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DRYWALL ANALYSIS REPORT

Results from

Carbon Disulfide & Carbonyl Sulfide Verification

Regarding:

**Gypsum Wallboard – 5/8” Impact Resistant/Comfort Guard
West Memphis, AR**

MAS Project: M49788

For:

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

October 14, 2009

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SUMMARY:

Drywall samples from Temple-Inland's West Memphis, AR 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, M49788-001 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 M49788-001 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>
M49788-001	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 1
M49788-002	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 2
M49788-003	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 3
M49788-004	5/8" Impact Resistant/Comfort Guard - 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 (West Memphis, AR)

MAS No.	Client Description/Location	Weight (grams)	Carbon Disulfide (CS₂) Concentration (ppb)	Carbonyl Sulfide (COS) Concentration (ppb)
M49788-001	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 1	3.09	BQL (1.0)	BQL (4.1)
M49788-002	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 2	3.27	BQL (1.0)	BQL (3.9)
M49788-003	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 3	3.56	BQL (0.9)	BQL (3.5)
M49788-004	5/8" Impact Resistant/Comfort Guard - Gypsum Wallboard 4	3.30	BQL (1.0)	BQL (3.8)

The attached GC/MS spectra shows that the Temple-Inland samples M49788-001 thru -004 of the submitted drywall material did not emit carbon disulfide above the quantitation limit (1.0 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 ≤ 1.0 ppb of carbon disulfide along with BQL or ≤ 4.1 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 (CS_2) from the control drywall samples tested. Any CS_2 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

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Materials Analytical Services, LLC - Test Report

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

October 14, 2009

MAS Project #: M49788

Date Sampled: 09/17/09

Date Received: 09/18/09

Client Proj. Name: 5/8" Impact Resistant Comfort Guard-West Memphis, AR

Date Analyzed: 09/24/09

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
M49788 - 001	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (1)	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	4.1
M49788 - 002	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (2)	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	3.9
M49788 - 003	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (3)	Carbon Disulfide	BQL	BQL	0.9	Carbonyl Sulfide	BQL	BQL	3.5
M49788 - 004	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (4)	Carbon Disulfide	BQL	BQL	1.0	Carbonyl Sulfide	BQL	BQL	3.8

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. M49788
 Client Temple-Inland EHS
 Analyst JJ
 Date 10/14/2009
 Instrument GC/MS

Client Job ID: CS₂ & COS in Wallboard
 Project Name: 5/8" Impact Resistant Comfort Guard-West Memphis, AR
 Date Sampled: 09/17/09
 Date Received: 09/18/09
 Date Analyzed: 09/24/09

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

Lowest STD (ug/ml): 10

Carbon Disulfide

MAS Sample ID	Client Sample ID	Sample Aliquot (g)	Result (ug)	ng/g	Detection Limit (ppb)
M49788 - 001	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (1)	3.09	BQL	BQL	1.0
M49788 - 002	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (2)	3.27	BQL	BQL	1.0
M49788 - 003	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (3)	3.56	BQL	BQL	0.9
M49788 - 004	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (4)	3.30	BQL	BQL	1.0

Control ID
 Negative Control
 Positive Control

BQL 272
 BQL 87
 BQL 1.0
 BQL 1.0

Carbonyl Sulfide

MAS Sample ID	Client Sample ID	Sample Aliquot (g)	Result (ug)	ng/g	Quantitation Limit (ppb)
M49788 - 001	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (1)	3.09	BQL	BQL	4.1
M49788 - 002	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (2)	3.27	BQL	BQL	3.9
M49788 - 003	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (3)	3.56	BQL	BQL	3.5
M49788 - 004	5/8" Impact Resistant/Comfort Guard-Gypsum Wallboard (4)	3.30	BQL	BQL	3.8

