



Cert. No.: 21T1200

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function:

Temperature measurement

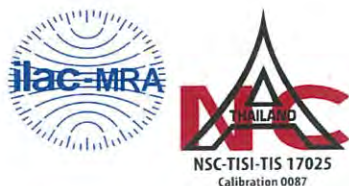
Dimension of probe : Diameter 3 mm., Length 55 mm. Sheath material : Stainless Steel

Immersion Depth (mm.)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
50	25.0029	24.9	-0.1029	0.12
50	30.0018	29.9	-0.1018	0.12
50	40.0035	40.0	-0.0035	0.12

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

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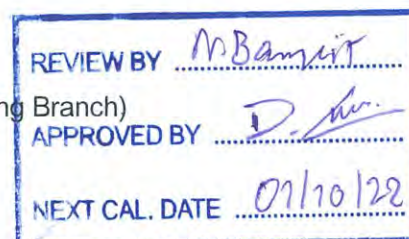


Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID.): 1627845 (RYG_EN0037)
Manufacturer: HACH
Condition: In Condition

Certificate No.: C06210159
Issued Date: 01 April 2021
Job No.: KSPR2104738
Page: 1 of 3

Customer: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.



Environment Condition: Temperature 25.1 °C ± 0.4 °C
Humidity 48.8 %RH ± 3.7 %RH

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) (Wet Chemistry Lab)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.

Calibration By: Mr. Chattuphon Foithong

Calibration Date: 01 April 2021

The Method used: In house method, SPCC-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 87146 and 87152

The standard for Photometric Certificate No. 87220 and 87139

The standard for Stray light Certificate No. 87163 and 87161

The standard for Spectral resolution Certificate No. 87173

(Mr. Chattuphon Foithong)

Person in charge

บริษัท เอสพีซี อาร์ที จำกัด
SPC RT Co., Ltd.

(Mr. Dumrong Boonsopon)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SPC RT Co., Ltd.

Calibration Results:**Without Adjustment****Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm**

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.4	0.21	0.13
536.66	536.7	-0.04	0.13
637.98	638.3	-0.32	0.14
748.48	748.7	-0.22	0.14
807.03	807.4	-0.37	0.14

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5890	0.590	-0.0010	0.0045
	0.7616	0.762	-0.0004	0.0045
	1.0263	1.027	-0.0007	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5787	0.579	-0.0003	0.0045
	0.7442	0.744	0.0002	0.0045
	1.0039	1.004	-0.0001	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5292	0.530	-0.0008	0.0045
	0.6865	0.687	-0.0005	0.0045
	0.9534	0.954	-0.0006	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5468	0.546	0.0008	0.0045
	0.6957	0.695	0.0007	0.0045
	0.9991	0.998	0.0011	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5851	0.584	0.0011	0.0045
	0.7238	0.723	0.0008	0.0045
	1.0957	1.094	0.0017	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5692	0.568	0.0012	0.0045
	0.6914	0.691	0.0004	0.0045
	1.0881	1.087	0.0011	0.0045

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7307	0.730	0.0007	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8516	0.850	0.0016	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2836	0.285	-0.0014	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6319	0.629	0.0029	0.0080

Stray light *			
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
260.57 +/- 0.11 nm	260.6	1.5	1.824
392.03 +/- 0.11 nm	392.0	1.5	1.824

The stray light transmission reference is less than 1.0 T(%) and absorbance is greater than 2.0 (A)

Spectral Resolution *				
Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.72	266.76	1.39	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4616	0.2797		
Absorbance (A)	0.416	0.300		

* Calibration Marked " Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2104738

ชนิดเครื่องมือ: SPECTROPHOTOMETER

รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
01 Apr 2021			01 Apr 2021		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิทช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	656.1=656.1 nm
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่เกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ :

Mr. Chattuphon Foithong

Service Engineer



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484

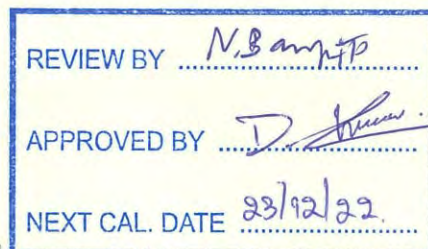


Cert.No.: 21CH1733

Page.: 1 of 3

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Mettler Toledo
Model :	SevenExcellence
Serial No. :	B834291445
ID No. :	RYG_EN0152
Condition As-Received:	Used Item
Received Date :	22 December 2021
Calibration Date :	23 December 2021
Reference :	2112-0636DSC-2
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch 616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method : - CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM) - CP-CH8 by comparison with standard thermometer



