

## **Interim Guidance – Identification of Homes with Corrosion from Problem Drywall**<sup>1</sup>

by the Consumer Product Safety Commission  
and the Department of Housing and Urban Development

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### **Executive Summary**

This preliminary identification guidance represents what the Federal Interagency Task Force on Problem Drywall believes is the best approach based on the limited information available today. This identification guidance is based primarily on the presence of metal corrosion in homes as well as other indicators of problem drywall. Additional work will continue to validate these methods and the identification guidance will be modified as necessary.

### **Identification Method**

The identification process is two steps: (1) an initial or threshold inspection to find visual signs of metal corrosion and evidence of drywall installation during the relevant time period, and (2) the identification of corroborating evidence or characteristics.

#### **Step 1: Threshold Inspection**

Visual inspection<sup>2</sup> must show:

- (a) Blackening of copper electrical wiring and/or air conditioning evaporator coils; and
- (b) The installation of new drywall (for new construction or renovations) between 2001 and 2008.

A positive result for this step (including both criteria) is a prerequisite to any further consideration.

#### **Step 2: Corroborating Evidence**

Because it is possible that corrosion of metal in homes can occur for other reasons, it is important to obtain additional corroborating evidence of problem drywall. Homes with the characteristic metal corrosion problems must also have at least 2 of these corroborating conditions if the new drywall was installed between 2005 and 2008. For installations between 2001 and 2004, at least 4 of the following conditions must be met. Collecting evidence of these corroborating conditions will in some cases require professional assessors and/or testing by analytical laboratories.

- (a) Corrosive conditions in the home, demonstrated by the formation of copper sulfide on copper coupons (test strips of metal) placed in the home for a period of 2 weeks to 30 days or confirmation of the presence of sulfur in the blackening of the grounding wires and/or air conditioning coils;
- (b) Confirmed markings of Chinese<sup>3</sup> origin for drywall in the home;
- (c) Strontium levels in samples of drywall core found in the home (i.e. excluding the exterior paper surfaces) exceeding 1200 parts per million (ppm);
- (d) Elemental sulfur levels in samples of drywall core found in the home exceeding 10 ppm;
- (e) Elevated levels of hydrogen sulfide, carbonyl sulfide and/or carbon disulfide emitted from samples of drywall from the home when placed in test chambers using ASTM Standard Test Method D5504-08 or similar chamber or headspace testing<sup>4</sup>;
- (f) Corrosion of copper metal to form copper sulfide when copper is placed in test chambers with drywall samples taken from the home.

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<sup>1</sup> This is a staff document, and has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission or the Department.

<sup>2</sup> For example, the Florida Department of Health's Self-Assessment Guide on signs that a home may be affected by drywall associated corrosion (<http://www.doh.state.fl.us/environment/community/indoor-air/inspections.html>) has questions that may be helpful; mention in this guidance of this or other references does not imply endorsement.

<sup>3</sup> This does not imply that all Chinese drywall or that only Chinese drywall is associated with these problems, but that among homes with the characteristic corrosion, Chinese drywall is a corroborating marker for the characteristic problems.

<sup>4</sup> ASTM International. Standard D5504-08: Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence. 2008. <http://www.astm.org/Standards/D5504.htm>. Subsequent revisions by ASTM of this standard will be considered to be "similar chamber or headspace testing" methods.

## Detailed Description

### Introduction

This preliminary identification guidance represents what the Federal Interagency Task Force on Problem Drywall believes is the best approach based on the limited information available today. We recognize that important additional guidance is still needed to clarify qualifications for inspectors and test laboratories and to describe methods for making the measurements in the criteria defined herein. This interim identification guidance is being released in recognition of the immediate need of homeowners for this information. Consumers should exercise caution in contracting for testing, and should be diligent in confirming the references, qualifications, and background of individuals and firms that offer such testing<sup>5</sup>. Scientific investigations have moved as quickly as possible to understand the complex problems presented by the issue of Chinese<sup>6</sup> drywall. The scientific work completed to date by the Federal Interagency Task Force has been essential to building the foundation for decision-making by homeowners and local, state and federal authorities.<sup>7</sup> The investigation continues on several fronts to expand our understanding of this issue – but the Task Force believes that current information is sufficient to develop interim guidance on how to identify homes with problems associated with this drywall.