Control ID
 Negative Control
 Positive Control

BQL 43.7
 BQL 18
 BQL 3.9
 BQL 4.1

Quantitation Report

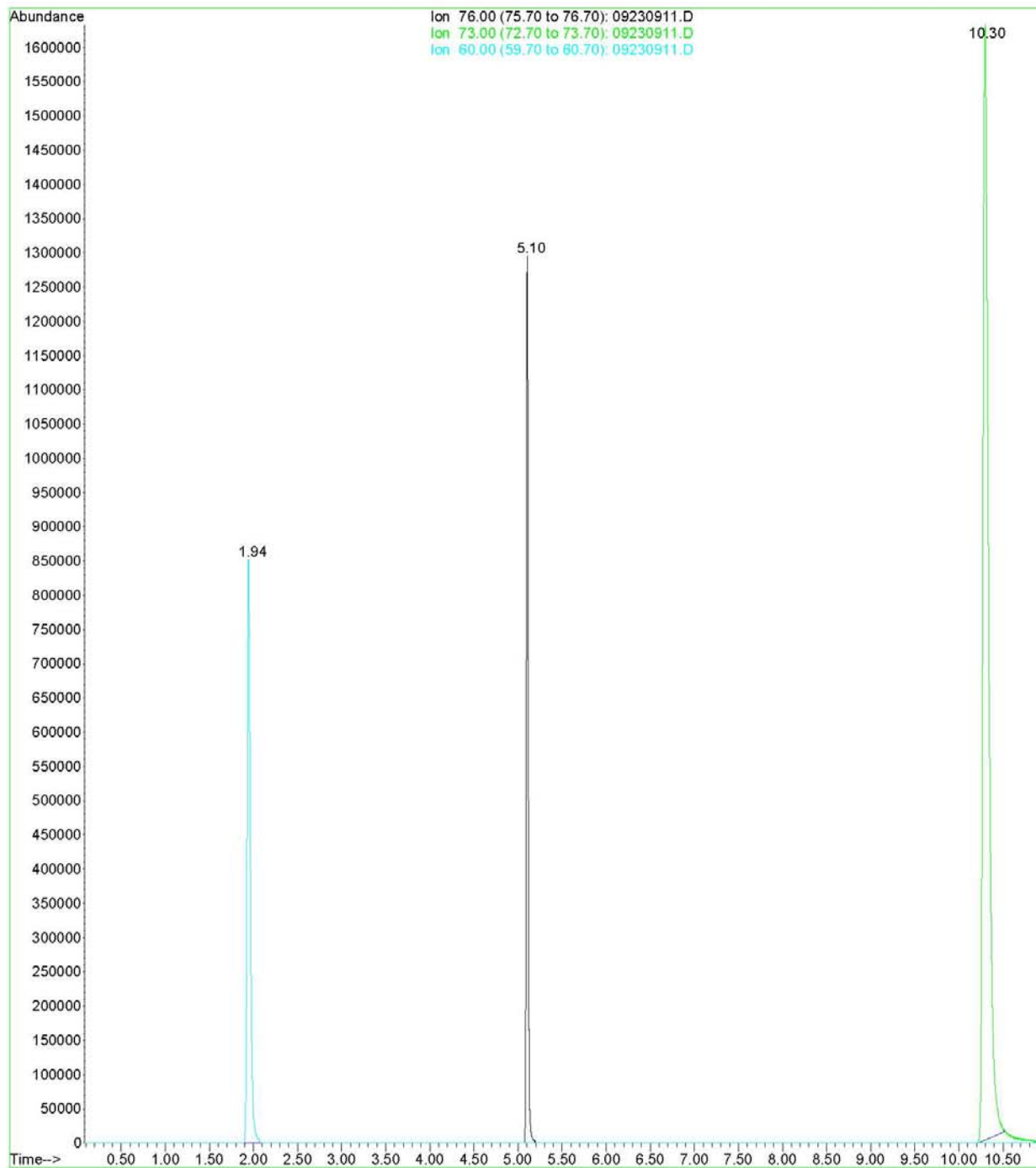
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 Sample : CCV-L4 Inst : Instrumen
 Misc : Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 23 16:56:22 2009 Quant Results File: 092209CS2_DRYWALL.RES

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
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File : C:\MSDCHEM\1\DATA\092309\09230911.D
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Instrument : Instrumen
Sample Name: CCV-L4
Misc Info :
Vial Number: 11



Quantitation Report

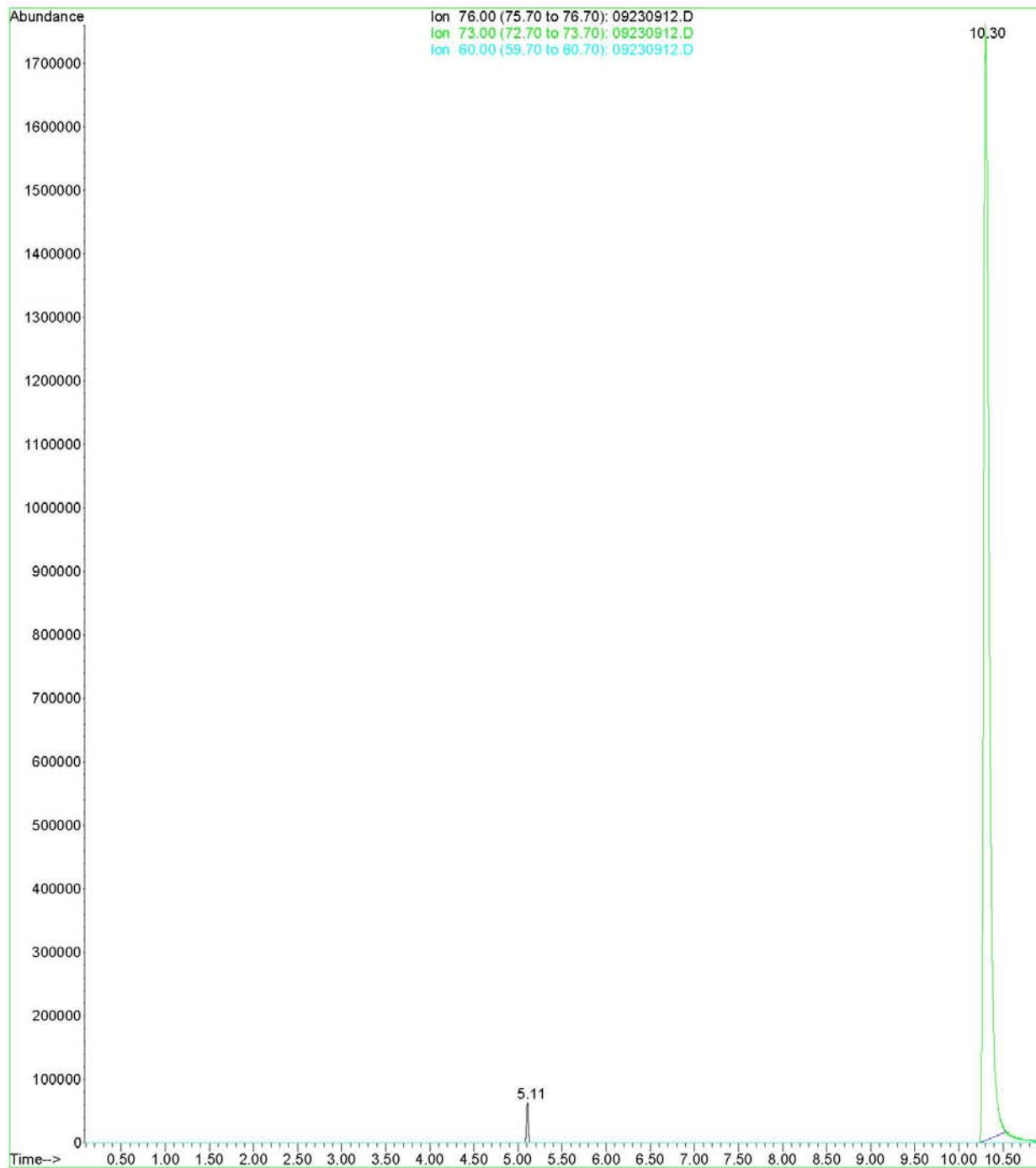
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 Sample : Blank Inst : Instrumen
 Misc : Multiplr: 1.00
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 Quant Time: Sep 24 10:38:56 2009 Quant Results File: 092209CS2_DRYWALL.RES