Calibrated by : Warakorn Lernagtrakul

Approved by :

Malee Butkruea

Approved Signatory

- (☒) Malee Butkruea
() Saithip Meangmai
() Warakorn Lernagtrakul

Issue Date : 24 December 2021

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0036356



Cert.No.: 21CH1733

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	21E2682	25 Aug 2022
2) Ref. Standard Thermometer	4982054	110RC044	21I1201	26 Oct 2022

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	761016	02 Aug 2023
pH 6.982	CPA chem	761017	02 Aug 2022
pH 10.015	CPA chem	761018	02 Aug 2022

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results**Function : mV Measurement****Performing standard curve by Fluke at pH (4,7,10)**

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: B834291445	4.000	177.48	177.3	4.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

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Cert.No.: 21CH1733

Page.: 3 of 3

Calibration Results**Function : pH Measurement**

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.: 1475518	4.008	4.011	180.6	0.0049	2.05
	6.982	6.984	5.3	0.0077	2.00
	10.015	10.014	-171.3	0.0065	2.00

Function : Temperature Measurement**(*) Without adjustment**

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro-ISM
- Serial No. : 1475518

Dimension of probe;

- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

Calibration Point ($^{\circ}\text{C}$)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of measurement (\pm $^{\circ}\text{C}$)	Coverage factor k
25.0	25.002	24.9	-0.102	0.13	2.00

Remark : - UUC* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 21E4151

Page : 1 of 2

Equipment : pH Meter
Manufacturer: Mettler Toledo
Model : SevenExcellence
Serial No.: B834291445
ID No.: RYG_EN0152
Condition As-Received: Used Item
Received Date: 22 December 2021
Calibration Date: 28 December 2021

This certificate may not be reproduced other than in full,
except with the prior written approval of the head of
Corporate Services 3: Equipment Calibration and Testing Services.

Reference: 2112-0636DSC
Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 10) %
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong
21140, Thailand

Procedure used: Calibration were conducted using In-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator.

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Multi-Product Calibrator	5500A	6440007	21E1444	07 May 2022

2.This result of calibration was made on requested at the point specified by customer.

3.The certificate is valid only to the item calibrated on date and place of calibration.

4.This Certification is traceable to the International System of Unit maintained at:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Wutchareeporn Wongchutikrane
Issue Date : 07 January 2022

Approved Signatory :

☒ Phalinee Prabpaipal

☐ Nuntawat Khamchai

☐ Pornthippa Tameyakul

B 0278122



Cert. No.: 21E4151

Page.: 2 of 2

Result of calibration :- (*) Without adjustment () After adjustment

Function:	DC voltage measurement	Range:	2000	mV	
	<u>Standard Value</u>	<u>UUC* Reading</u>	<u>Error</u>	<u>Uncertainty</u>	
	(mV)	(mV)	(mV)	($\pm \mu V$)	
	-100.0000	-100.0	0.0	65	
	-50.0000	-50.0	0.0	62	
	0.0000	0.0	0.0	58	
	50.0000	50.0	0.0	62	
	100.0000	100.0	0.0	65	
	150.0000	150.0	0.0	69	
	200.0000	199.9	-0.1	72	

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95 %

*UUC= Unit Under Calibration.

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Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand.

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100

Bangkok Tel : +668 9205 6851 , +669 8247 2360

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T220384I01 "Substitute for Calibration Certificate Number T220384" Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : MODULAR

Model : IREVCOHCOO

Serial No. : C00351459

Customer Code : RYG_EN0184


ID No. : T1939A5

Customer : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A.Plukdaeng, Rayong 21140

Customer Location : Laboratory

Date of Receipt : 18 February 2022

Calibrated By : Boonchai Suriyawong (Site Calibration Manager)

Approved By :  / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 18 MAR 2022



The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. T220384I01

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 22 February 2022
Environment : Temperature : 23.2-24.3 °C
Line Voltage : 221.8-227.2 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 16 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN141-TN150	T210743	21 April 2022
TC	TYPE T	TN151-TN160	T210743	21 April 2022
DATA LOGGER	34970A	T150	T210743	21 April 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant - Hour 40 Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment

