

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



DRYWALL ANALYSIS REPORT

Results from
Carbon Disulfide & Carbonyl Sulfide Verification

Regarding:
Gypsum Wallboard - 1/2" Regular
McQueeney, TX

MAS Project: M49787

For:
Mr. Patrick Miller
Temple-Inland EHS
303 S. Temple Drive
Diboll, Texas 75941

October 13, 2009

TABLE OF CONTENTS

SUMMARY: 3

DESCRIPTION OF SAMPLES: 3

PREPARATION AND ANALYSIS: 3

RESULTS AND DISCUSSION: 4

GC/ MS RESULTS 6

GC/ MS SPECTRA 8

CHAIN OF CUSTODY 26

SUMMARY:

Regular drywall samples from Temple-Inland's McQueeney, TX manufacturing plant were submitted for testing of carbon disulfide and carbonyl sulfide, (two problematic compounds associated with sulfur gas emissions) by a modified headspace analysis using gas chromatography and mass spectroscopy (GC/MS). A total of four samples were analyzed from the drywall submitted.

For comparison purposes, a series of MAS drywall controls (non-problematic drywall) were previously analyzed and found to contain an average of 2.6 ppb carbon disulfide. For each of the submitted samples, M49787-001 thru -004 the emission levels of carbon disulfide and carbonyl sulfide were below the quantitation limit (BQL). Based on these results, all of the submitted samples M49787-001 thru -004 were determined to be negative for sulfur off-gassing and are not considered problematic corrosive drywall types.

DESCRIPTION OF SAMPLES:

<u>MAS No.</u>	<u>Client Description</u>
M49787-001	½" Regular Gypsum Wallboard 1
M49787-002	½" Regular Gypsum Wallboard 2
M49787-003	½" Regular Gypsum Wallboard 3
M49787-004	½" Regular Gypsum Wallboard 4

PREPARATION AND ANALYSIS:

PREPARATION: A small subsample was removed from each of the submitted bulk drywall sample materials and weighed on an analytical balance. Each sample was powdered with a mortar and pestle then placed in a typical headspace container for analysis by GC/MS.

ANALYSIS: Tert-butyl methyl ether (MTBE) was used as an internal standard, and known concentrations of carbon disulfide and carbonyl sulfide were used as the external standards. The sample was then analyzed by GC/MS then compared to both the internal and external standards for quantification of carbon disulfide and carbonyl sulfide. Along with the submitted drywall samples, controls (corrosive problematic and non-problematic

type drywall) were run along with the primary samples as described. The amount of carbon disulfide found in the submitted drywall bulk samples were then compared to the MAS in-house controls.

RESULTS AND DISCUSSION:

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

TABLE 1
Four Samples of a Bulk Drywall Material from the Temple-Inland (McQueeney, TX)

MAS No.	Client Description/Location	Weight (grams)	Carbon Disulfide (CS₂) Concentration (ppb)	Carbonyl Sulfide (COS) Concentration (ppb)
M49787-001	½" Regular Gypsum Wallboard 1	3.08	BQL (1.0)	BQL (4.1)
M49787-002	½" Regular Gypsum Wallboard 2	3.04	BQL (1.1)	BQL (4.2)
M49787-003	½" Regular Gypsum Wallboard 3	3.22	BQL (1.0)	BQL (3.9)
M49787-004	½" Regular Gypsum Wallboard 4	3.07	BQL (1.0)	BQL (4.1)

The attached GC/MS spectra shows that the Temple-Inland samples M49787-001 thru -004 of the submitted drywall material did not emit carbon disulfide above the quantitation limit (1.1 ppb). The average concentration of carbon disulfide (background amounts) in the MAS in-house controls is 2.6 ppb. Using the criteria of 4 X the standard deviation* of the in-house MAS controls ($2.6 + (4 \times 1.5) = 8.6$ ppb), it is our opinion, that the findings of BQL or ≤ 1.1 ppb of carbon disulfide along with BQL or ≤ 4.2 carbonyl sulfide confirms that these samples are not considered problematic corrosive drywall.

*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.



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



William E. Longo, Ph.D.
President

GC/MS RESULTS

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



Materials Analytical Services, LLC - Test Report

Patrick Miller
 Temple-Inland EHS
 303 S. Temple Drive
 Diboll, TX 75941

October 13, 2009

MAS Project #: M49787

Date Sampled: 09/14/09

Date Received: 09/16/09

Date Analyzed: 09/24/09

Client Proj. Name: 1/2" Regular Wallboard-McQueeney,TX

Analysis: Carbon Disulfide (CS₂) and Carbonyl Sulfide (COS) by GC/MS

Method: Headspace by GC/MS

Media: Drywall

MAS Sample ID	Client Sample ID	Analyte	ng/g	ppb	LOQ	Analyte	ng/g	ppb	LOQ
M49787 - 001	1/2" Regular Gypsum Wallboard (1)	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	4.1
M49787 - 002	1/2" Regular Gypsum Wallboard (2)	Carbon Disulfide	BQL	BQL	1.1	Carbonyl Sulfide	BQL	BQL	4.2
M49787 - 003	1/2" Regular Gypsum Wallboard (3)	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	3.9
M49787 - 004	1/2" Regular Gypsum Wallboard (4)	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	4.1

Control ID	Analyte	ng/g	ppb	LOQ	Analyte	ng/g	ppb	LOQ
Negative Control	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	3.9
Positive Control	Carbon Disulfide	272	87	1.0	Carbonyl Sulfide	44	18	4.1

BQL-Below Quantitation Limit
 LOQ-Limit Of Quantitation

Analyst: JJ

Review: _____

Randy Brown
 Randy Brown
 Chemistry Department Manager

GC/MS SPECTRA

CS₂ & COS Sample Analysis Spreadsheet

Job No. M49787
 Client Temple-Inland EHS
 Analyst JJ
 Date 10/13/2009
 Instrument GC/MS

Client Job ID: CS₂ & COS in Wallboard
 Project Name: 1/2" Regular Wallboard-McQueeney, TX
 Date Sampled: 09/14/09
 Date Received: 09/16/09
 Date Analyzed: 09/24/09