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



Quantitation Report

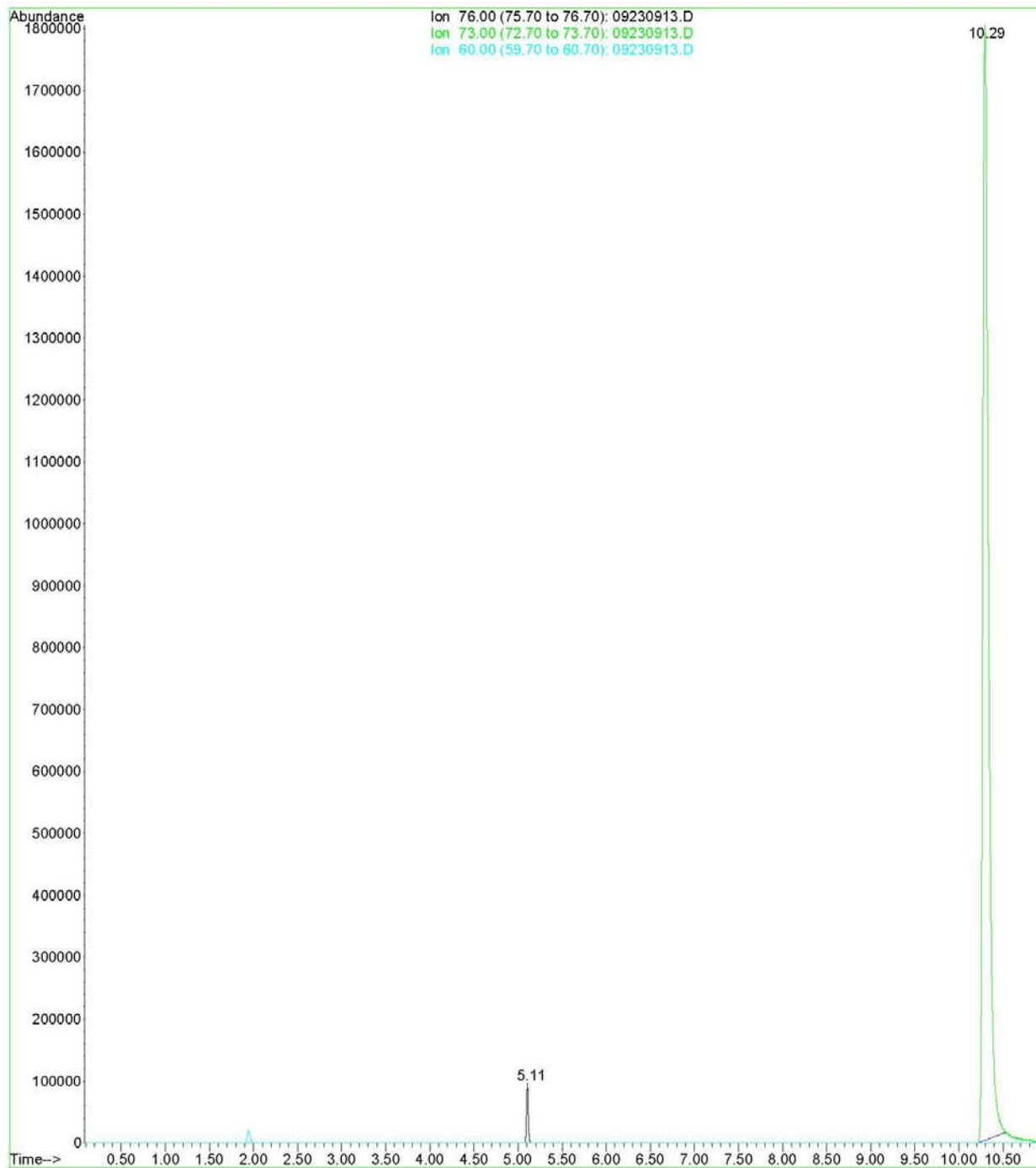
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 Acq On : 23 Sep 2009 5:55 pm Operator: JJ
 Sample : Negative Control Inst : Instrumen
 Misc : 3.20g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 24 10:40:21 2009 Quant Results File: 092209CS2_DRYWALL.RES

