loss** that can impact their educational progress.
- 10-15% of all elementary school children experience a temporary hearing loss from middle-ear **ear infections** on any given day of the week.
- 37% of children with a minimal hearing loss **fail at least one grade** in school compared to a 3% failure rate for hearing students.

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Minimum Acoustical Performance

"Many children that are labeled ADD or ADHD have very distorted hearing. I suspect that up to 70% of the children on Ritalin are on it for this specific reason."

Do not make the mistake of trivializing hearing problems triggered by the environment as compared to those innately physical. The effects are the same. **The inability to hear (clearly) causes ALL children, even those with the best intentions to pay attention, to disengage themselves from auditory learning.**

Kay Ness, MS, Neurodevelopmentalist, c1999 "Hearing Learning and Listening"

Material & Resources

Low-emitting Materials

✓ All adhesives and sealants installed in the building interior (defined as inside the weatherproofing system and applied on-site) must meet the testing and product requirements of the California Department of Health Services *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers*, including 2004 Addenda.

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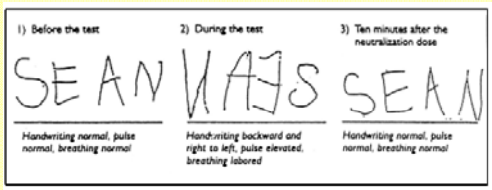
Mold Prevention

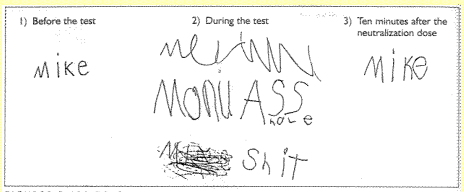


Example of the reaction to a mold allergen.

Dr. Doris J. Rapp, *Is This Your child's World?* 1996

Material & Resources

Mold Prevention



FIGURES 5.42A TO C
Changes in Mike's handwriting during testing for allergy to mold.

Dr. Doris J. Rapp, *Is This Your child's World?* 1996

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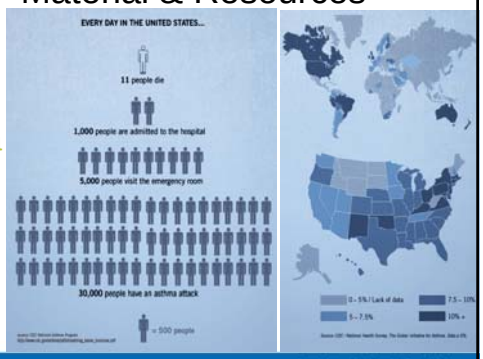
Asthma



Material & Resources

✓ **Precautionary Principle**

The Wingspread Statement's definition of the precautionary principle is now widely quoted: "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

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Toxicants

258

chemicals commonly used in building products were found in newborn blood

180 are known to cause cancer;

217 are poisonous to the brain and nervous system;

208 have been linked to birth defects in animal studies.

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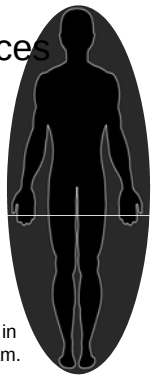
Chemicals enter the body through:

- Inhalation
- Skin
- Digestion



…They all end up in your blood stream.

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chemicals registered in the United States.

are monitored through the EPA Toxic Release Inventory.

have been tested for threats to human health and safety.

5 are **BANNED.**

1976 Toxic Substances Control Act (TSCA)

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Table 2. Indoor sources of the VOCs posing the largest risks of cancer.