MW(CS₂)= 76.139
 k factor = 0.321
 MW(COS)= 60.075
 k factor = 0.407

Lowest STD (ug/m): 10 31

Carbon Disulfide

MAS Sample ID	Client Sample ID	Sample Aliquot (g)	Result ng	ng/g	ppb	Detection Limit ppb
M49787 - 001	1/2" Regular Gypsum Wallboard (1)	3.08	BQL	BQL	BQL	1.0
M49787 - 002	1/2" Regular Gypsum Wallboard (2)	3.04	BQL	BQL	BQL	1.1
M49787 - 003	1/2" Regular Gypsum Wallboard (3)	3.22	BQL	BQL	BQL	1.0
M49787 - 004	1/2" Regular Gypsum Wallboard (4)	3.07	BQL	BQL	BQL	1.0

Control ID
 Negative Control BQL 272 1.0
 Positive Control 3.10 842.91 87 1.0

Carbonyl Sulfide

MAS Sample ID	Client Sample ID	Sample Aliquot (g)	Result ng	ng/g	ppb	Quantitation Limit ppb
M49787 - 001	1/2" Regular Gypsum Wallboard (1)	3.08	BQL	BQL	BQL	4.1
M49787 - 002	2	3.04	BQL	BQL	BQL	4.2
M49787 - 003	3	3.22	BQL	BQL	BQL	3.9
M49787 - 004	4	3.07	BQL	BQL	BQL	4.1

Control ID
 Negative Control BQL 43.7 18 3.9
 Positive Control 3.10 135.39 4.1

Quantitation Report

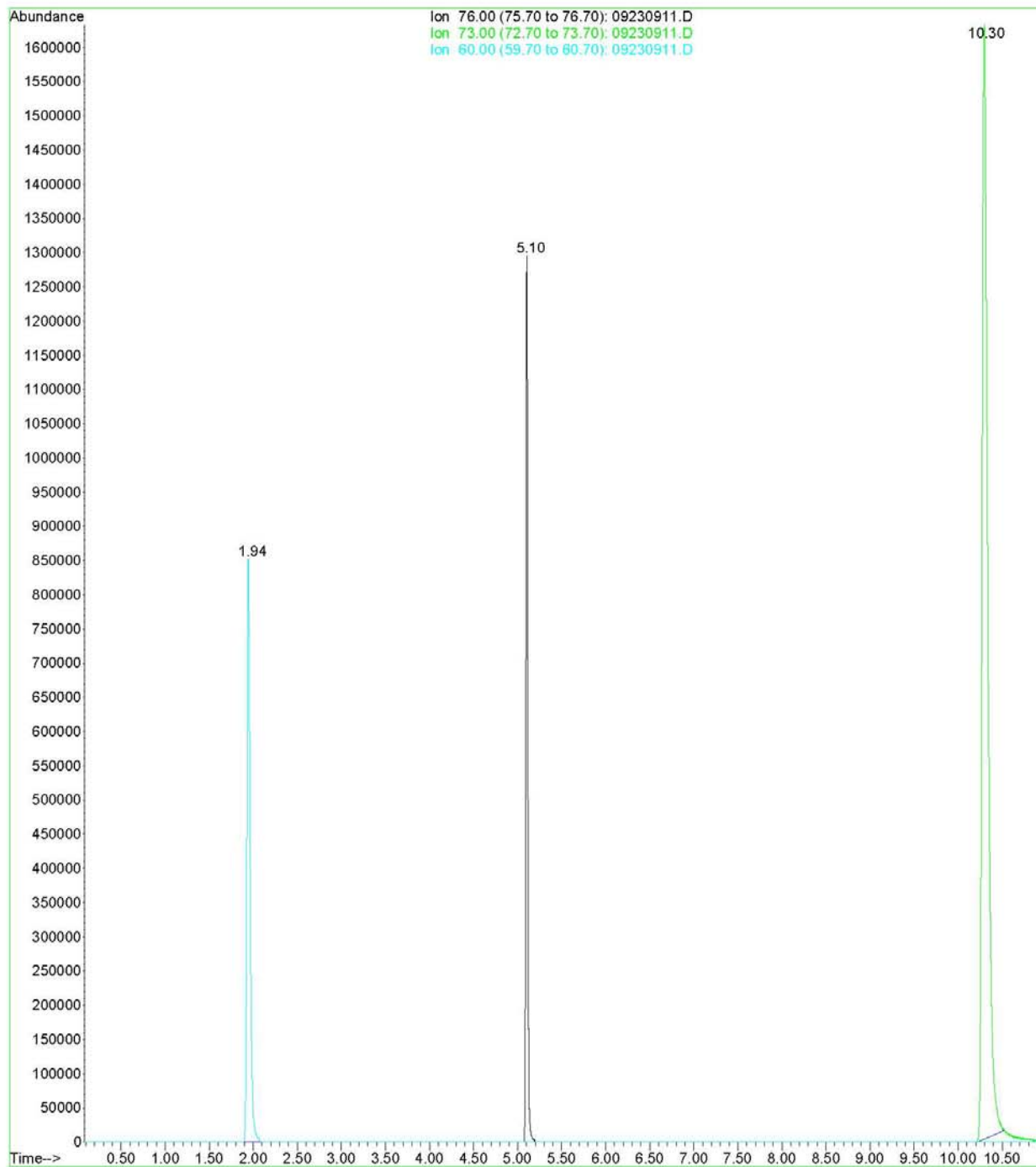
Data File : C:\MSDCHEM\1\DATA\092309\09230911.D Vial: 11
 Acq On : 23 Sep 2009 4:44 pm Operator: JJ
 Sample : CCV-L4 Inst : Instrumen
 Misc : Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 23 16:56:22 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
 Title :
 Last Update : Tue Sep 22 17:26:55 2009
 Response via : Initial Calibration
 DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
-----	-----	-----	-----	-----	-----	-----
1) MTBE	10.30	73	71604356	740.00	ng	0.00
Target Compounds						Qvalue
2) Carbonyl sulfide	1.94	60	21343219	332.29	ng	99
3) Carbon Disulfide	5.10	76	18299935	162.75	ng	100
-----	-----	-----	-----	-----	-----	-----

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230911.D 092209CS2_DRYWALL.M Thu Sep 24 10:23:34 2009

File : C:\MSDCHEM\1\DATA\092309\09230911.D
Operator : JJ
Acquired : 23 Sep 2009 4:44 pm using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: CCV-L4
Misc Info :
Vial Number: 11