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
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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

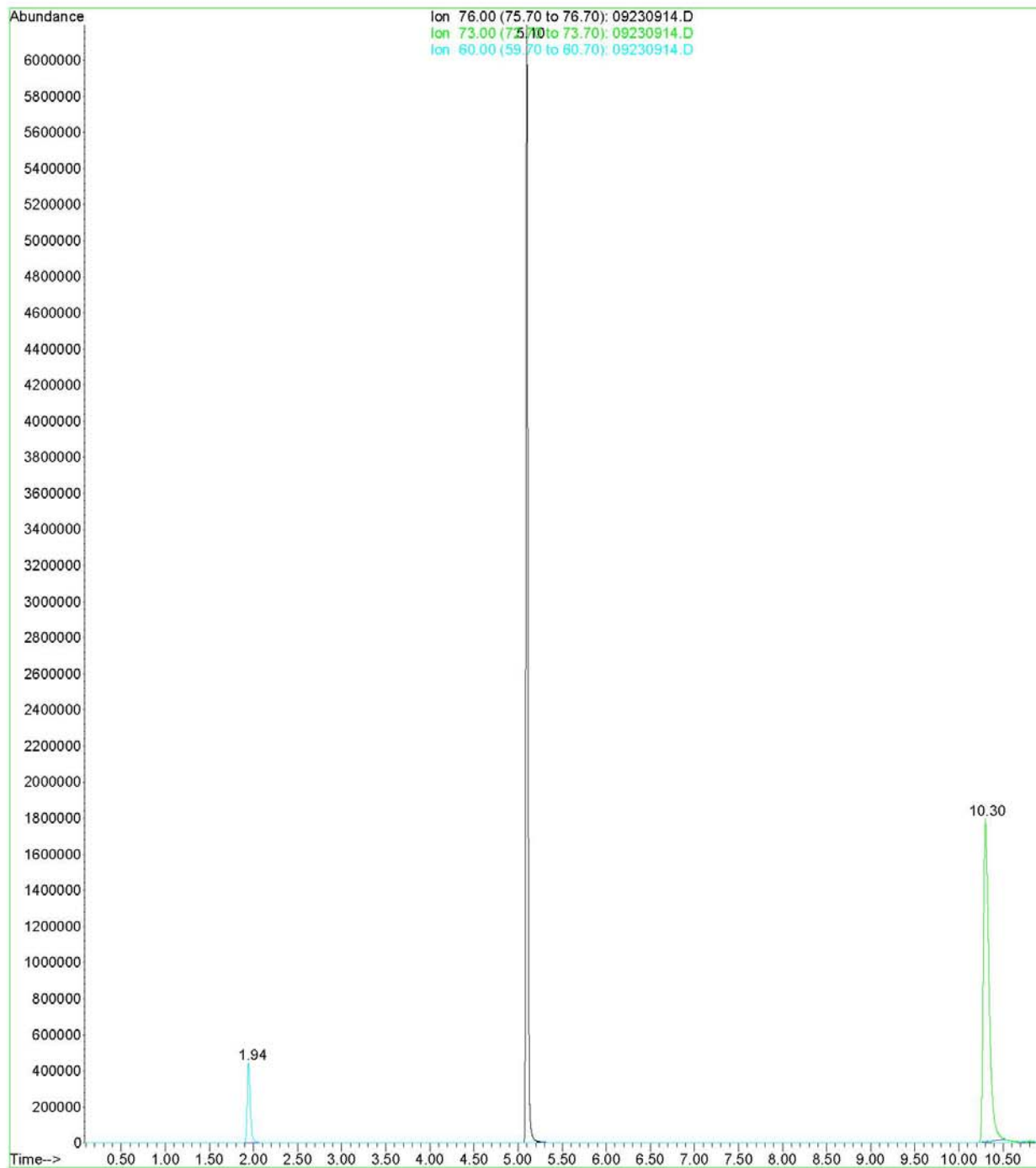
Data File : C:\MSDCHEM\1\DATA\092309\09230914.D Vial: 14
 Acq On : 23 Sep 2009 6:31 pm Operator: JJ
 Sample : Positive Control Inst : Instrumen
 Misc : 3.10g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 24 10:42:02 2009 Quant Results File: 092209CS2_DRYWALL.RES