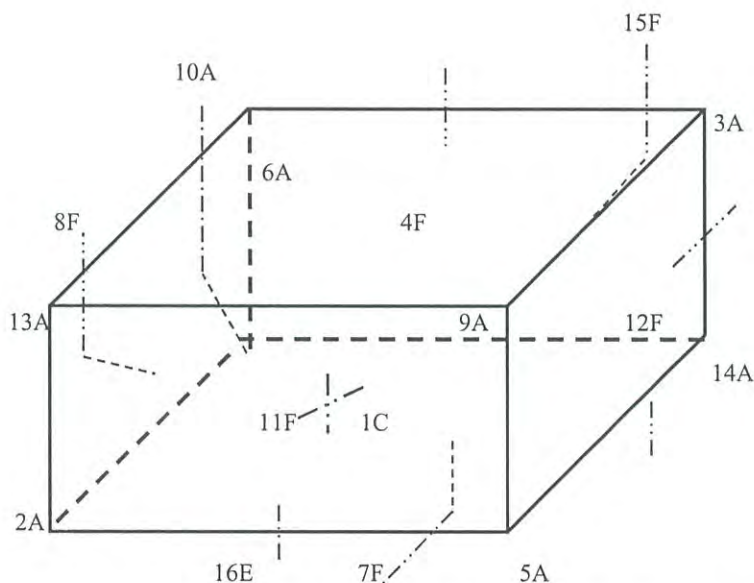
() after adjustment

Approved By. 

Certificate No. T220384I01

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

1C	=	TN141
2A	=	TN142
3A	=	TN143
4F	=	TN144
5A	=	TN145
6A	=	TN146
7F	=	TN147
8F	=	TN148
9A	=	TN149
10A	=	TN150
11F	=	TN151

12F	=	TN152
13A	=	TN153
14A	=	TN154
15F	=	TN155
16E	=	TN156

Approved By. 

Certificate No. T220384I01

Page 4 of 4

Calibration Report

Measurement Results

Average Standard Reading at each position (°C)										
Calibration Point	TN141	TN142	TN143	TN144	TN145	TN146	TN147	TN148	TN149	TN150
3.0	2.80	2.96	2.98	2.97	3.16	3.29	2.95	3.14	3.10	3.45
	TN151	TN152	TN153	TN154	TN155	TN156				
	3.04	3.19	3.03	3.34	3.21	3.11				

Chamber (Cold Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
	Min , Max	Average					
3.0	2.7 , 4.1	3.5	3.11	1.30	1.30	2.00	2.05

* The Acuoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. _____



Certificate of Calibration

Equipment:	Block Digestion Unit	Certificate No.:	C29220011
Model:	KT-20s	Issued Date:	18 March 2022
Serial No. (or ID.):	5720210009/5770200073	Job No.:	KSPR2203623
Manufacturer:	Gerhardt	Page:	1 of 3
Condition:	In Condition	Digestion Block:	20 holes.

Customer: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand.

Environment Condition:

Temperature:	24 °C	±	0.8 °C
Humidity:	67 %RH	±	2.2 %RH
Voltage:	226 VAC	±	1.7 VAC

REVIEW BY N-Barnir
APPROVED BY D. [Signature]
NEXT CAL. DATE 17/3/23

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
(Wet Chemistry Lab)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand.

Calibration By: Mr. Worachat Hongkaew

Calibration Date: 17 March 2022

The Method used: In house method, base on by comparison with standard

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through N.M. Technical Center Laboratory (NTL)
Certificate No.: TC21/0075



(Mr. Worachat Hongkaew)

Person in charge

SERT
บริษัท เอสพีซี อาร์ที จำกัด
SPC RT Co., Ltd.