Quantitation Report

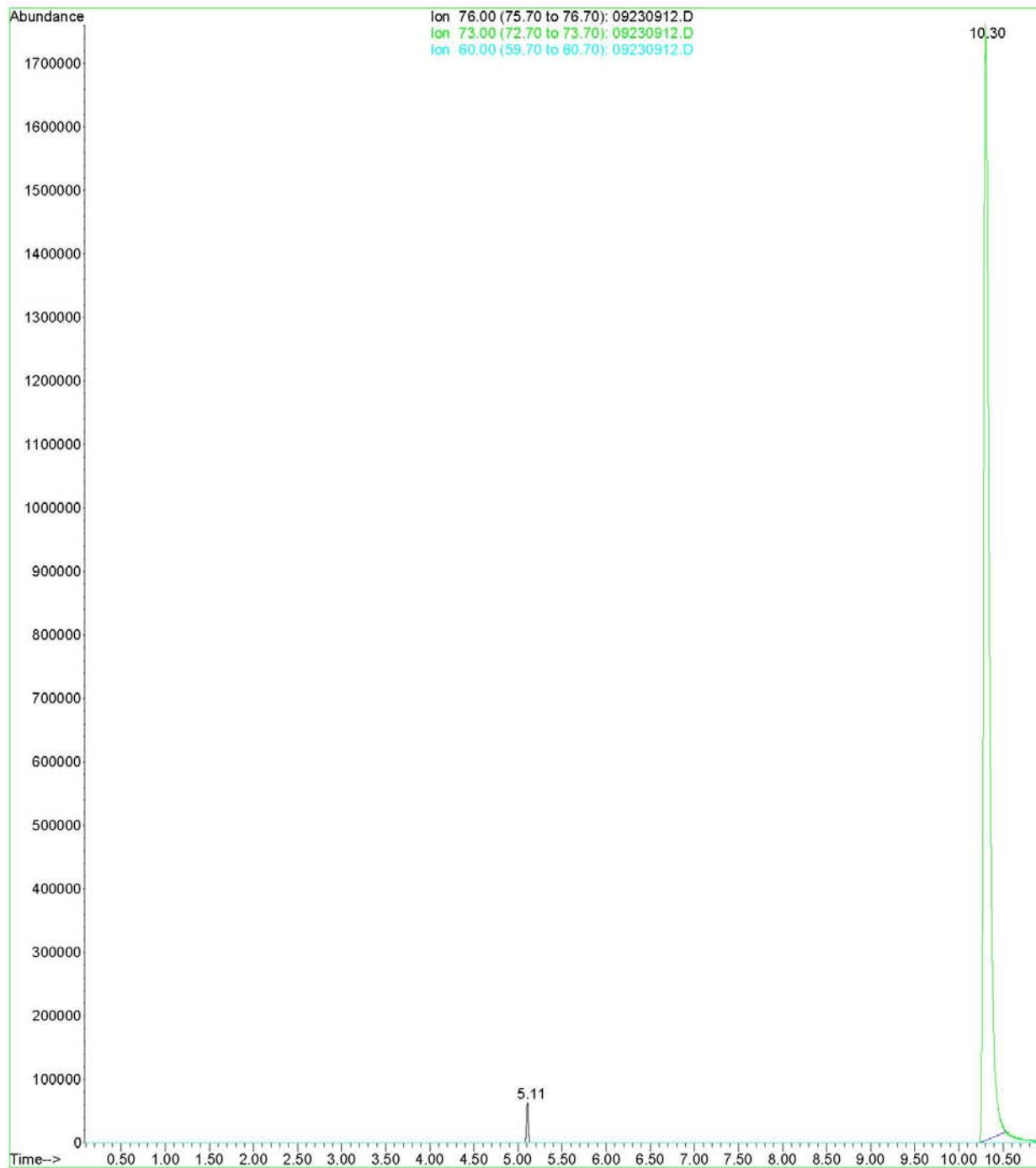
Data File : C:\MSDCHEM\1\DATA\092309\09230912.D Vial: 12
Acq On : 23 Sep 2009 5:20 pm Operator: JJ
Sample : Blank Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: EVENTS.E
Quant Time: Sep 24 10:38:56 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
Title :
Last Update : Tue Sep 22 17:26:55 2009
Response via : Initial Calibration
DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
-----	-----	-----	-----	-----	-----	-----
1) MTBE	10.30	73	76493335	740.00	ng	0.00
Target Compounds						Qvalue
2) Carbonyl sulfide	0.00	60	0		N.D.	
3) Carbon Disulfide	5.11	76	876388		Below Cal	95
-----	-----	-----	-----	-----	-----	-----

(#) = qualifier out of range (m) = manual integration (+) = signals summed
09230912.D 092209CS2_DRYWALL.M Thu Sep 24 10:38:56 2009

File : C:\MSDCHEM\1\DATA\092309\09230912.D
Operator : JJ
Acquired : 23 Sep 2009 5:20 pm using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: Blank
Misc Info :
Vial Number: 12