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

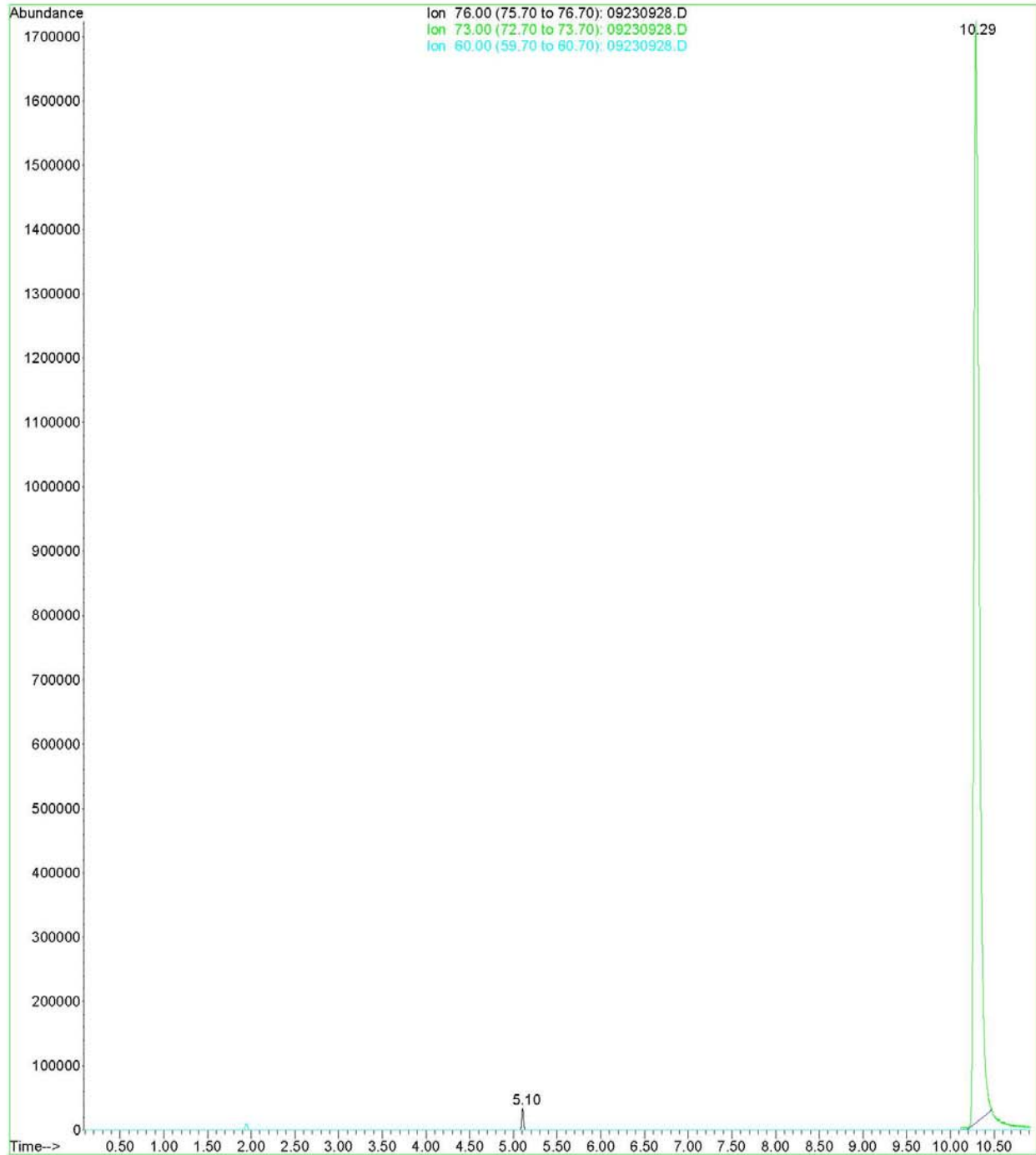
Data File : C:\MSDCHEM\1\DATA\092309\09230928.D Vial: 28
 Acq On : 24 Sep 2009 2:42 am Operator: JJ
 Sample : M49788-001 Inst : Instrumen
 Misc : 3.09g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 28 10:10:46 2009 Quant Results File: 092209CS2_DRYWALL.RES

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	73611156	740.00	ng	-0.01
						Qvalue
2) Carbonyl sulfide	1.94	60	200302	Below Cal	#	59
3) Carbon Disulfide	5.10	76	449943	Below Cal	#	75

(#) = qualifier out of range (m) = manual integration (+) = signals summed
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File : C:\MSDCHEM\1\DATA\092309\09230928.D
Operator : JJ
Acquired : 24 Sep 2009 2:42 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49788-001
Misc Info : 3.09g
Vial Number: 28



Quantitation Report

Data File : C:\MSDCHEM\1\DATA\092309\09230929.D Vial: 29
Acq On : 24 Sep 2009 3:17 am Operator: JJ
Sample : M49788-002 Inst : Instrumen
Misc : 3.27g Multiplr: 1.00
MS Integration Params: EVENTS.E
Quant Time: Sep 28 10:12:52 2009 Quant Results File: 092209CS2_DRYWALL.RES