VOC	Examples of Indoor Sources	Reference (s)
formaldehyde	some manufactured wood products used as building materials, in cabinets, and in furniture (e.g., medium density fiberboard, particle board, plywood with urea formaldehyde resin; urea formaldehyde foam insulation (no longer used but still present in some buildings); tobacco smoking; ozone-initiated chemical reactions with common indoor VOCs, unvented combustion appliances	[3, 4, 37, 38]
napthalene	pesticides (moth balls)	[1]
paradichlorobenzene	pesticides (moth crystals); toilet bowl deodorizer	[1, 2, 32]
chloroform	pesticides; showering; washing clothes and dishes	[1] [2]
acetaldehyde	tobacco smoking; water-based paint; unvented combustion appliances; leakage from wood stoves, furnaces, and fireplaces; (outdoor air also an important source)	[1, 3]
benzene	tobacco smoke; some furnishings, paints, coatings, wood products, gasoline from attached garages (outdoor air also an important and sometimes predominant source)	[1]

Return to top

http://www.iaqscience.lbl.gov/voc-cancer.html

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Let's say you want to replace a bottle with a non-toxic alternative

You get an alternative *and* the science is correct …then you're **safe**

You get an alternative *and* the science is wrong …then you're **safe**

You don't get an alternative *and* the science is correct…then you're **not safe**

Indoor Air Quality (IAQ)

Material & Resources

Product Labels

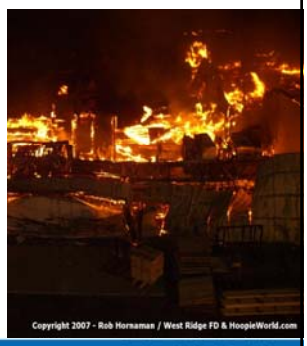
1. Declaring what a product is NOT
2. Declaring how a product contributes to a green building rating system
3. Declaring Certifications
4. Declaring product composition

Indoor Air Quality (IAQ)

Material & Resources

Considerations:

Heat: What is the melting point? What does it off-gas at that point?
Fire: What is the boiling point? What are the effects of the chemicals in the smoke?
Off-gassing: What does it off-gas under normal conditions?
End-of-life cycle: What happens at the end of it's life?
Transmittance into the Body How bonded is the substance?



Indoor Air Quality (IAQ)

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Demand Transparency

Indoor Air Quality (IAQ)

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www.transparency.perkinswill.com

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Indoor Air Quality (IAQ)

Material & Resources

- Overview
  - John
  - The big picture
    - Pollutant and Source control
      - Matting (8-12 foot falls minimum)
        - » Hard vs. Soft
        - » Why soft makes since
      - Soft Flooring types (Broadloom carpet, Modular carpets, Hybrid Resilients)
      - Pollutant removal processes
      - Control soil, control moisture (humidity, floods, maintenance,)

Material & Resources

- John
  - Matting systems
    - 80 %- 90 % soil can be captured at the door
    - Not walk off matting, but INSTALLED systems
    - Textiles hold soil in place until it can be removed
      - University of Tulsa study
      - European studies

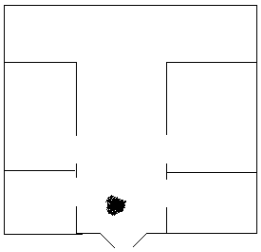
Soil Control

Localize Soil Migration

Soil Control

Hard Surface

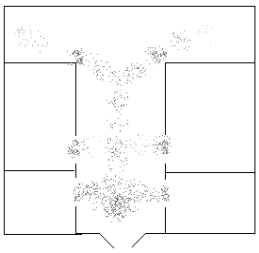
Localize Soil Migration



Soil Control

Hard Surface

"Chase the soil."



✕ Cannot Localize Soil

Soil Control

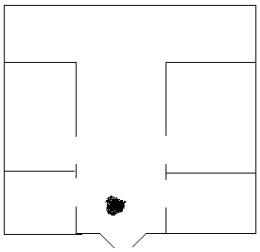
Localize Soil Migration

Indoor Air Quality (IAQ)

Soil Control

Link Engineered Surface

Localize Soil Migration



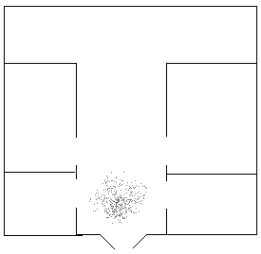
C&A

Indoor Air Quality (IAQ)