Quantitation Report

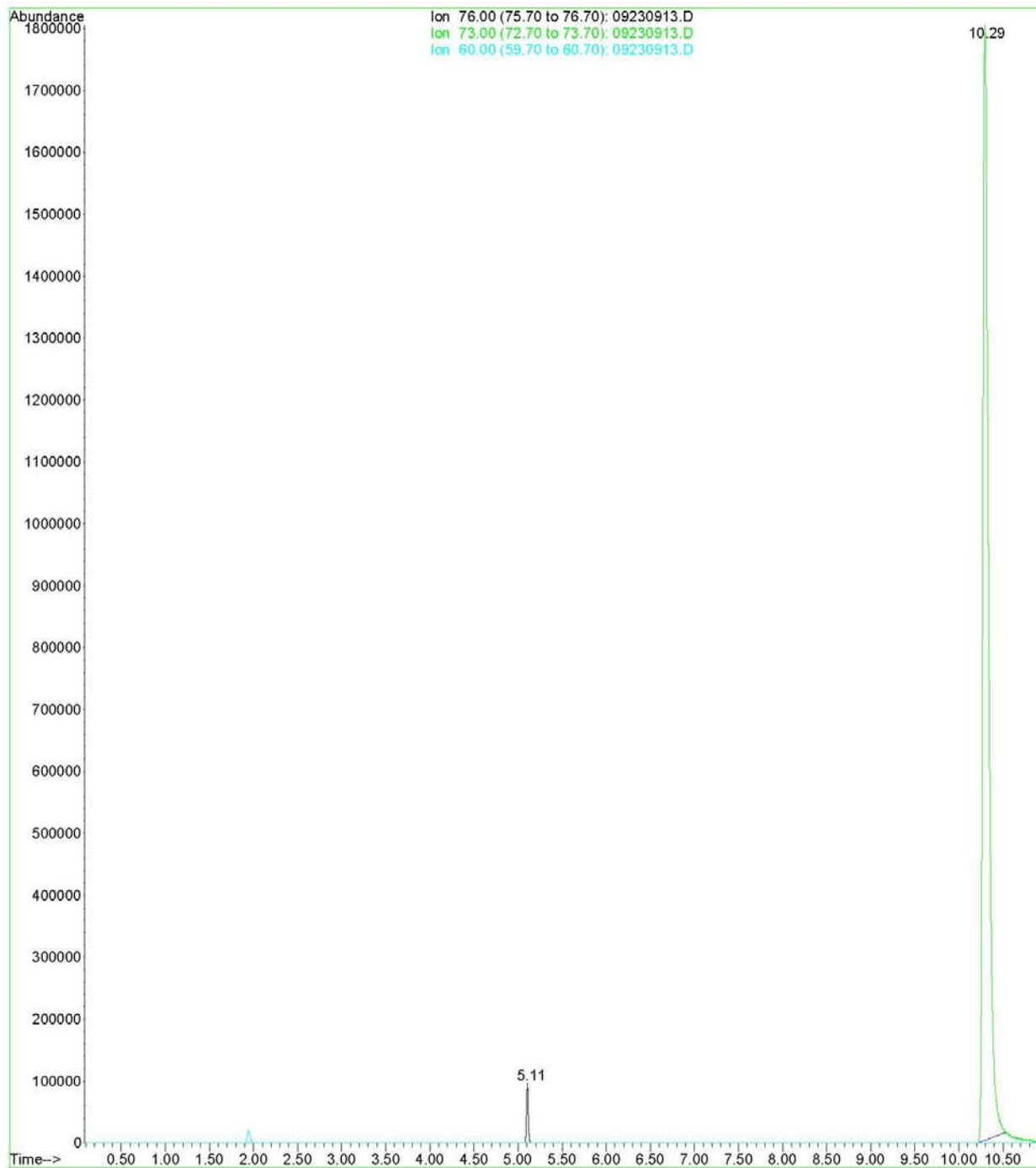
Data File : C:\MSDCHEM\1\DATA\092309\09230913.D Vial: 13
 Acq On : 23 Sep 2009 5:55 pm Operator: JJ
 Sample : Negative Control Inst : Instrumen
 Misc : 3.20g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 24 10:40:21 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
 Title :
 Last Update : Tue Sep 22 17:26:55 2009
 Response via : Initial Calibration
 DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
-----	-----	-----	-----	-----	-----	-----
1) MTBE	10.30	73	80396552	740.00	ng	-0.01
Target Compounds						Qvalue
2) Carbonyl sulfide	1.94	60	449031	Below	Cal	92
3) Carbon Disulfide	5.11	76	1315408	Below	Cal	97
-----	-----	-----	-----	-----	-----	-----

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230913.D 092209CS2_DRYWALL.M Thu Sep 24 10:40:46 2009

File : C:\MSDCHEM\1\DATA\092309\09230913.D
Operator : JJ
Acquired : 23 Sep 2009 5:55 pm using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: Negative Control
Misc Info : 3.20g
Vial Number: 13



Quantitation Report

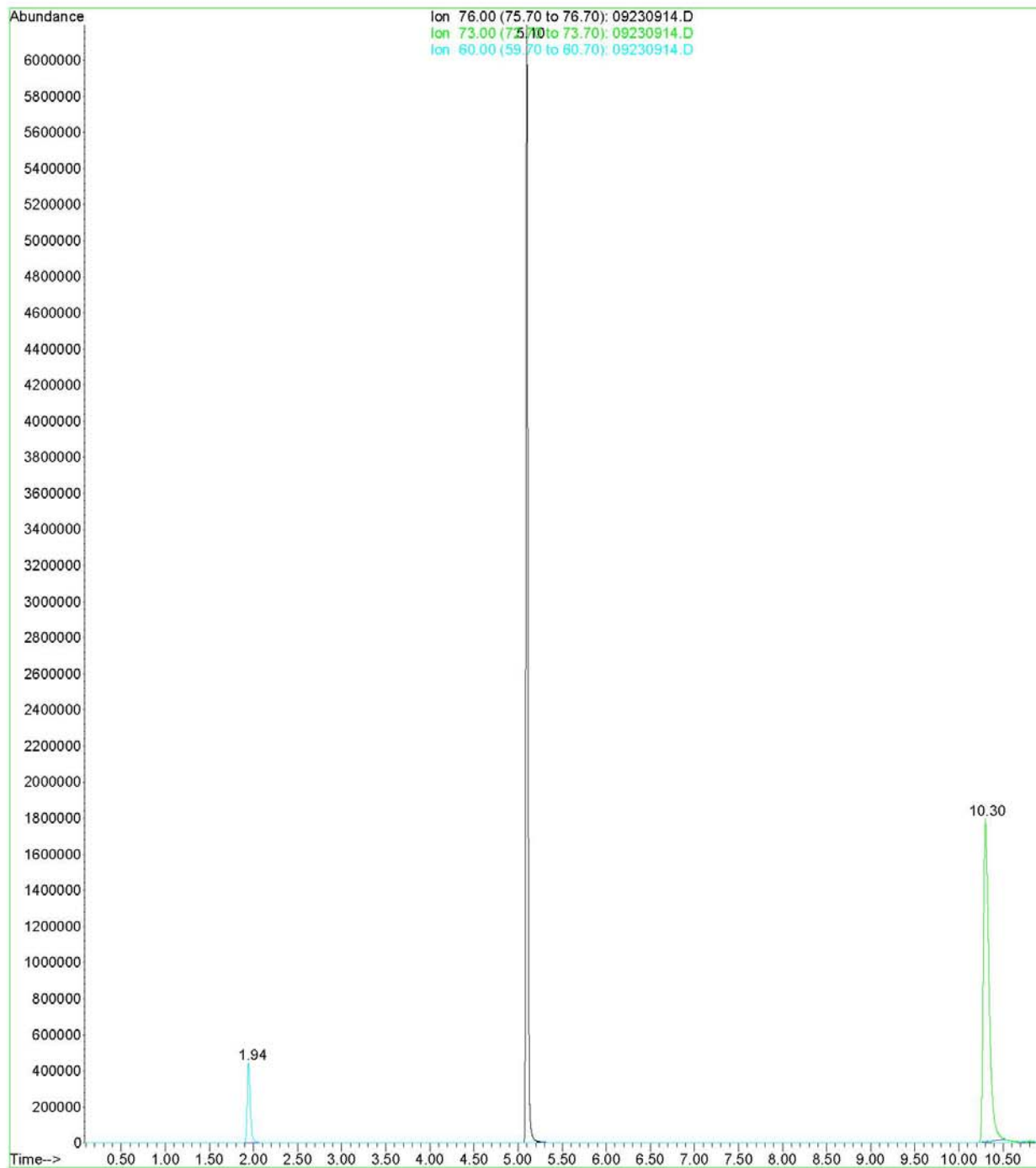
Data File : C:\MSDCHEM\1\DATA\092309\09230914.D Vial: 14
 Acq On : 23 Sep 2009 6:31 pm Operator: JJ
 Sample : Positive Control Inst : Instrumen
 Misc : 3.10g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 24 10:42:02 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
 Title :
 Last Update : Tue Sep 22 17:26:55 2009
 Response via : Initial Calibration
 DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
-----	-----	-----	-----	-----	-----	-----
1) MTBE	10.30	73	78614807	740.00	ng	0.00
Target Compounds						Qvalue
2) Carbonyl sulfide	1.94	60	10888131	135.39	ng	100
3) Carbon Disulfide	5.10	76	95051217	842.91	ng	100
-----	-----	-----	-----	-----	-----	-----