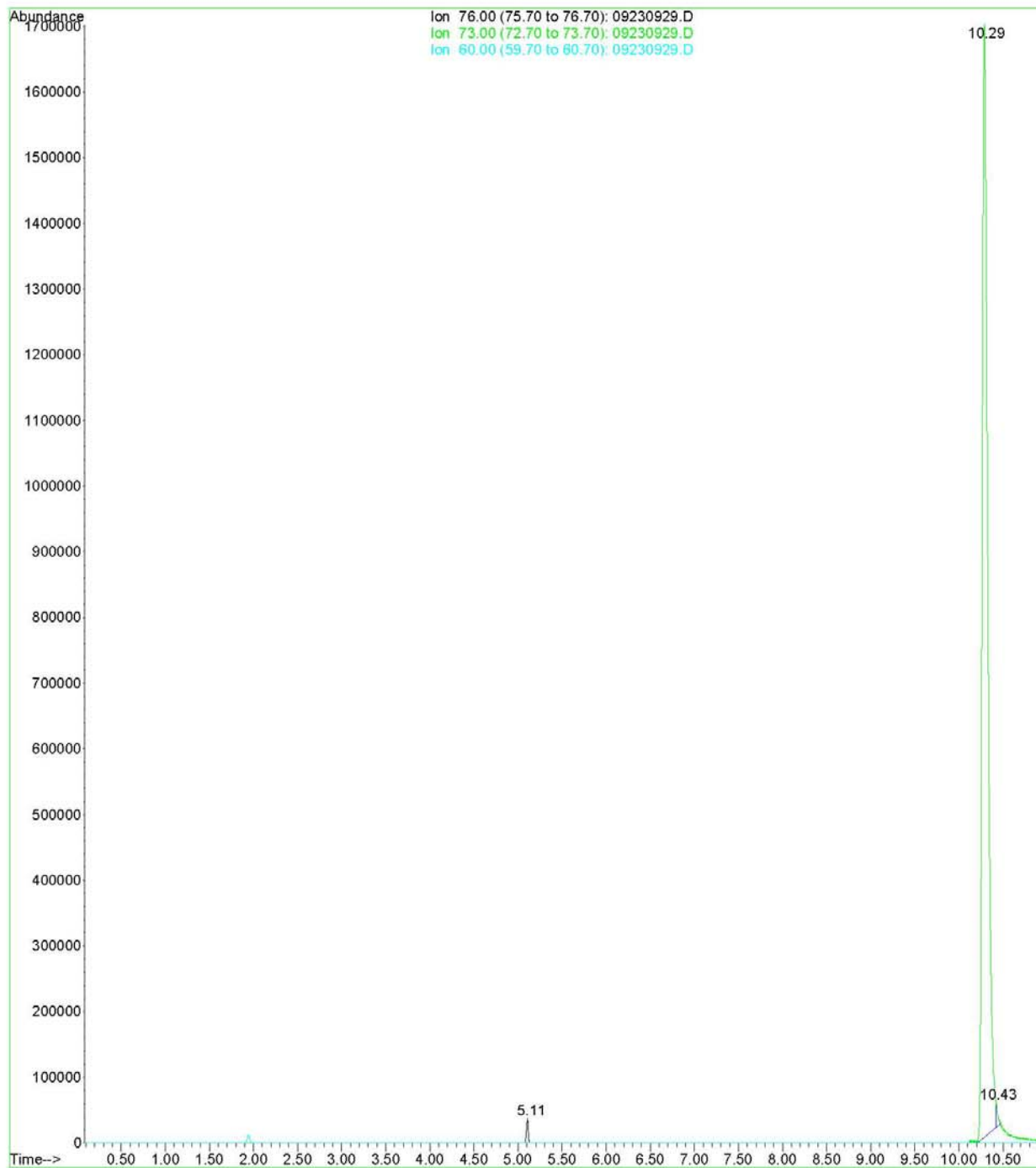
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Title :
Last Update : Tue Sep 22 17:26:55 2009
Response via : Initial Calibration
DataAcq Meth : 8260WALL

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

1) MTBE	10.29	73	74809313	740.00	ng	-0.02
Target Compounds						Qvalue
2) Carbonyl sulfide	1.94	60	232769	Below Cal	#	75
3) Carbon Disulfide	5.11	76	490402	Below Cal	#	75

(#) = qualifier out of range (m) = manual integration (+) = signals summed
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File : C:\MSDCHEM\1\DATA\092309\09230929.D
Operator : JJ
Acquired : 24 Sep 2009 3:17 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49788-002
Misc Info : 3.27g
Vial Number: 29



