



Microbial Resistant Building Products

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Outline

- **Fungi in the indoor environment**
- **Microbial resistant building products**
- **Environmental Technology Verification (ETV)**
- **Product Evaluation**

Importance of Work

Dearth of knowledge regarding indoor fungal contaminants

Lab has projects aimed at elucidating fungal biology

- identification, molecular, characterization

Holistic Analysis

- Risk Management Solutions

- Chem/Bio Analysis of products

Improve indoor environmental quality

Fungi and Allergy

1.5 million species of fungi

Most common adverse response to fungal exposure is development or exacerbation of hypersensitivity disease
rhinitis, sinusitis, asthma

Fungal allergy is common

6% - 10% general population

15% - 50% of atopic population

40% of asthmatic population sensitive

Fungal Sources

Spore laden outdoor air – sometimes in excess of 70,000 spores/m³

Growth on indoor building materials

wood-based (cellulose) materials

gypsum board

ceiling tile

flooring



Water and food source

Indoor Menace



**40% of homes in North America
contain mold growth**

Methods of Microbial Resistance

Each company has developed its own manufacturing strategies.

- Removal of growth substrates
- Antimicrobials onto surface
- Antimicrobials incorporated into and throughout the products

Removal of Growth Substrates

Georgia Pacific Drywall

- Removal of all starch and cellulose
- Carbohydrates that fungal organisms use as nutrients for growth
- Reduces the ability of mold to grow by removing the “food”

Removal of Growth Substrates

U.S. Gypsum

- Incorporated sodium pyrethrum into the paper facing of their gypsum products
- Federal Insecticide and Rodenticide Act (FIFRA) registered
- Control pests such as fleas and other insect pests
- Most widely used botanical insecticide in the United States

Removal of Growth Substrates

National Gypsum

- Two different EPA FIFRA registered antimicrobials
- Dow Fungi Block™ into the paper surfaces

EPA-registered for use in the wet end of paper machines, adhesives, paper coatings, and wood preservation.

- Sodium almandine into the core of their gypsum wallboard

Industry Wide Participation

Georgia Pacific

U.S. Gypsum

National Gypsum

BPB America

Lafarge

American Gypsum

Availability

Several building products readily available that can reduce mold growth in the indoor environment

No nationally accepted testing and verification program to:

- Guide consumers
- Guide building professionals

ETV Objectives

- Provide credible performance information for **commercial-ready technology** to help solve high risk environmental problems. **Aid:**
 - **Policymakers and Regulators** in making policymaking and permitting decisions for innovative technologies,
 - **Purchasers** in making decisions to purchase innovative technologies, and
 - **Vendors/Developers** in selling and further innovating technologies



Verification definition

- To establish or prove the truth of the performance of a technology under specific, predetermined criteria or protocols and adequate QA procedures.
- ETV does not:
 - Pass / fail,
 - Approve, or
 - Certify technologies.



ETV Successes

- Supports solving important environmental problems
- Increasing:
 - Funding from vendors and other partners over 50% from others
 - Stakeholder participation - 805 stakeholders in 21 groups
 - Web and International interest – >1M hits/yr
- Have played important role in homeland security verifications



New in 2005: ETV ESTE Environmental and Sustainable Technology Evaluations

- ✦ **Targeted to high risk, Agency needs, EPA chooses technology categories to verify**
- ✦ **EPA initiates and directly manages verifications**
- ✦ **Scoped to include all environmental technologies, except remediation**

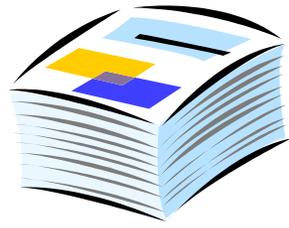


Building a scientific foundation for sound environmental decisions

ETV Verification Process



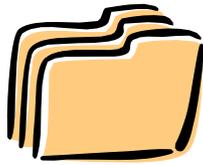
EPA, verification organizations, stakeholders or EPA-only (ESTE)



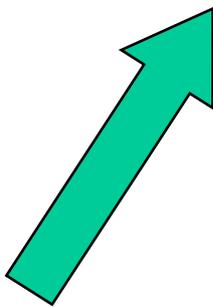
With Stakeholders, develop test protocols, Quality Assurance test plans AND



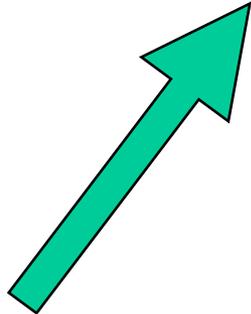
Conduct technology testing



Identify technology categories



Identify vendors, collaborators



Write verification report

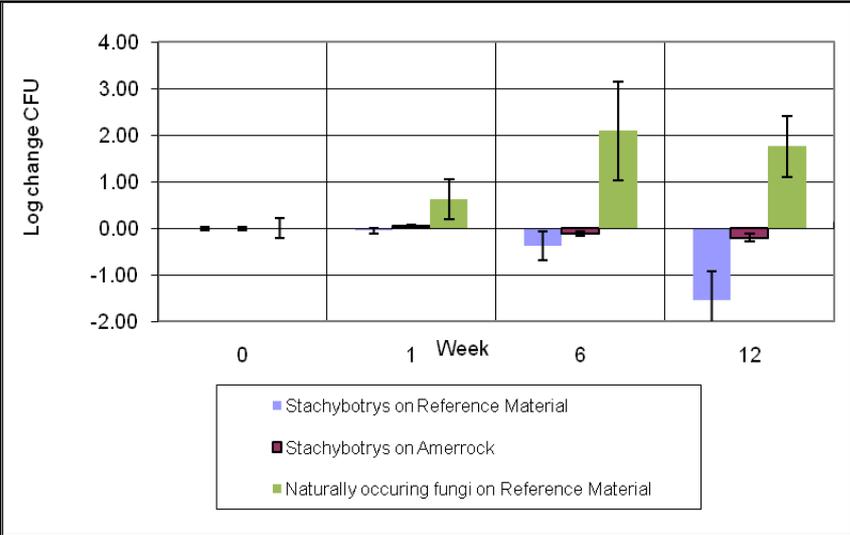


Evaluation Will Test...

- Mold Growth
- Volatile Organic Compound (VOC) release
- Moisture uptake

- Based on Developed Testing Methodologies

Testing Data



VOCs and Formaldehyde Emissions*	
Emission Types	Minimum emission results
Total VOCs	< 0.5 mg/m ³
Formaldehyde	< 0.1 ppm
Individual VOCs	< 0.1 TLV

<http://www.epa.gov/etv/este.html>

Ultimate Project Goals

- Generate nationally accepted testing and verification program
 - Testing and verification under ETV-ESTE is the first step in the development of a product testing system
- Additional building materials such as coating, sealants, and carpet will be tested
- Improve sustainability in built environment

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