Smart Materials Selection

- John Sumlin, Tandus Flooring
- Paula Vaughan, 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)

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

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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 -

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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%
Thousands of schools have air considered “unfit to breathe.”

Why Green Schools?

Consensus-Based Standards
USGBC has four levels of LEED:

- LEED Gold
- LEED Silver
- LEED Certified
- LEED Platinum

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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 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 Hess, MS, Neurodevelopmentalist, c1999
"Hearing Learning and Listening"

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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

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

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.

Chemicals enter the body through:
• Inhalation
• Skin
• Digestion

They all end up in your bloodstream.

Table 2: Indoor sources of the USCA posing the highest risk of cancer.

<table>
<thead>
<tr>
<th>VOC</th>
<th>Examples of Indoor Sources</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>formaldehyde</td>
<td>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; once hormetide form. (no longer used but still present in some buildings); tobacco smoking;某些室内化学物质与室外VOCs,室内光化学反应)</td>
<td>[5, 7, 11]</td>
</tr>
<tr>
<td>methylene chloride</td>
<td>methylene chloride (metal lacquers), toilet bowl disinfectant</td>
<td>[2, 7]</td>
</tr>
<tr>
<td>chloroform</td>
<td>washing, showering; smoking cigarettes and dishes</td>
<td>[2]</td>
</tr>
<tr>
<td>acetaldehyde</td>
<td>tobacco smoking; water-based paint; water-based combustion appliances; finishes from wood stoves, furnaces, and fireplaces; outdoor air also an important source</td>
<td>[1, 3]</td>
</tr>
<tr>
<td>benzene</td>
<td>tobacco smoke; some furnishings, paints, varnishes, wood products, gasoline vapor</td>
<td>[1]</td>
</tr>
</tbody>
</table>

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.

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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 its life?
Transmittance into the Body: How bonded is the substance?

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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

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

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• 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

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Localize Soil Migration

Soil Control

Soil Control

Hard Surface

Localize Soil Migration

“Chase the soil.”

X Cannot Localize Soil

Hard Surface
Localize Soil Migration

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

Link Engineered Surface

Hard Surface Corridors
LEF Surface Classrooms

Fibers hold soil from migrating
Inlay Indicates Vacuum Frequency

Mats Capture 85%-90% of Soil

Varnell Elementary, Varnell, GA
Limit application of floors with an applied wear layer

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

Evidence: Exposure to respirable contaminants

MYTH: Shiny is clean

FACT: VCTT reduces respirable exposure to resuspended dust.
WHERE DOES THE DIRT ON HARD FLOORING GO?

- Hard floors do not retain dirt on surface
  - Loss to resuspension
  - Deposits on shelving, bookcases, surfaces, shutters

Settled Dust (S.D.)

- S.D. accumulation related to sick building
  syndrome (shelf factor)
  - Skov, Valbjorn, Danish Town Hall Study, 1987
  - Symptom reports correlated to S.D. content
    (bacteria, fungi, allergen) Skov et al., 1990

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.