Quantitation Report

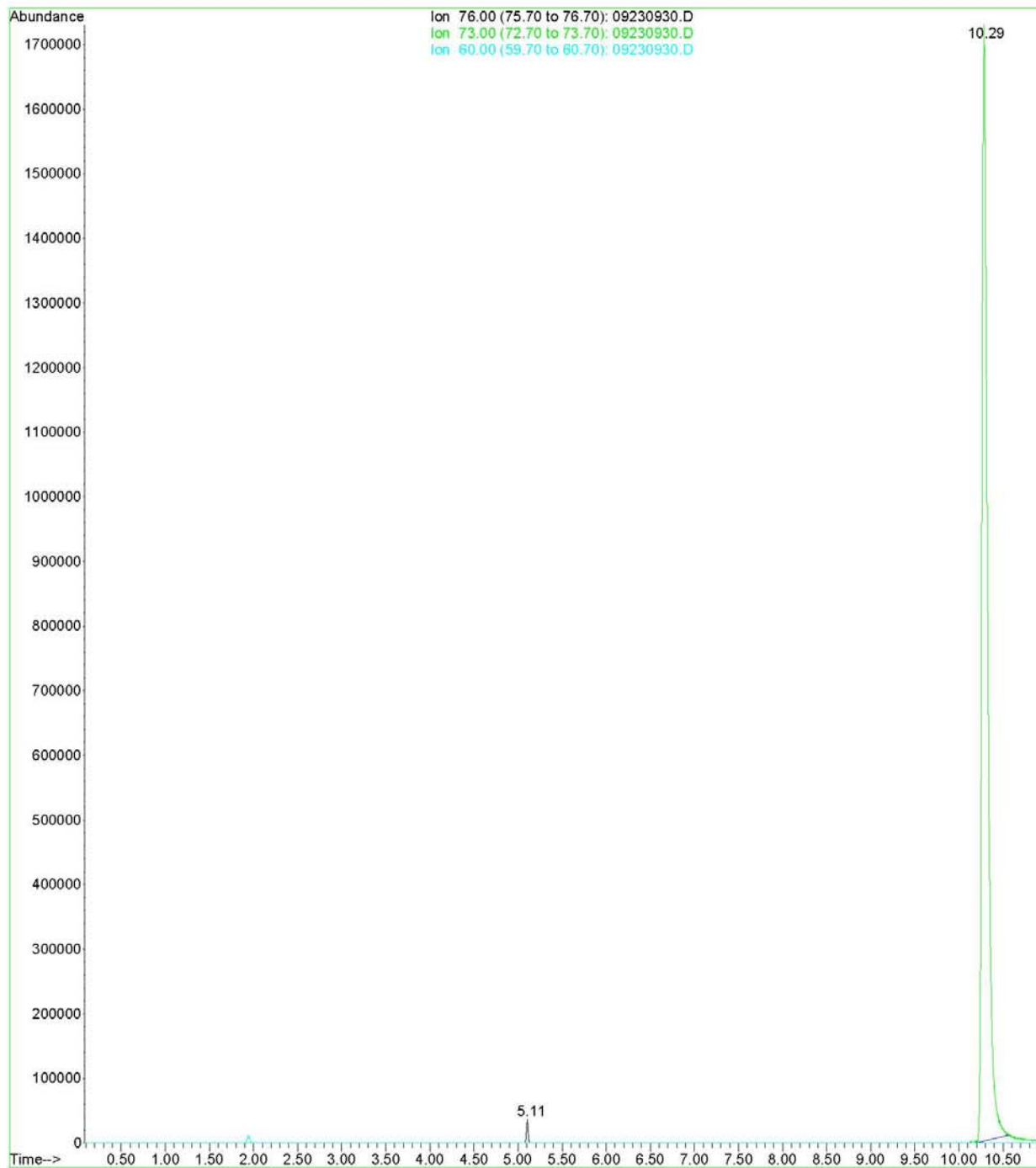
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 Acq On : 24 Sep 2009 3:52 am Operator: JJ
 Sample : M49788-003 Inst : Instrumen
 Misc : 3.56g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 28 10:14:22 2009 Quant Results File: 092209CS2_DRYWALL.RES

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	10.29	73	75979623	740.00	ng	-0.02
						Qvalue
2) Carbonyl sulfide	1.94	60	237805	Below Cal	#	51
3) Carbon Disulfide	5.11	76	447174	Below Cal	#	81

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230930.D 092209CS2_DRYWALL.M Mon Sep 28 10:14:22 2009

File : C:\MSDCHEM\1\DATA\092309\09230930.D
Operator : JJ
Acquired : 24 Sep 2009 3:52 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49788-003
Misc Info : 3.56g
Vial Number: 30



