



Defective Chinese Drywall: Analytical Testing

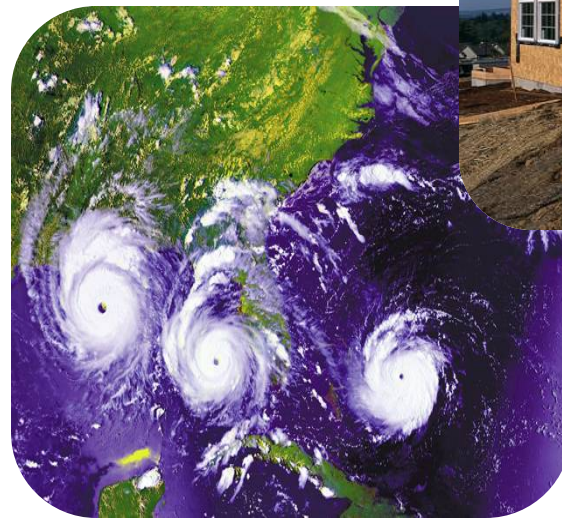
**Alyson Fortune
Air Quality Scientist
Columbia Analytical Services**

Presentation Outline

- Definition & extent of problem
 - Major available analytical testing options
 - Columbia Analytical Services
 - Suite of 3 available tests
 - Ongoing research: results & summary
 - Advice for homeowners
 - Internet resources
 - Q&A
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Definition of Problem

- 2005: Hurricanes Katrina & Rita caused massive rebuilding in Southeast US
- Housing boom in south Florida around same time



Definition of Problem

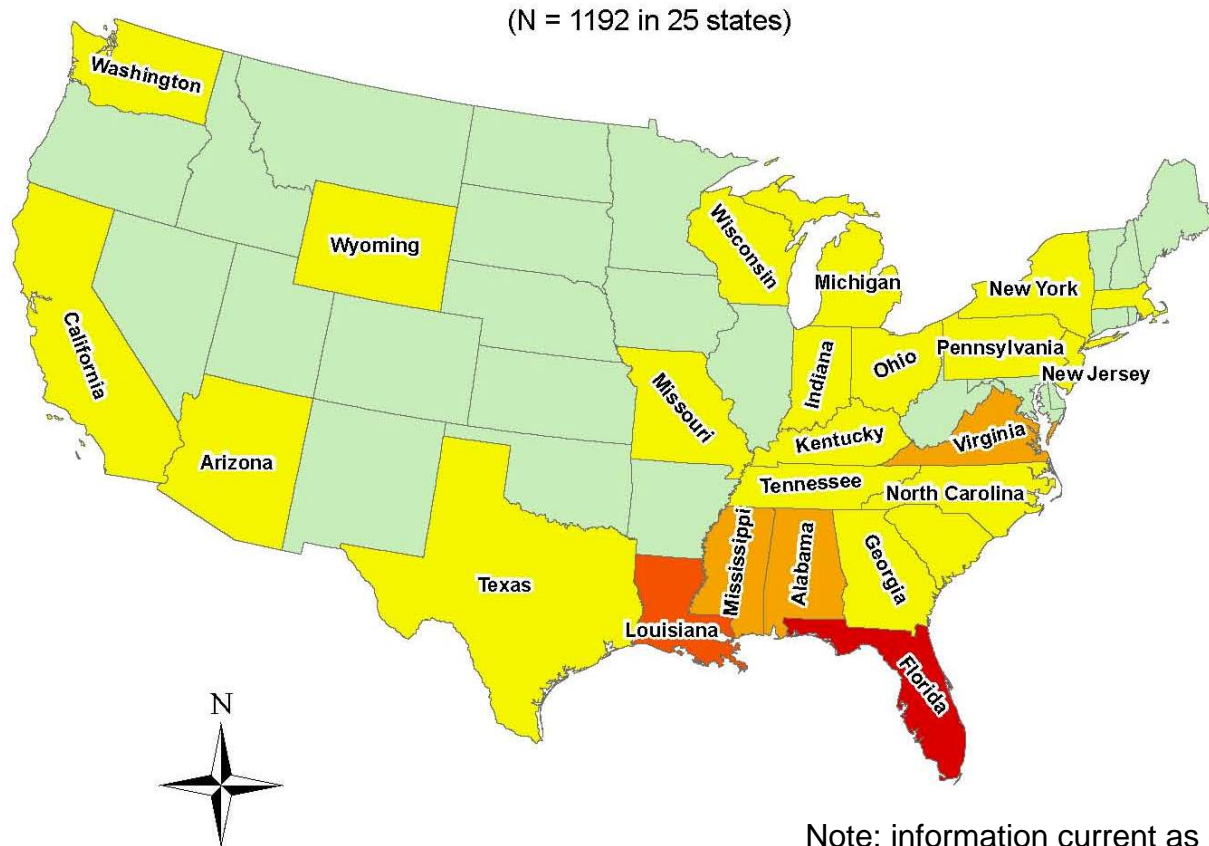
- US CPSC reports at least 5,503,694 drywall sheets were imported from China in 2006¹
 - Used in new home construction
 - Primary problems
 - Odor (“rotten egg”)
 - Corrosion/blackening/pitting of appliance (e.g. air conditioner) copper tubing/coils, electrical wiring, mirrors, etc.
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Note: information current as of 9/30/09