Soil Control

Link Engineered Surface

Localize Soil Migration



✓ Fibers Hold Soil

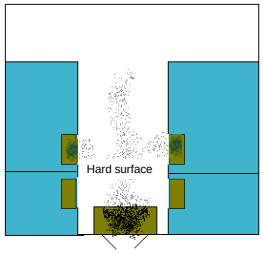
C&A

Indoor Air Quality (IAQ)

Soil & Maintenance Control

Hard Surface Corridors
LEF Surface Classrooms

Localize Soil Migration



✓ Mats Capture 85%-90% of Soil
✓ 10%-15% Migrates on to hard surface

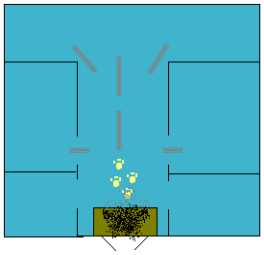
Indoor Air Quality (IAQ)

Soil Control

Link Engineered Surface

Localize Soil Migration

✓ Fibers hold soil from migrating
✓ Inlay Indicates Vacuum Frequency

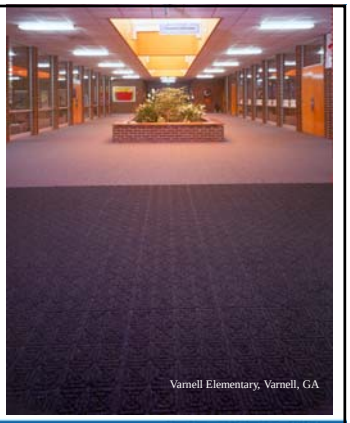


✓ Mats Capture 85%-90% of Soil

Indoor Air Quality (IAQ)

Soil Control

Localize Soil Migration



Indoor Air Quality (IAQ)

Soil Control

Localize Soil Migration

San Diego School District, San Diego CA

Indoor Air Quality (IAQ)

Limit application of floors with an applied wear layer

VCT:

- Labor intensive
- Not just mopping
- High H2O consumption
- High chemical exposure
- Respirable exposure

Indoor Air Quality (IAQ)

Evidence: Exposure to respirable contaminants

Burnishing VCT

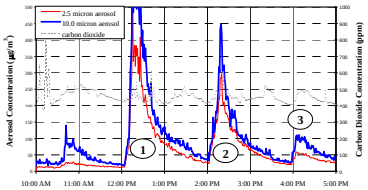
(#1) a state-of-the-art, battery-powered 2500-rpm device,

(#2) a new plug-in 1500-rpm unit, and

(#3) an older plug-in 1,000-rpm device.

New pads were used for each test.

All burnishing devices were utilized with a manufacturer-supplied dust collector bag.



Indoor Air Quality (IAQ)

MYTH: Shiny is clean

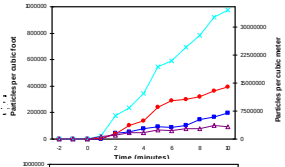
"Shiny is NOT clean"

Indoor Air Quality (IAQ)

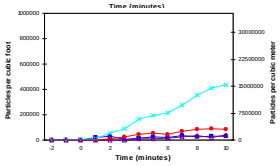
FACT: VCTT

reduces respirable exposure to resuspended dust.