Findings have shown a strong association between the presence of problem drywall and metal corrosion in homes. The results of investigations reported by the Federal Interagency Task Force provide criteria and indicators for identifying those homes. The Task Force developed this preliminary guidance document based on these findings.

This identification guidance is based primarily on the presence of metal corrosion in homes as well as other indicators of problem drywall. It is possible to misclassify homes because of other possible sources of metal corrosion such as volatile sulfur compounds from sewer gas, well water, and outdoor contaminants that may enter the home independent of the drywall in the home. Homes may also be misclassified as having no drywall problem due to the absence of characteristics found to be typical in the limited testing to date. Given these limitations, additional work will continue to validate these methods and the identification guidance will be modified as necessary.

### **Identification Method**

The identification process will be two steps: (1) an initial or threshold inspection to find visual signs of metal corrosion and evidence of drywall installation in the relevant time period, and (2) the identification of corroborating evidence or characteristics.

#### **Step 1: Threshold Inspection**

A visual inspection shall seek to identify blackening of copper electrical wiring and/or air conditioning evaporator coils (or documentation of replacement of evaporator coils due to blackened corrosion causing failure), and the installation of new drywall (for new construction or renovations) between 2001 and 2008. Meeting both criteria for this step is a prerequisite for further consideration.

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<sup>5</sup> FTC Consumer Alert, “Defective Imported Drywall: Don’t Get Nailed by Bogus Tests and Treatments”, <http://www.ftc.gov/bcp/edu/pubs/consumer/alerts/alt164.pdf>, December 2009.

<sup>6</sup> The Interagency Task Force on Problem Drywall is conducting a broad investigation and its studies have included both Chinese and non-Chinese samples. While this work does reference “Chinese” drywall as a general term, we have not concluded that all Chinese-manufactured drywall may present corrosion or health issues, or that drywall made elsewhere will never present these issues.

<sup>7</sup> Reports and information released regarding Chinese drywall can be found at [www.drywallresponse.gov](http://www.drywallresponse.gov).

## Rationale

Visual observations of corrosion of air conditioning evaporator coils and/or electrical wiring by trained inspectors is believed to be a prerequisite for consideration of a home as having problem drywall. The Florida Department of Health has long included such corrosion as part of its definition of problem drywall homes<sup>8,9</sup>. It is appropriate to limit the dates to the relevant time period, as this corresponds to the vast majority of complaints received by the Consumer Product Safety Commission (CPSC), also much older homes could exhibit corrosion due to different sources acting over longer periods of time.

A CPSC contractor completed a detailed study of 51 homes in Florida, Louisiana, Virginia, Alabama, and Mississippi; the report was issued on November 23, 2009 and is available on [www.drywallresponse.gov](http://www.drywallresponse.gov). This investigation included inspections of each home for the presence and extent of corrosion. Copper and silver metal test strips, called “coupons,” were also placed in the home for 2 weeks to test the corrosive environment of each house. The copper and silver coupons showed significantly higher rates of corrosion in homes where complaints had been registered than in the control homes. The dominant types of corrosion on the coupons were copper sulfide and silver sulfide, respectively, as determined by additional laboratory tests. Copper sulfide and silver sulfide appear as a black coating on copper or silver metal. Visual inspection and evaluation of electrical (ground) wire corrosion also revealed statistically significant greater corrosion in complaint homes compared to the control homes.

## Step 2: Corroborating Evidence

Because it is possible that corrosion of metal in homes can occur for other reasons, it is important to obtain additional corroborating evidence of problem drywall. Homes with the characteristic metal corrosion problems must also have at least 2 of these corroborating conditions if the new drywall was installed between 2005 and 2008. For installations between 2001 and 2004, at least 4 of the following conditions must be met. Collecting this corroborating evidence will in some cases require professional assessors and/or testing by analytical laboratories.

- (a) Corrosive conditions in the home, demonstrated by the formation of copper sulfide on copper coupons (test strips of metal) placed in the home for a period of 2 weeks to 30 days or confirmation of the presence of sulfur in the blackening of the grounding wires and/or air conditioning coils;
- (b) Confirmed markings of Chinese<sup>10</sup> origin for drywall in the home;
- (c) Strontium levels in samples of drywall core found in the home (i.e., excluding the exterior paper surfaces) exceeding 1200 parts per million (ppm);
- (d) Elemental sulfur levels in samples of drywall core found in the home exceeding 10 ppm;
- (e) Elevated levels of hydrogen sulfide, carbonyl sulfide and/or carbon disulfide emitted from samples of drywall from the home when placed in test chambers using ASTM Standard Test Method D5504-08 or similar chamber or headspace testing<sup>11</sup>;
- (f) Corrosion of copper metal to form copper sulfide when copper is placed in test chambers with drywall samples taken from the home.