Extent of Problem

- To date, US CPSC reports 1192 cases reported in 25 states (plus District of Columbia)²



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Extent of Problem

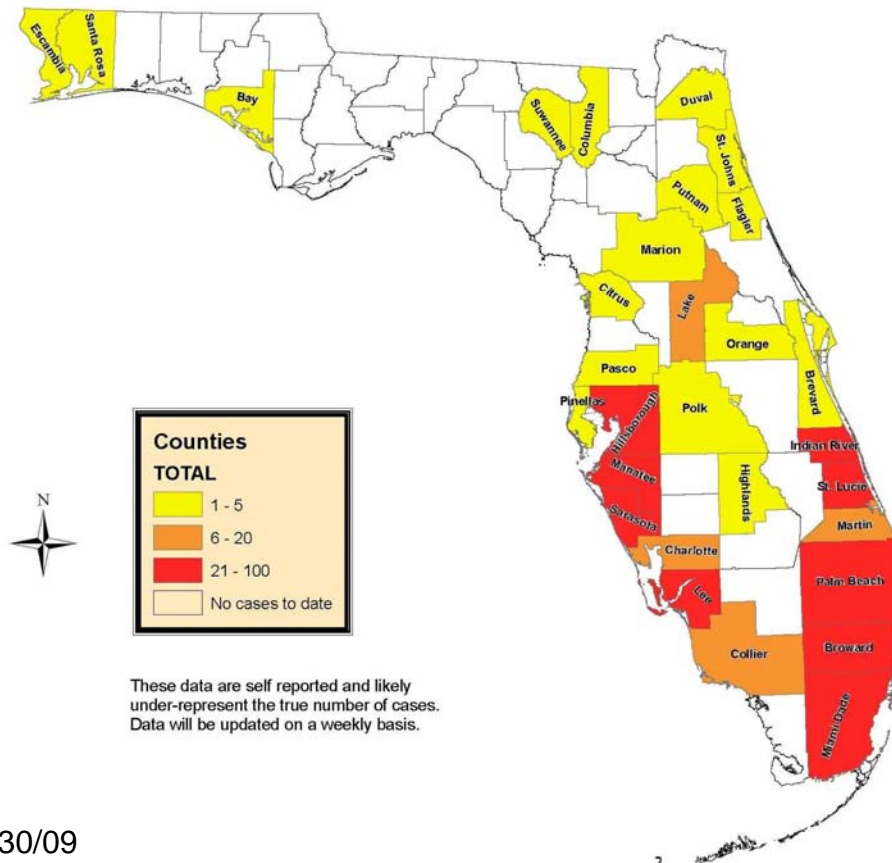
- Majority of cases are in Florida (74%), Louisiana (17%), and Virginia (3%)²



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Extent of Problem

- As of September 15, 2009, FLDOH reports 555 cases in 30 counties³



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Source of Problem

- As of July 15, 2009, US CPSC reports that Chinese gypsum may have been mined in ShanDong province¹
 - 2006 academic paper reports malodors in Chinese gypsum⁴

Note: information current as of 9/30/09

Source of Problem

- Media sources have theorized that Chinese drywall may contain gypsum produced as a by-product of flue gas desulfurization (FGD)
 - However, May 2009 US EPA did not find microscopic evidence of fly ash⁵