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230914.D 092209CS2_DRYWALL.M Thu Sep 24 10:42:21 2009

File : C:\MSDCHEM\1\DATA\092309\09230914.D
Operator : JJ
Acquired : 23 Sep 2009 6:31 pm using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: Positive Control
Misc Info : 3.10g
Vial Number: 14



Quantitation Report

Data File : C:\MSDCHEM\1\DATA\092309\09230924.D Vial: 24
Acq On : 24 Sep 2009 12:21 am Operator: JJ
Sample : M49787-001 Inst : Instrumen
Misc : 3.08g Multiplr: 1.00
MS Integration Params: EVENTS.E
Quant Time: Sep 28 10:01:32 2009 Quant Results File: 092209CS2_DRYWALL.RES

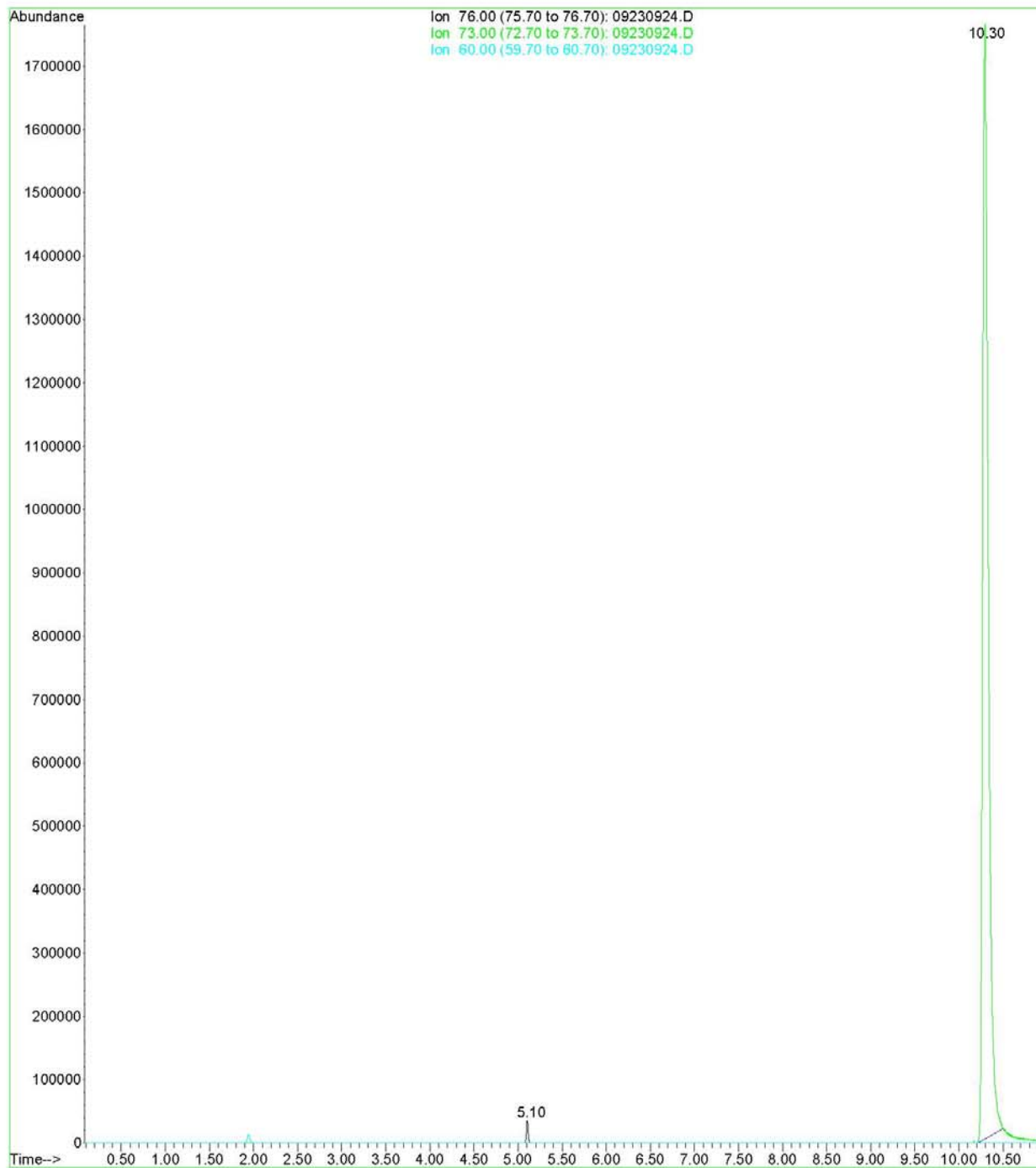
Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
Title :
Last Update : Tue Sep 22 17:26:55 2009
Response via : Initial Calibration
DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)

