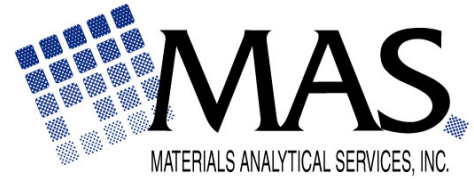


ATLANTA
Corporate Headquarters
3945 Lakefield Court
Suwanee, GA 30024
(770) 866-3200 FAX (770) 866-3259



DRYWALL ANALYSIS REPORT

Results of
Orthorhombic Cyclooctasulfur (S₈), Sulfur Gas Scan & Strontium Verification

Regarding:
Temple – Inland Gypsumboard from Various Locations

MAS Project: M51749

For:
Pat Miller
Temple-Inland EHS
P.O. Drawer N
303 S. Temple Drive
Diboll, TX 75941

October 19, 2010

TABLE OF CONTENTS

SUMMARY:..... 3

DESCRIPTION OF SAMPLES: 3

PREPARATION AND ANALYSIS: 3

RESULTS AND DISCUSSION: 5

CHAIN OF CUSTODY 7

SUMMARY:

Drywall from four different Temple–Inland locations was submitted for assessment of sulfur (S) bearing gases, orthorhombic Cyclooctasulfur (S₈), and strontium. S-bearing gases assessed by a modified headspace analysis using gas chromatography and sulfur chemiluminescence detector (GC/SCD). Strontium (Sr) content was assessed by inductively coupled plasma optical emission spectroscopy (ICP). The Sulfur (S₈) was determined using a gas chromatograph equipped with an electron capture detector (GC/ECD). All of the samples were found not to contain any of the sulfur gases. Strontium (Sr) was not detected in any of the Temple-Inland samples above a level of 1,200 ppm set by CPSC and Department of Housing and Urban Development for problematic drywall. Orthorhombic Cyclooctasulfur (S₈) was not detected in any of the drywall samples. None of the Temple-Inland samples exceeded MAS control limits for (S) bearing gases, and along with S₈ and Sr results, this confirms that these samples were not consistent with a problematic type drywall material.

It has been shown that some drywall products emit sulfur bearing gases and can possess an elevated level of Sr and S₈. S-bearing gases are corrosive to various soft metals used in construction and furnishings including copper wire, copper HVAC system components, silver and zinc coated materials.

DESCRIPTION OF SAMPLES:

<u>MAS No.</u>	<u>Client Description</u>
M51749-001	Bulk Drywall – 540 E. Barton Ave., West Memphis, AR
M51749-002	Bulk Drywall – 150 Temple Dr., Cumberland City, TN
M51749-003	Bulk Drywall – 16850 N.E. 135 St., Fletcher, OK
M51749-004	Bulk Drywall – 3401 FM 78, McQueeney, TX

PREPARATION AND ANALYSIS:

PREPARATION: Two small subsamples were removed from the submitted bulk drywall sample material. The exterior paper was removed from the surfaces and each subsample weighed on an analytical balance. Each subsample was powdered with a mortar and pestle. One subsample was placed in a typical headspace container for analysis by GC/SCD. An acid digestion was performed on the second subsample which was prepared for analysis on the ICP using EPA Method SW846-3050B/6010 as a guide.

ANALYSIS: GC/SCD (S bearing gases) - Ethyl methyl sulfide was used as an internal standard, and known concentrations of carbon disulfide and carbonyl sulfide were used as the external standard. The drywall sampled was then analyzed by GC/SCD then compared to both the internal and external standards for quantification of carbon disulfide. Along with the suspected drywall sample, a control (non-offensive type drywall) was run along with the primary samples as described. The amount of carbon disulfide found in the offensive drywall bulk samples was then compared to the MAS in-house controls.

ICP (Strontium) - The acid digested drywall subsample was analyzed by the ICP then compared to a series of standards for quantification of strontium. The concentration determined was then compared to the criteria established by the US Consumer Protection Safety Council (CPSC) and US Department of Housing and Urban Development.

GC/ECD (S₈) - A portion of each drywall sample was subcontracted to Columbia Analytical laboratory to be tested for Orthorhombic Cyclooctasulfur (S₈) content.

RESULTS AND DISCUSSION:

Table 1 shows the result from the analysis of the submitted drywall sample.

TABLE 1
Bulk Drywall Material from Various Temple-Inland Locations

October 7, 2010



Materials Analytical Services, LLC - Test Report

MAS Client	Temple-Inland					
MAS ID	M51749-001	M51749-002	M51749-003			
Client Sample ID	A090710-09261 1/2 12	None Stated	1/2" Regular			
Client Sample Location	West Memphis	Cumberland City	Fletcher			
			McQueeneey			
			M51749-004			
			1/2" Regular			
			McQueeneey			
Test Parameters	Results	Results	Results	Results	LOQ	Test Methods / Date Analyzed
Sulfur (mg/kg)						CAS AQL 103A
Orthorhombic Cyclooctasulfur (S ₈)	ND	ND	ND	ND	5.0	09/14/10
Gases (ug/kg)						ASTM D 5504
Carbonyl Sulfide	ND	ND	ND	ND	3.1	Enhanced
Carbon Disulfide	ND	ND	ND	ND	3.2	09/21/10
Dimethyl Sulfide	ND	ND	ND	ND	11	09/21/10
Hydrogen Sulfide	ND	ND	ND	ND	70	09/21/10
Sulur Dioxide	ND	ND	ND	ND	44	09/21/10
Methyl Mercaptan	ND	ND	ND	ND	3.0	09/21/10
Metals (mg/kg)						EPA SW 846-
Strontium	399	276	570	981	50	3050B/6010
						09/21/10