Quantitation Report

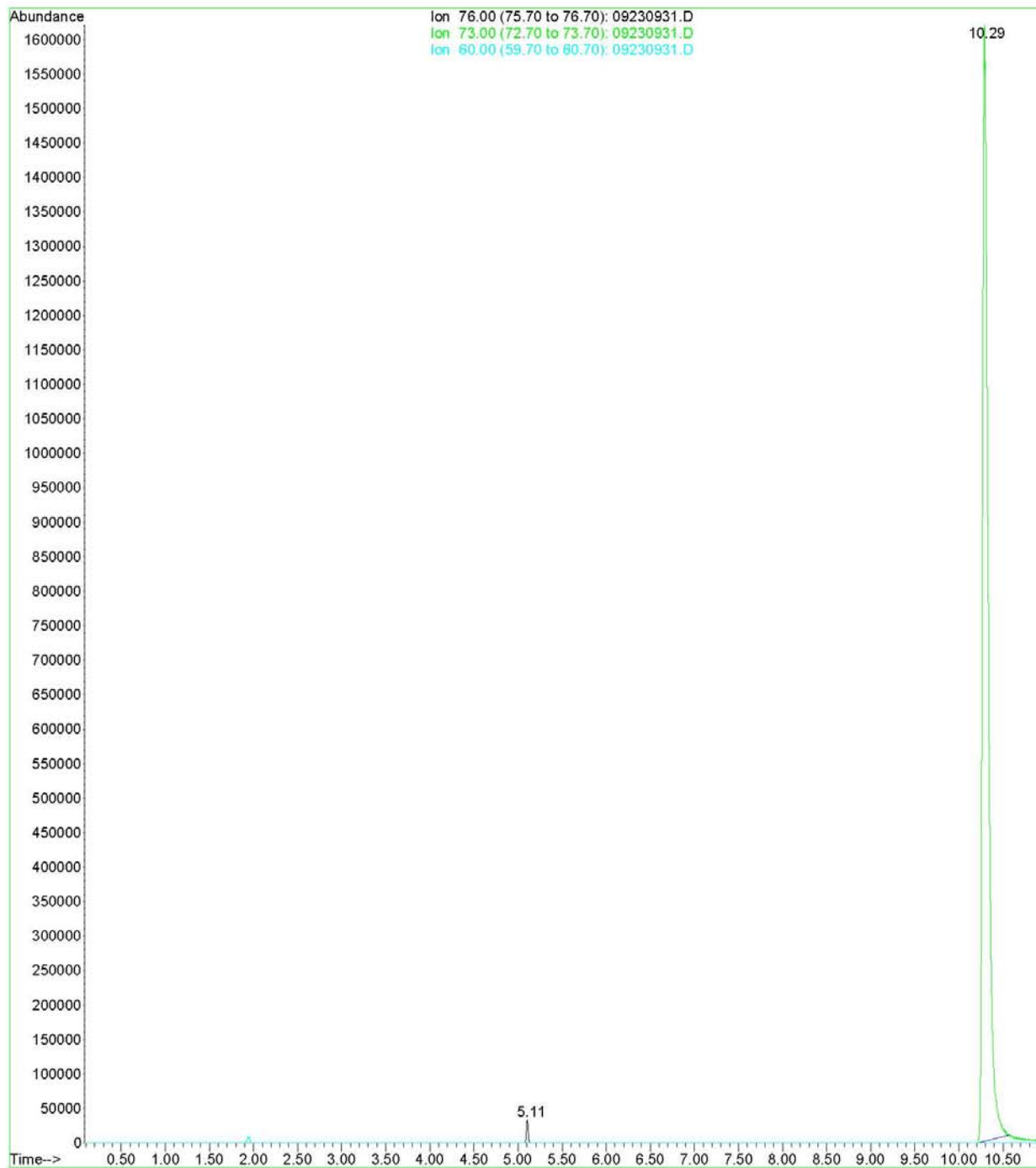
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 Sample : M49788-004 Inst : Instrumen
 Misc : 3.30g Multiplr: 1.00
 MS Integration Params: EVENTS.E
 Quant Time: Sep 28 10:15:59 2009 Quant Results File: 092209CS2_DRYWALL.RES

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	70742926	740.00	ng	-0.02
						Qvalue
2) Carbonyl sulfide	1.95	60	195465	Below Cal	#	41
3) Carbon Disulfide	5.11	76	426095	Below Cal	#	75

(#) = qualifier out of range (m) = manual integration (+) = signals summed
 09230931.D 092209CS2_DRYWALL.M Mon Sep 28 10:16:24 2009

File : C:\MTCHEM\1\DATA\092309\09230931.D
Operator : JJ
Acquired : 24 Sep 2009 4:28 am using AcqMethod 8260WALL
Instrument : Instrumen
Sample Name: M49788-004
Misc Info : 3.30g
Vial Number: 31



CHAIN OF CUSTODY



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

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

Client Information

Company: Temple Inland Forest Products
 Street Address: 540 E Barton Avenue
 City/State: West Memphis AR
 Zip/Postal Code: 72301
 Country: USA
 Contact Name: Clifton Edison
 Title: Quality Supervisor
 Phone Number: 870 702 3185
 Fax Number: 870 702 3200
 Email Address: Clifton.edison@templeinland.com

Manufacturer Information (if different)

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

Sample Details

Sample ID:
 Product Name: 5/8" Impact Resistant Comfort Guard
 Product Type: Ceiling/Wall Panels, Flooring, Trim, Wall Paint, Wall Coverings, Thermal Insulation, Furnishings (desks & chairs & other), Other
 Date Manufactured: 9/17/09 or unknown inventory stock
 Warehouse, Vendor Supplied
 Sample Collected by: Clifton Edison
 Date & Time Collected: 9-17-09 13:00
 Number of Sample Pieces: 4

Shipping Details

Packed By: Clifton Edison
 Shipping Date: 9-17-09
 Carrier/Airbill Number: Fed Ex

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:

Gypsum Wallboard.

Laboratory Receipt (to be completed by Laboratory Representative)

Received By: Pangsead
 Received Date: 9/18/09
 Condition of Shipping Package: OIC
 Condition of Sample:
 Remarks:

Sample Handling

Relinquished By	Received By	Company	Date/Time
	<u>Pangsead</u>	<u>MAS</u>	<u>9-18-09</u>