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<sup>8</sup> Case Definition (03-31-09) for Premature Copper Corrosion in Residences Possibly Associated with the Presence of Imported Drywall from China.

<sup>9</sup> Case Definition (12-18-09) for Drywall Associated Corrosion in Residences.

(<http://www.doh.state.fl.us/ENVIRONMENT/COMMUNITY/indoor-air/casedefinition.html>.)

<sup>10</sup> This does not imply that all Chinese drywall or that only Chinese drywall is associated with these problems, but that among homes with the characteristic corrosion, Chinese drywall is a corroborating marker for the characteristic problems.

<sup>11</sup> ASTM International. Standard D5504-08: Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence. 2008. <http://www.astm.org/Standards/D5504.htm>. Subsequent revisions by ASTM of this standard will be considered to be “similar chamber or headspace testing” methods.

## **Rationale**

The Federal Interagency Task Force's study of the elemental and chemical composition of 17 drywall samples shows higher concentrations of elemental sulfur and strontium in Chinese drywall than in non-Chinese drywall.<sup>12</sup> Additionally, the 51-home study (41 homes with reported problems and 10 control homes) also found a correlation between elevated strontium levels and problem homes.<sup>13</sup> Additional studies have also found sulfur and strontium to be associated with problem drywall homes. Thus, the presence of elevated levels of either elemental sulfur or strontium is believed to be corroborating evidence for homes with problem drywall.

The 51-home study and the preliminary corrosion reports<sup>14,15</sup> also found that the type of corrosion present on copper coupons and copper electrical wire and air conditioning evaporator coils was copper sulfide. Thus, the confirmation of copper sulfide or sulfur in the corrosion of the copper (and similarly silver sulfide or sulfur in the corrosion on silver coupons) is believed to be a corroborating marker.

Chinese drywall installed in the affected period has been associated with the types of corrosion problems reported. This does not imply that all Chinese drywall or that only Chinese drywall is associated with these problems, but that among homes with the characteristic corrosion, Chinese drywall is a corroborating marker for the characteristic problems. It is not absolutely necessary for the markings to be found as in some cases Chinese drywall does not have markings indicating nation of origin.

Additionally, the preliminary results reported for the study underway at the Lawrence Berkeley National Laboratory indicated that higher levels of total volatile sulfur compounds were released by Chinese drywall samples compared to domestic drywall samples, and the fifty-one home study reported an association between hydrogen sulfide levels in homes and corrosion in those homes. Thus it is believed that one of the possible corroborating tests which could be considered is emissions testing from suspect drywall from homes. Another similar corroborative test that could be considered is determining if corrosion of copper metal to form copper sulfide occurs when copper is placed in test chambers with drywall from the home at elevated humidity. Chamber tests may be costly and time consuming options.

## **Continuing Development of this Guidance**

We will incorporate future findings as appropriate to improve upon this preliminary guidance. More information on problem drywall is available at the federal Drywall Information Center website, [www.drywallresponse.gov](http://www.drywallresponse.gov).

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<sup>12</sup> Statistical Analysis of the Chemical Screening of a Small Sample of Unused Chinese and non-Chinese Drywall, October 30, 2009, <http://www.cpsc.gov/info/drywall/TabA.pdf>.

<sup>13</sup> U.S. Consumer Product Safety Commission Staff Summary of Contractor's Indoor Air Quality Assessment of Homes Containing Chinese Drywall, November 23, 2009, <http://www.cpsc.gov/info/drywall/51homeStudy.pdf>.

<sup>14</sup> Status Report on the Preliminary Analysis of HVAC, Gas Distribution, and Fire Safety Equipment Installed in Homes with Chinese Drywall, November 23, 2009, <http://www.cpsc.gov/info/drywall/PrelimHVACGasDistFireSyst.pdf>.

<sup>15</sup> Interim Report on the Status of the Analysis of Electrical Components Installed in Homes with Chinese Drywall, November 23, 2009, <http://www.cpsc.gov/info/drywall/prelimelectrical.pdf>.