At MAS, we use carbon disulfide as a marker for affected drywall that emits corrosive sulfur bearing gases using the MAS modified headspace analysis. This distinctive marker is based on our own research with off gassing drywall with both the modified headspace analysis, high temperature GC/SCD analysis, and chamber emission testing. In these tests six principle sulfur bearing gases emitted from offensive drywall have been detected (hydrogen sulfide, carbon disulfide, methyl mercaptan, dimethyl sulfide, sulfur dioxide and carbonyl sulfide). Additionally, carbonyl sulfide has also been detected and its concentration has been quantified. Based on this work elevated levels of carbon disulfide in the bulk samples was the one constituent that was consistently found in the MAS test on offensive drywall and is quantifiable with known standards. The finding of sulfur gas emissions by MAS testing corroborates the significant corrosion problems caused by offensive sulfur bearing drywall gases impacting various types of materials in effected residences. Carbon disulfide gas in residences has also been verified by Florida Department of Health (FDOH) testing^{1,2}. Strontium has also been detected at levels above 1,200 ppm in many types of problematic drywall. According to the Florida Department of Health a positive result above 10 ppm of S₈ is also indicative of corrosive drywall.

Therefore as stated above, elevated levels of S-bearing gases such as carbon disulfide, and the presence of carbonyl sulfide contained by bulk drywall samples shows that such drywall is an offensive type and will emit sulfur bearing gases such as hydrogen sulfide, carbonyl sulfide, sulfur dioxide and carbon disulfide which are known to be corrosive to metals such as copper wire, copper and aluminum HVAC components, zinc, silver, etc. The corrosion product appears as a black coating on copper wires, the complete corrosion/ erosion of copper cooling coils or a white/gray corrosion product on other metals such as zinc and silver.

*Statistically 3 times the standard deviation (SD) encompasses 99.7 percent of the variation around the average for emission of carbon disulfide (CS₂) from the control drywall samples tested. Any CS₂ emission values at or beyond 3 times the SD would be considered significantly different from the controls and the sample would be considered an offensive drywall type. It is our opinion that a value of 4 times the SD is even more conservative statistically and would further strengthen the finding that the sample tested is an offensive drywall product.

References

1. Florida Department of Health, Memorandum, December 22, 2008
2. Florida Department of Health, Memorandum, October 31, 2008



Mark W. Rigler, Ph.D.
Senior Consulting Scientist



William E. Longo, Ph.D.
President

CHAIN OF CUSTODY

EXPRESS

68
1
9517
60

Express

M51749-002
rec'd 9/19/10
6000

Align top of FedEx Express Shipping Label here



<p>From: Origin ID: CKVA (931) 827-4547 Bob Bertolami Temple-Inland 150 Temple Inland Cumberland City, TN 37050</p> <p>FedEx Express</p> <p>E</p> <p>PERFORMANCE</p> <p>SHP TO: (770) 866-3200 BILL SENDER Martin R. Bennett Materials Analytical Services, LLC 3945 LAKEFIELD CT SUWANEE, GA 30024</p>	<p>Ship Date: 08SEP10 ActWgt: 3.5 LB CAD: 9079863JNET3060</p> <p>Delivery Address Bar Code</p> <p>Ref # Invoice # PO # Dept #</p>	<p>TRK# 7962 2328 9517 0201</p> <p>THU - 09 SEP A2 PRIORITY OVERNIGHT</p> <p>XH AYSA</p> <p>30024 GA-US ATL</p> <p>58C332024X</p>
--	---	---

The World On Time.
Maximum Run

MAS, LLC.
CHAIN-OF-CUSTODY

CLIENT: Temple-Inland
CONTACT: Patrick Miller
PHONE: (512) 434-3880
CLIENT JOB NAME: Drywall Project
CLIENT JOB#:
CLIENT DOC(S): COC (3)
FAX NUMBER: (512) 434-8017

MAS JOB: M51749
DATE RECEIVED: 9/9/2010
SUBMITTED BY: Edison,Lindley
TRANSPORT: FedEx
RECEIVED BY: Nancy Sears
CONDITION: OK

MAS #	CLIENT ID	VOLUME	TYPE MATERIAL	MAS #	CLIENT ID	VOLUME	TYPE MATERIAL
001	West Memphis, AR		drywall				
LOCATION AO90810 08371 West Memphis, AR							
002	Cumberland City, TN		drywall				
LOCATION (NO COC)							
003	Fletcher, OK		drywall				
LOCATION 1/2" regular							
004	McQueeney, TX		drywall				
LOCATION 1/2 regular							

MAS, LLC.
3945 Lakefield Court
Suwanee, Georgia 30024
(770) 866-3200