Broadloom



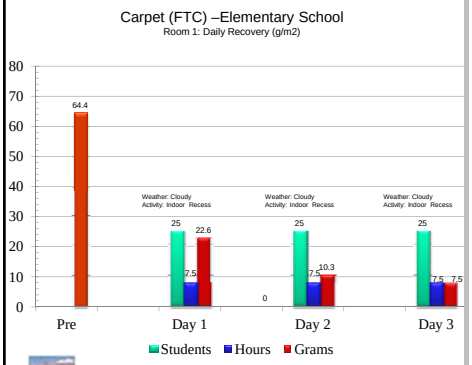
VCTT



Loads: 50 g/m² 100 g/m² 150 g/m²

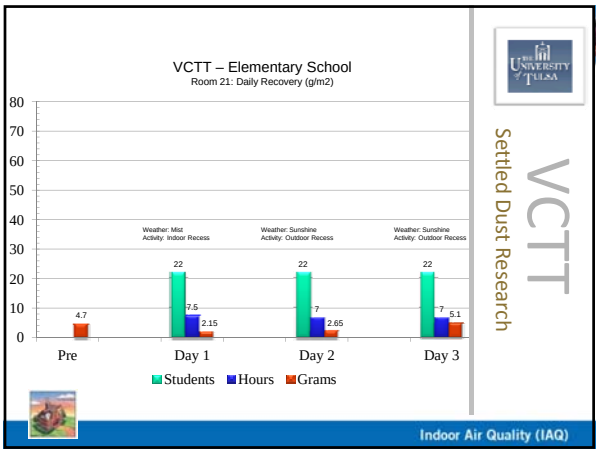
VCTT Resuspension Research

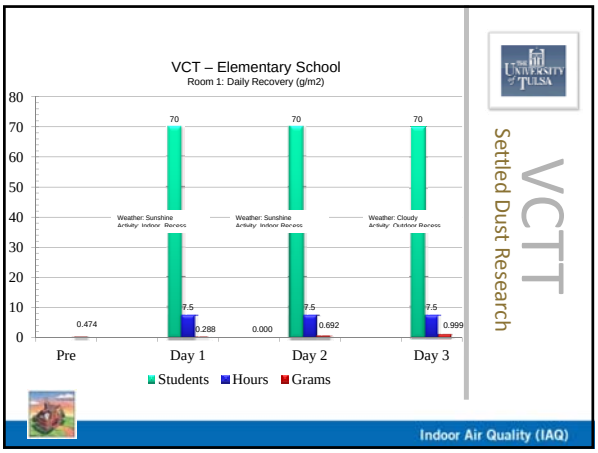
Indoor Air Quality (IAQ)

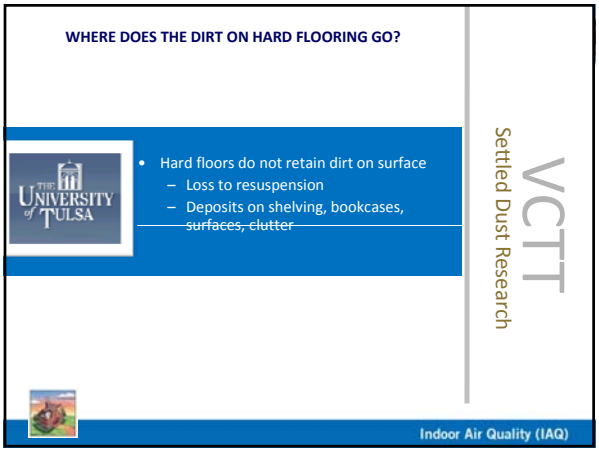


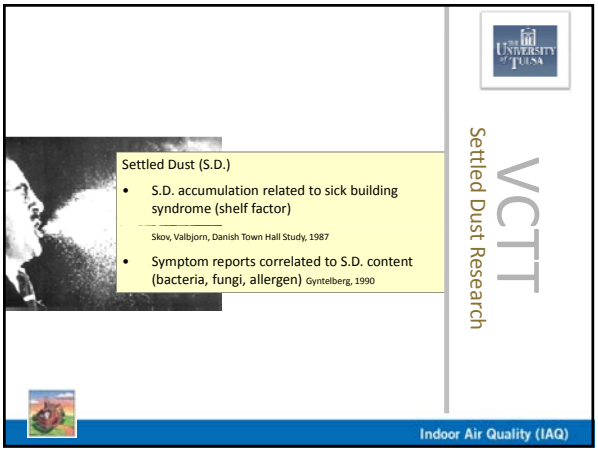
VCTT Settled Dust Research

Indoor Air Quality (IAQ)









Breakout Session Q&A

- Review your actions and strategies that you would like to apply to your own work.
- Please be ready to discuss these actions in your own words.

Indoor Air Quality (IAQ)