(Mr. Udon Srichana)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

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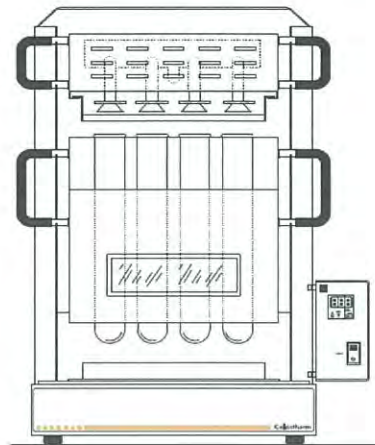
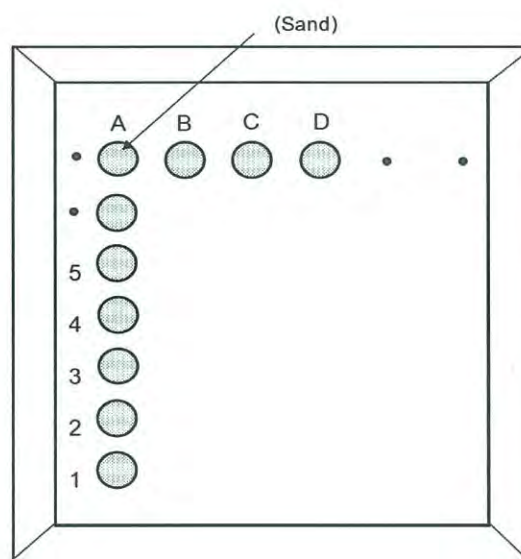


Fig. 1.: Front view



Location of standard

Fig. 2.: Digestion block

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the Digestion block.

Measured Temperature: The average reading of working standard at any positions or location.

Calibration Results:
Without adjustment

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
A1	380	380	380	378.6	-1.4	1.5
A2				382.2	2.2	1.5
A3				380.2	0.2	1.5
A4				381.5	1.5	1.5
A5				381.2	1.2	1.5
B1				378.8	-1.2	1.5
B2				381.8	1.8	1.5
B3				379.4	-0.6	1.5
B4				382.1	2.1	1.5
B5				380.9	0.9	1.5
C1				378.2	-1.8	1.5
C2				380.0	0.0	1.5
C3				377.4	-2.6	1.5
C4				381.8	1.8	1.5
C5				382.3	2.3	1.5
D1				379.7	-0.3	1.5
D2				378.3	-1.7	1.5
D3				378.8	-1.2	1.5
D4				379.0	-1.0	1.5
D5				379.4	-0.6	1.5

The End of Certificate

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSPR2203623

ชนิดเครื่องมือ: Block Digestion Unit รุ่น: KT-20s
หมายเลขเครื่อง: 5720210009/5770200073

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
17 Mar 2022			17 Mar 2022		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. สภาพ Hole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาพฝาปิด	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

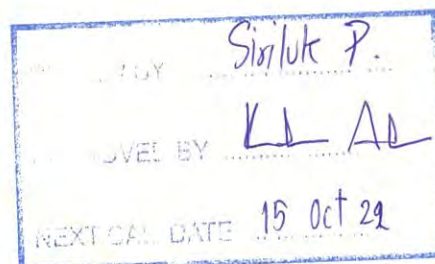
ข้อแนะนำ :

Mr. Worachat Hongkaew
Service Engineer

Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-290/21
Equipment UV/Vis Spectrophotometer
Model UV-1800
Manufacturer Shimadzu
Serial No. A11454908533CD
ID No. BKK_EN0018
Date of receipt 15 October 2021
Date of calibration 15 October 2021
Date of issue 25 October 2021



Customer name ALS Laboratory Group (Thailand) Co., Ltd.

Address 104 Soi Phatthanakan 40, Phatthanakan Road, Phatthanakan, Suan Luang, Bangkok 10250

Temperature (25.0 - 26.4) °C (On site)
Humidity (49.5 - 53.4) %RH (On site)

Equipment condition Good Operation

Calibration Location Organic Prep

Calibration Procedure In-house method WI-UV-702-01 based on ASTM E275-01

Traceability Wavelength Accuracy is traceable to certificate No. 87839 and 87844
Photometric Accuracy is traceable to certificate No. 87846 and 87877
Stray Light is traceable to certificate No. 87825
The above certificate are traceable to SI unit through Sarna Scientific Ltd.
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr.Wanchana Janloey

Approved by



Mr.Kanchit Choothep
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced
except in full, without written approval of the Bara Scientific Co., Ltd.