1) MTBE	10.29	73	78420329	740.00	ng	-0.01
Target Compounds						Qvalue
2) Carbonyl sulfide	1.94	60	269294	Below Cal	#	81
3) Carbon Disulfide	5.10	76	443531	Below Cal	#	75

(#) = qualifier out of range (m) = manual integration (+) = signals summed
09230924.D 092209CS2_DRYWALL.M Mon Sep 28 10:01:52 2009

File : C:\MSDCHEM\1\DATA\092309\09230924.D
Operator : JJ
Acquired : 24 Sep 2009 12:21 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49787-001
Misc Info : 3.08g
Vial Number: 24



Quantitation Report

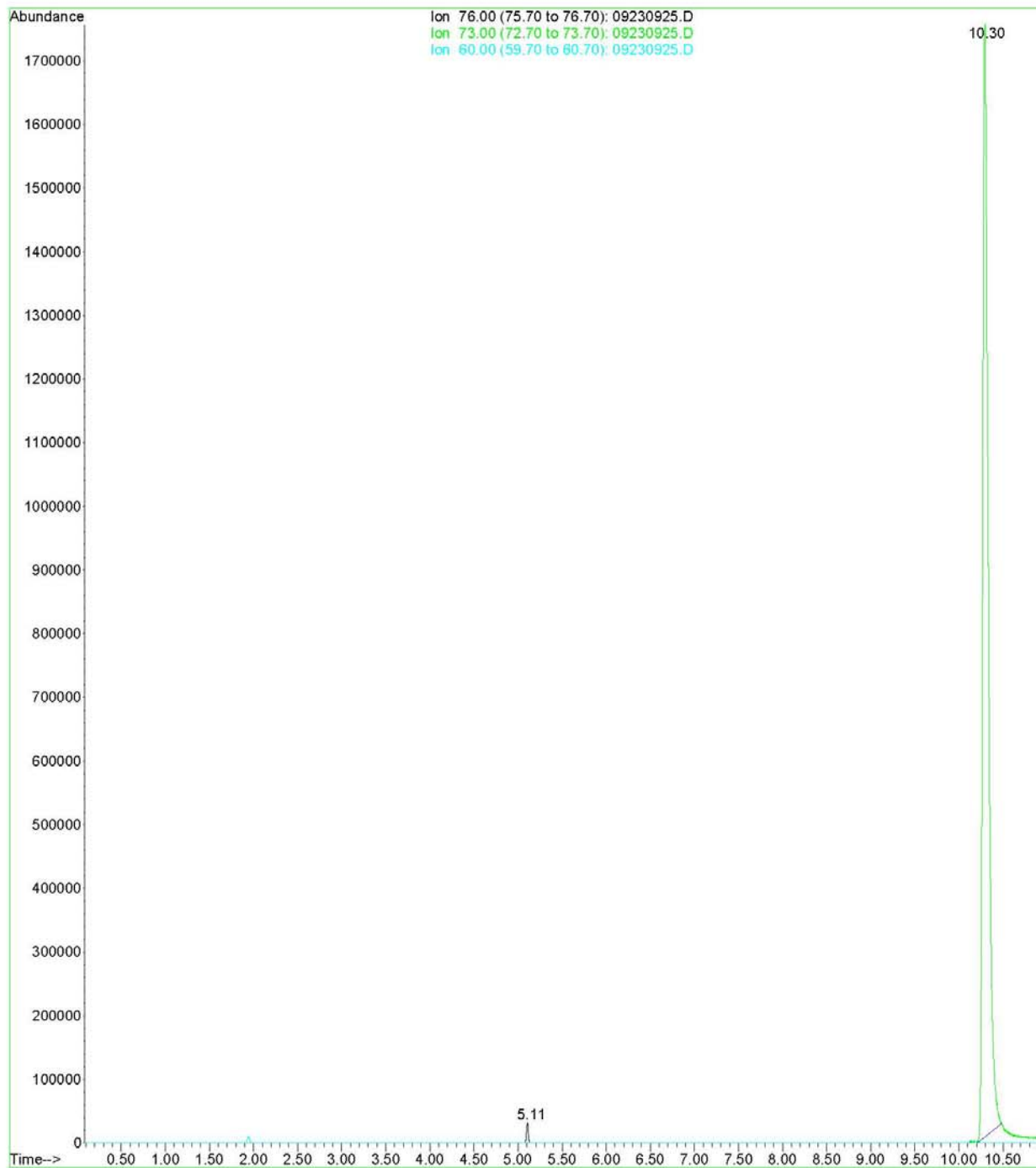
Data File : C:\MSDCHEM\1\DATA\092309\09230925.D Vial: 25
 Acq On : 24 Sep 2009 12:56 am Operator: JJ
 Sample : M49787-002 Inst : Instrumen
 Misc : 3.04g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 28 10:05:06 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
 Title :
 Last Update : Tue Sep 22 17:26:55 2009
 Response via : Initial Calibration
 DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
-----	-----	-----	-----	-----	-----	-----
1) MTBE	10.29	73	77104042	740.00	ng	-0.01
Target Compounds						Qvalue
2) Carbonyl sulfide	1.95	60	180567	Below Cal	#	78
3) Carbon Disulfide	5.11	76	411135	Below Cal	#	75
-----	-----	-----	-----	-----	-----	-----

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230925.D 092209CS2_DRYWALL.M Mon Sep 28 10:05:07 2009

File : C:\MSDCHEM\1\DATA\092309\09230925.D
Operator : JJ
Acquired : 24 Sep 2009 12:56 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49787-002
Misc Info : 3.04g
Vial Number: 25