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Investigation: US EPA

- May 2009 US EPA report⁵ noted several differences between Chinese drywall (2 samples) and domestic drywall (4 samples), including:
 - Chinese drywall had elevated sulfur (83 & 119 ppm) vs. no sulfur in domestic samples
 - Chinese drywall had higher levels of strontium (2570 & 2670 ppm) vs. lower levels (841 – 3210 ppm) in domestic samples
 - Chinese drywall had two VOCs which were not present in domestic drywall (associated with acrylic paint)

Note: information current as of 9/30/09

Investigation: US CPSC

- According to the July 15, 2009 US CPSC report¹, US CPSC staff and their contractors are pursuing three major tracks in order to evaluate the relationship between drywall emissions and consumer reported health effects:
 - elemental analysis
 - emission chamber studies
 - in-home indoor air sampling

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Major Analytical Testing Options

- Laboratory testing of drywall
 - Gas Chromatography/Mass Spectrometry (GC/MS)
 - High Performance Liquid Chromatography (HPLC)
 - Various Microscopy techniques
 - Metals analysis (XRF, ICP)
- Simulated environmental chamber testing (“jar tests”)
 - Gas Chromatography/Mass Spectrometry (GC/MS)
 - GC/Sulfur Chemiluminescence Detection (GC/SCD)

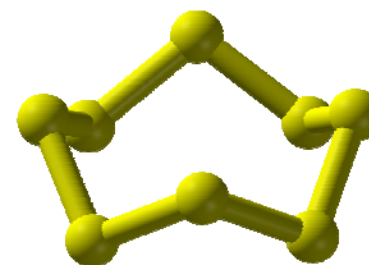
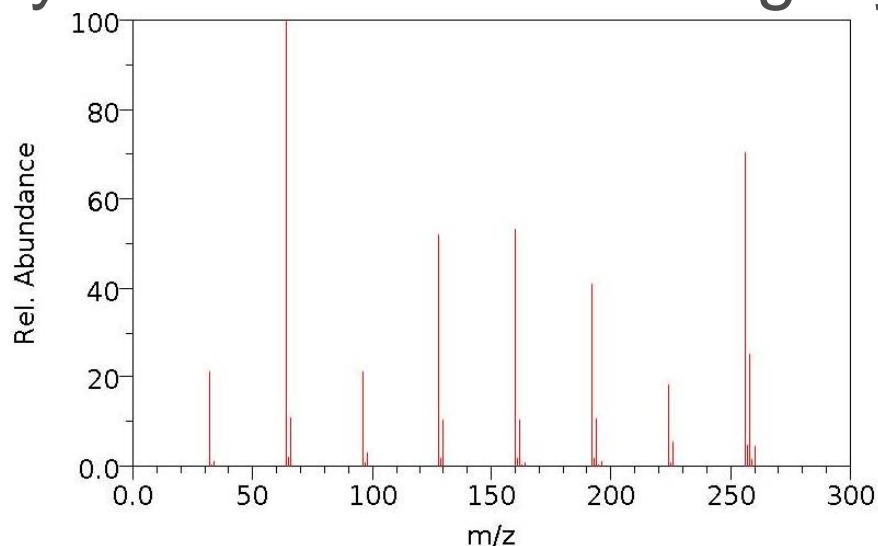
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Elemental Sulfur

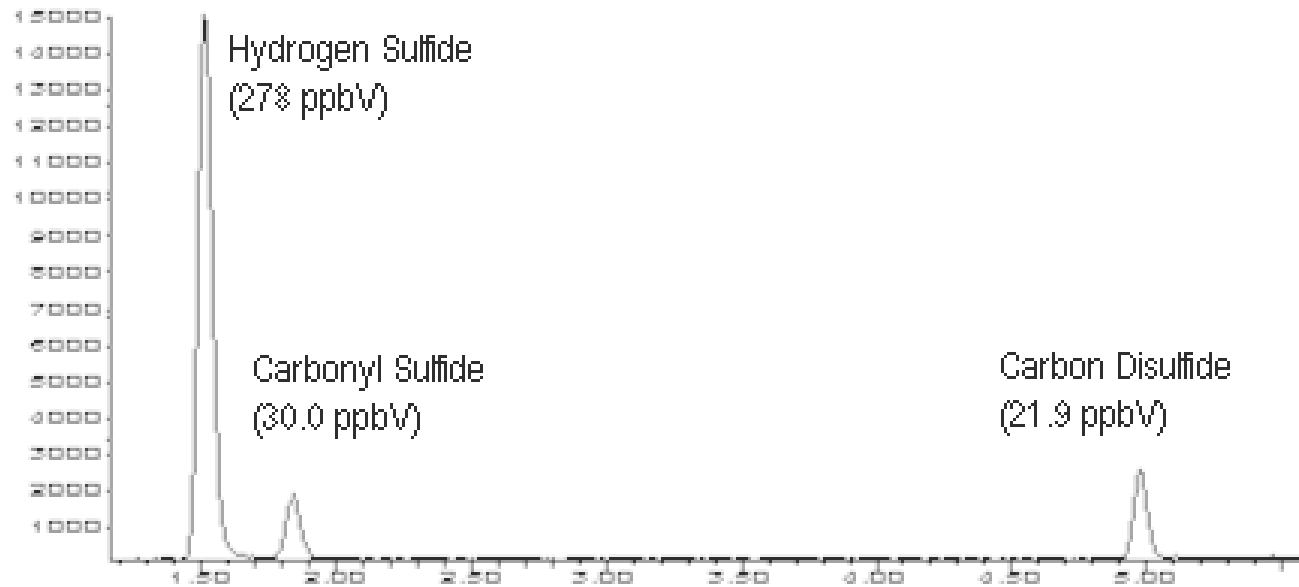
- Research has shown that the orthorhombic cyclooctasulfur (S_8) allotrope is a unique marker found only in defective Chinese drywall
- Analyzed via GC/MS for legally defensible data