Certificate of Calibration

Certificate No. BSCC-UV-290/21

Number of Page(s) 2 of 3

Calibration Results:

1.Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (\pm nm)
241.70	241.55	-0.15	0.18
334.02	333.80	-0.22	0.18
418.53	418.40	-0.13	0.18
572.99	572.85	-0.14	0.18
879.41	879.15	-0.26	0.18

2.Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (\pm A)
235	0.0000	0.0000	0.0000	0.0075
	0.7174	0.7198	0.0024	0.0075
257	0.0000	-0.0001	-0.0001	0.0075
	0.8362	0.8377	0.0015	0.0075
313	0.0000	0.0000	0.0000	0.0075
	0.2778	0.2803	0.0025	0.0075
350	0.0000	-0.0001	-0.0001	0.0075
	0.6202	0.6221	0.0019	0.0075

*CNR = Customer not request

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Certificate of Calibration

Certificate No. **BSCC-UV-290/21**

Number of Page(s) **3 of 3**

Calibration Results:

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty ($\pm A$)
420.0	0.0000	0.0000	0.0000	0.0042
	0.5631	0.5570	-0.0061	0.0042
	0.7390	0.7334	-0.0056	0.0042
	1.0863	1.0816	-0.0047	0.0042
440.0	0.0000	0.0000	0.0000	0.0042
	0.5524	0.5469	-0.0055	0.0042
	0.7217	0.7166	-0.0051	0.0042
	1.0606	1.0570	-0.0036	0.0042
465.0	0.0000	0.0000	0.0000	0.0042
	0.5018	0.4966	-0.0052	0.0042
	0.6657	0.6610	-0.0047	0.0042
	0.9775	0.9740	-0.0035	0.0042
546.1	0.0000	0.0000	0.0000	0.0042
	0.5147	0.5113	-0.0034	0.0042
	0.6743	0.6705	-0.0038	0.0042
	0.9909	0.9890	-0.0019	0.0042
590.0	0.0000	0.0000	0.0000	0.0042
	0.5427	0.5394	-0.0033	0.0042
	0.7037	0.7001	-0.0036	0.0042
	1.0338	1.0323	-0.0015	0.0042
635.0	0.0000	0.0000	0.0000	0.0042
	0.5268	0.5235	-0.0033	0.0042
	0.6720	0.6685	-0.0035	0.0042
	0.9864	0.9847	-0.0017	0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Unit Under Calibration(UUC)		
	Wavelength (nm)	Transmission (%T)	Absorbance (A)
200.91 \pm 0.11nm	200.31	0.9399	2.0274

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A

*Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

*****End of Certificate*****

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand.

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100

Bangkok Tel : +668 9205 6851 , +669 8247 2360

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T211009

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Laboratory

Date of Receipt : 6 May 2021

Calibrated By : Watcharapon Songthong (Technician)

Approved By : Boonchai Suriyawong / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 20 MAY 2021

REVIEW BY	<u>Sinlue P.</u>
APPROVED BY	<u>LL AL</u>
NEXT CAL. DATE	<u>16/11/22</u>

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. T211009

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 18 May 2021
Environment : Temperature : 23.4-24.9 °C
 Line Voltage : 221.4-230.2 V
 Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert 16 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T210009	8 January 2022
TC	TYPE T	TN171-TN180	T210009	8 January 2022
DATA LOGGER	34970A	T149	T210009	8 January 2022

- This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

- Condition of calibrated item : good

Equipment Description :

Time Constant 1 Hour - Minute At 3 °C
 Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

- Adjustment :

(X) without adjustment

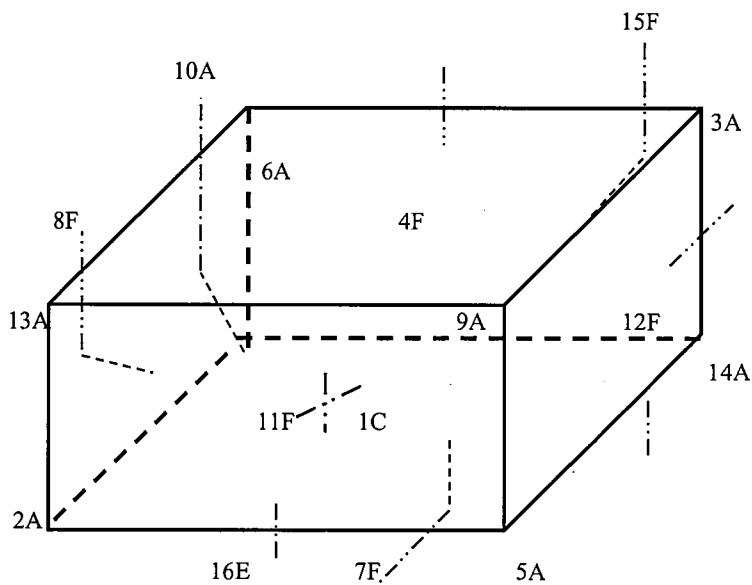
() after adjustment

Approved By. 