Quantitation Report

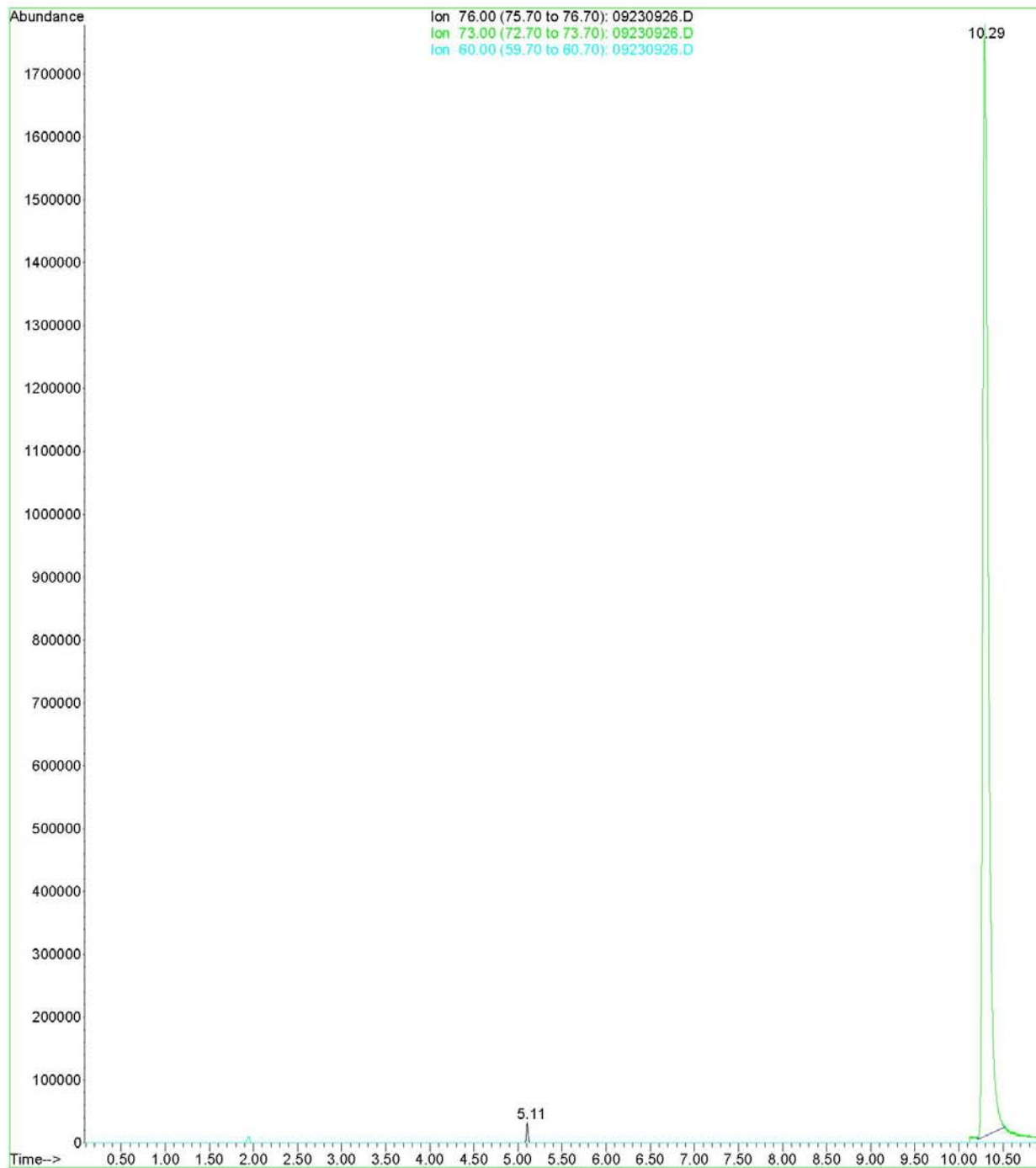
Data File : C:\MSDCHEM\1\DATA\092309\09230926.D Vial: 26
 Acq On : 24 Sep 2009 1:31 am Operator: JJ
 Sample : M49787-003 Inst : Instrumen
 Misc : 3.22g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 28 10:06:35 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
 Title :
 Last Update : Tue Sep 22 17:26:55 2009
 Response via : Initial Calibration
 DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) MTBE	10.29	73	76869722	740.00	ng	-0.01
						Qvalue
2) Carbonyl sulfide	1.94	60	211353	Below Cal	#	72
3) Carbon Disulfide	5.11	76	400420	Below Cal	#	75

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230926.D 092209CS2_DRYWALL.M Mon Sep 28 10:06:35 2009

File : C:\MSDCHEM\1\DATA\092309\09230926.D
Operator : JJ
Acquired : 24 Sep 2009 1:31 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49787-003
Misc Info : 3.22g
Vial Number: 26