Note: information current as of 9/30/09

Hydrogen Sulfide Emission

- Hydrogen Sulfide (H₂S) Jar Test
 - GC/SCD for specific low level sulfur detection
 - Sample prep technique important to “release” H₂S



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Jar Corrosion Test

- Jar Corrosion Test



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Data Summary (4/21/09-9/22/09)

- Ongoing research & development since February 2008
- Suite of 3 tests offered starting in April 2009
- 113 samples analyzed for all three tests
 - 34.5% had negative corrosion, ND S₈ & H₂S
 - 57.5% had positive corrosion, detect S₈ & H₂S

Conclusion: Correlation seems excellent between tests (92%)—only 8% had potential false positive/negatives

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Additional Drywall Research

- Jar tests: VOC EPA TO-17 (GC/MS) and Aldehyde EPA TO-11A (HPLC) analysis

Compound	Chinese Drywall µg/kg	Domestic Drywall µg/kg
1-Butanol	4.1	ND
1-Propanol	4.8	ND
Cyclopentane	20	2.9
Hexaldehyde	4.3	2.8
Valeraldehyde	8.9	2.7
Butyraldehyde	5.9	11
Formaldehyde	14	8.8
Acetaldehyde	12	15

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Additional Drywall Research

- Overall, Chinese drywall showed similar compounds, but in different ratios than domestic drywall
- Additionally, Chinese drywall had alcohols and complex ketones detected which were not found in domestic drywall
- Interestingly, domestic drywall had dimethyl disulfide detected, which was not found in Chinese drywall

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Advice for Homeowners

- US CSPC recommends homeowners contact their home builder
 - FL DOH “self assessment” guide
 - 6 step process to diagnose whether home qualifies as a “case definition”
 - FL Attorney General warns homeowners of scams
 - Bogus test kits/analytical testing
 - Sprays/applications/ozone claiming to fix problem
 - Consulting “experts” with no apparent qualifications
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Internet Resources

- Florida Department of Health
 - <http://www.doh.state.fl.us/environment/community/indoor-air/drywall.html>
- US Consumer Product Safety Commission
 - <http://www.cpsc.gov/info/drywall/index.html>
- US Centers for Disease Control & Prevention
 - <http://www.cdc.gov/nceh/drywall/>
- Florida Attorney General
 - <http://myfloridalegal.com>

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Questions?

Alyson Fortune
Air Quality Scientist
Columbia Analytical Services
afortune@caslab.com
978-501-2735
www.caslab.com

References

1. July 2009 US CPSC Status Report, available at:
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 2. Info/map/picture courtesy of US CPSC:
<http://www.cpsc.gov/info/drywall/index.html>
 3. Info/map courtesy of FL DOH:
<http://www.doh.state.fl.us/environment/community/indoor-air/drywall.html>
 4. Freitag, Mayer, and Breuer. Identification of Odor-Active Organic Sulfur Compounds in Gypsum Products, February 2009. <http://www.clean-journal.com>
 5. May 7, 2009 US EPA drywall analysis report, available at:
http://landrieu.senate.gov/news/09.05.19_EPA_Analysis.pdf
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