

Imported Drywall: Joint State and Federal Evaluation of 10-home Indoor Air Investigation

**Lynn Wilder, MsHyg, CIH
Environmental Scientist**

ATSDR Division of Health Studies

**Technical Symposium on Corrosive Imported
Drywall**

11/06/2009



ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

Investigation Collaborators

- **State:**
 - Florida Department of Health
 - Louisiana Department of Health and Hospitals
- **Federal:**
 - EPA's Environmental Response Team (ERT)
 - Agency for Toxic Substances and Disease Registry



Evaluation Collaborators

- **States**

- Florida Department of Health
- Louisiana Department of Health and Hospitals
- Virginia Department of Health

- **Federal**

- Consumer Product Safety Commission (lead federal agency)
- Environmental Protection Agency (HQ, Region IV and VI)
- Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry
- Department of Housing and Urban Development



Testing Purpose

- **Determine if:**
 - **Indoor air is different in homes with imported drywall problems vs. those without**
 - **Exposures of health concern exist**
- **Refine future sampling events**



Testing

FLDOH:

- Two test homes and 2 control

EPA:

- Four test homes and 2 control
- Split between FL and LA



Time-Weighted Sample Data Reviewed

- Reduced sulfur compounds
- Volatile organic compounds
- Amines (aliphatic, aromatic)
- Aldehydes
- Acids (inorganic, acetic, formic)
- Pesticides/PCBs
- PAHs
- Quality assurance results



Other Data Reviewed

- **Real-time monitoring**
 - Hydrogen sulfide
 - Sulfur dioxide
 - Sulfuric acid
 - VOCs
- **Home characteristics**
 - Air exchange rate
 - Size
 - Temperature, humidity
 - CO, CO₂





>1,500 time-weighted samples

Selecting Chemicals of Interest

- **Reduced sulfur compounds**
- **Only found in test homes at**
 - **Mean value > quantification limit, or**
 - **Frequency of detection $\geq 50\%$**
- **Higher mean value in test home vs. comparison**
- **$\geq 50\%$ frequency in Test home and less frequent in Control home**



Evaluation

- **Test vs. Control Homes**
 - Home characteristics
 - Sulfur compounds
 - Mean and maximum contaminant concentrations
 - Sum of contaminant levels by chemical group



Evaluation, cont'd

Compared indoor mean and maximum contaminant levels to:

- Results of other indoor air investigations
- Outdoor results
- Health-based guidelines
- Odor thresholds
- Odor characteristics
- Irritant properties



Findings—home characteristics

- Air exchange rates (changes per hour):

	<u>Test</u>	<u>Control</u>
Mean	0.27	0.31
Median	0.25	0.20
Minimum	0.12	0.16
Maximum	0.47	0.68

- Size (square feet):

	<u>Test</u>	<u>Control</u>
Mean	2,480	2,510
Minimum	1,100	287
Maximum	3,810	5,704

- No trend in contaminant levels and air exchange rates



Findings—other indoor air investigations

- **Test and Control home results \approx available literature values**



Findings—sulfur compounds

- **Hydrogen sulfide:**
 - Low levels indoors and out
 - Low levels Test and Control
 - Periodically exceeded odor threshold
 - Below health-based guidelines (except EPA RfC 1.4 ppb)
- **Carbonyl sulfide and carbon disulfide:**
 - Low frequency
 - Low levels indoors and out in one Test home
 - Below health-based guidelines
- **Sulfur dioxide**
 - Near detection limit inside 3 Test homes (1 real-time instrument)
 - Additional testing required



Findings—acids

- **Sulfuric acid**
 - Low levels indoors and out **Test and Control**
 - Near lower detection limit
 - Additional testing required
- **Formic Acid**
 - Low levels indoors and out
 - No health-based guideline
- **Acetic Acid**
 - High detection frequency **Test and Control**
 - Not found outdoors
 - Exceeded odor threshold
 - No health-based guideline



Findings—aldehydes

Acetaldehyde and formaldehyde:

- No statistical difference between Test and Control homes
- \approx 50% reduction in levels with AC running



Findings—health

- **Some formaldehyde levels with AC off exceed those known to cause irritation and exacerbation of pre-existing respiratory problems**
- **Malodorants:**
 - **FL testing: Test homes had more malodorants at or near odor thresholds**
 - **EPA: TBD**
- **Irritants:**
 - **Present**



Limitations

- Small “n” (6 Test homes)
- 1 – 2 days of sampling per home
- Have not fully explored additive effects



Conclusions

- **Irritant and malodorous compounds present**
 - Sensitive individuals may have exacerbation of respiratory problems
 - Sensitive individuals may experience ENT irritation
 - May or may not be due to imported drywall
- **Contaminants in Test homes similar to Control homes**
- **Most contaminant levels similar to other studies and are commonly found in U.S. homes**



Recommendations

- **Further testing of sulfur dioxide and sulfuric acid (chamber testing)**
- **People should see their health care provider if they are experiencing health effects they feel are associated with living in a home with drywall problems**