Quantitation Report

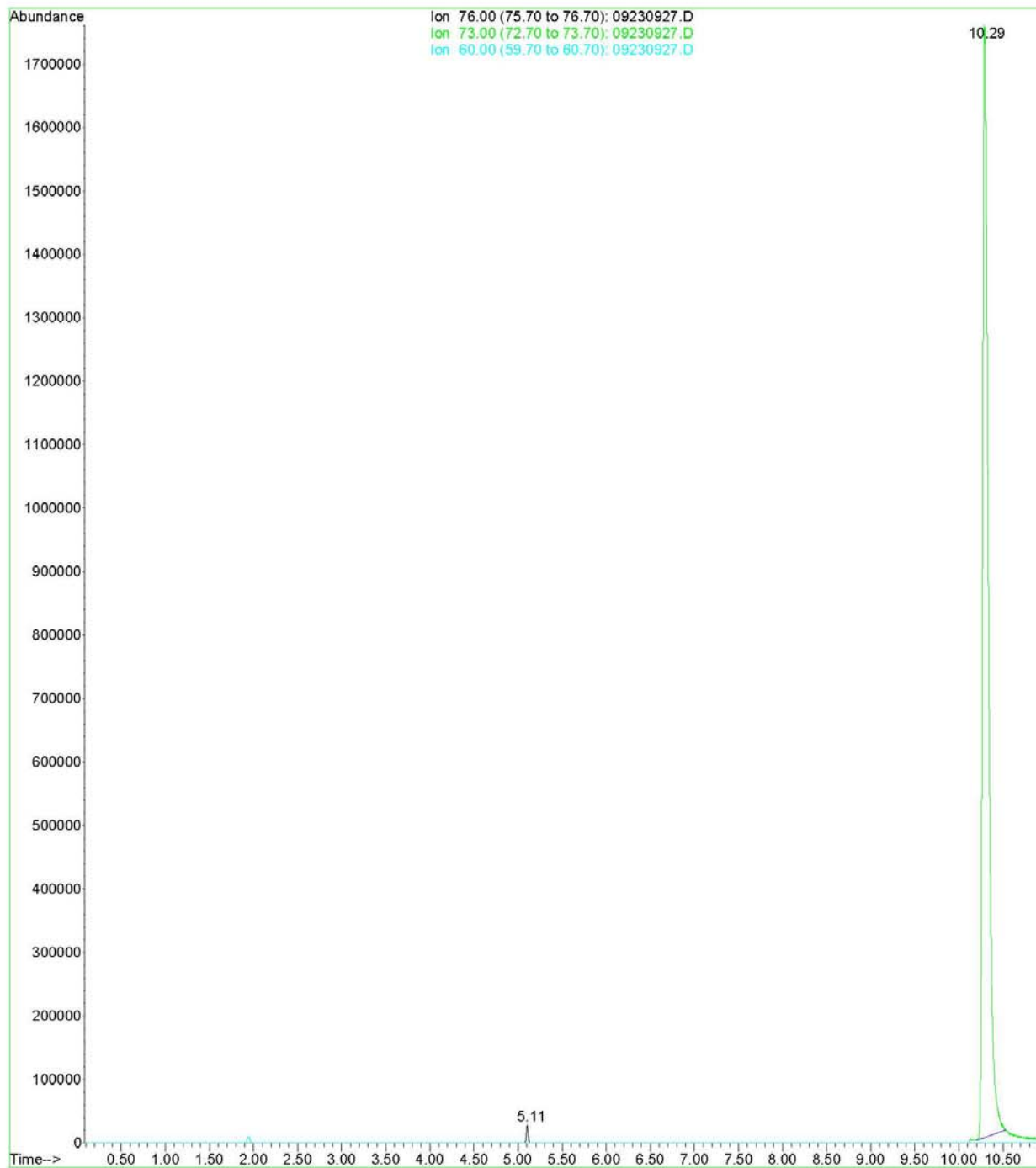
Data File : C:\MSDCHEM\1\DATA\092309\09230927.D Vial: 27
 Acq On : 24 Sep 2009 2:06 am Operator: JJ
 Sample : M49787-004 Inst : Instrumen
 Misc : 3.07g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 28 10:08:27 2009 Quant Results File: 092209CS2_DRYWALL.RES

Quant Method : C:\MSDCHEM\1...\092209CS2_DRYWALL.M (Chemstation Integrator)
 Title :
 Last Update : Tue Sep 22 17:26:55 2009
 Response via : Initial Calibration
 DataAcq Meth : 8260WALL

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) MTBE	10.29	73	77495854	740.00	ng	-0.01
						Qvalue
2) Carbonyl sulfide	1.94	60	193558	Below Cal	#	60
3) Carbon Disulfide	5.11	76	357581	Below Cal	#	75

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230927.D 092209CS2_DRYWALL.M Mon Sep 28 10:08:27 2009

File : C:\MTCHEM\1\DATA\092309\09230927.D
Operator : JJ
Acquired : 24 Sep 2009 2:06 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49787-004
Misc Info : 3.07g
Vial Number: 27



CHAIN OF CUSTODY



Materials Analytical Services LLC
 3945 Lakefield Court
 Suwanee, Georgia 30024
 Phone: 770-866-3200
 Fax: 770-866-3259

Georgia Department of Public Health
Standard Method (Section 01350)
PRODUCT EMISSIONS TESTING
CHAIN OF CUSTODY

Client Information

Company: Temple Inland
 Street Address: 3401 FM 78
 City/State: Mc Queen, TX 78123
 Zip/Postal Code: 78123
 Country: U.S.
 Contact Name: Jason Greer
 Title: BHS Manager
 Phone Number: 830.401.1038
 Fax Number: 830.401.1003
 Email Address: jason.greer@templeinland.com

Manufacturer Information (if different)

Company:
 City/State/Country:
 Contact Name/Title:
 Phone Number:

Sample Details

Sample ID: 1
 Product Name: 1/2" Regular wallboard
 Product Type: Ceiling/Wall Panels or Flooring, Trim, Wall Paint, Wall Coverings, Thermal Insulation, Furnishings (desks or chairs or other), Other
 Date Manufactured: 9/19/09 for unknown inventory stock
 Warehouse, Vendor Supplied
 Sample Collected by: Jason + Rob
 Date & Time Collected: 9/14/09 3:00pm
 Number of Sample Pieces: 4

Shipping Details

Packed By: Jason + Rob
 Shipping Date: 9/15/09
 Carrier/Airbill Number: FedEx

Specific Building Parameters (per CHPS)

Organization:
 City/State/Country:
 Office or School:
 Material exposed area (ft²):
 Building volume (ft³):
 Room floor area (ft²):
 Ceiling height (ft):

Furnishing Construction Details (as applicable)

Covering Type: Fabric (Primary Fiber type: _____), Vinyl , Leather
 Polymer Type(s): Nylon , PVC , PE , PP , PU , PS , PC , ABS , Acrylic , Lexan
 Substrate Type: MDF , Particle Board , Plywood , Solid Wood (Type: _____)
 Finish Type: Oil , Water , Catalyzed , Conversion , Polyurethane , Laminate , Other
 Foam Type: Polyurethane , Memory , Latex , Evlon , High Resilience , High Density
 Paint Type: Latex , Oil , Low VOC , No VOCs , PowderCoat .

Notes or Comments from Manufacturer:

Laboratory Receipt (to be completed by Laboratory Representative)

Received By: Nancy Seab
 Received Date: 9-16-09
 Condition of Shipping Package: ok
 Condition of Sample: ok
 Remarks:

Sample Handling		Date/Time
Relinquished By: Jason Greer	Received By: Nancy Seab	9-16-09
Company: Temple Inland	Company: MAS	