Certificate No. T211009

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

1C = TN161	12F = TN172
2A = TN162	13A = TN173
3A = TN163	14A = TN174
4F = TN164	15F = TN175
5A = TN165	16E = TN176
6A = TN166	
7F = TN167	
8F = TN168	
9A = TN169	
10A = TN170	
11F = TN171	

Approved By. 

Certificate No. T211009

Page 4 of 4

Calibration Report

Measurement Results

Average Standard Reading at each position (°C)										
Calibration Point	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	3.23	3.38	3.23	3.41	3.36	3.52	3.51	3.11	3.29	3.50
	TN171	TN172	TN173	TN174	TN175	TN176				
	3.36	3.18	3.52	3.22	3.28	3.31				

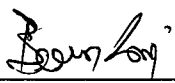
Chamber (Cold Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
	Min , Max	Average					
3.0	2.7 , 3.4	3.0	3.34	1.00	1.10	1.46	2.00

* The Acuoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 

Certificate of System Qualification

GC-OQ + GCMS-OQ

REVIEW BY	<i>Nant Som</i>
APPROVED BY	<i>LLAL</i>
CAL. DATE	22/05/23

System ID: GM-10

Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.

Organization Location: 104 Patthanakarn 40, Patthanakarn Rd., Kwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date: November 23, 2021 1:12:35 PM

EQP Name: AgilentRecommended , AgilentRecommended

EQP Revision: GC.02.52, GCMS.02.51

Overall Qualification Status: Pass

CDS Logon Verification - GC

Logon: Nanthawadee.Somboon

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front MMI

Setpoint Status: Pass

	Setpoint	Actual
Inlet Pressure:	25.0 psi	24.9 psi
Accuracy:		0.1 psi
Agilent Recommended:	<=	1.2

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 229.8 °C

Accuracy: -0.2 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C) ≤ 1.0 % setpoint in K (5.0 °C)

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 99.8 °C

Accuracy: -0.2 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-3.7 °C) ≤ 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 99.78333 °C

Stability: 0.1 °C

Agilent Recommended: ≤ 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

Tune EI

Tested Combination1	Front	MMI	/ External	TQ
Name:	7000D			
Setpoint Status:	Pass			
Filament:	1			
Setpoint Status:	Pass			
Filament:	2			

Overall Tune EI Test Status

Pass

Scouting Run

Tested Combination1	Front	MMI	/ External	TQ
	Injection Tower			
Name:	7693A			
Source:	EI - Extractor			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			

Overall Scouting Run Status

Completed

Instrument Detection Limit

Tested Combination1	Front	MMI	/ External	TQ
	Injection Tower			
Name:	7693A			
Source:	EI - Extractor			

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area

5.79

%

Minimum RSD:

<=

12.00

Agilent Recommended:

Pass

Status:

Retention Time

0.05

%

<=

1.00

Pass

Instrument Detection Limit:

1.94800

fg

Agilent Recommended:

<=

4.03800

Status:

Pass

Overall Instrument Detection Limit Test Status

Pass

Mass Ratio Precision

Tested Combination1

Front

MMI

/ External

TQ

Injection Tower

Name:

7693A

Source:

EI - Extractor

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area Mass 1

Abundance*s

4.07

%

RSD:

<=

5.00

Agilent Recommended:

Pass

Mass Ratio

2.66

%

<=

5.00

Pass

Overall Mass Ratio Precision Test Status

Pass

Date:

November 23, 2021 1:12:35 PM

System ID:

GM-10

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GM-10
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Injection Tower
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN18180003
Firmware Revision	A.11.03
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN18170137
Firmware Revision	A.11.03
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN18153080
Firmware Revision	B.02.05
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	7890
Type	MMI
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	TQ
Name	7000D
Serial Number	US1826U108
Firmware Revision	G.7000.085A
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Extractor
Number of filaments	2

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Jaruwat Channarong
Logged On User Name:	jaruwat.channarong@agilent.com
Signature Creation Date:	November 23, 2021
Reason for Signature:	Executed protocol and published this original version of document

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User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:13:35 AM	Audit	SessionCreated	Session	None
November 23, 2021 10:13:35 AM	Start	Configuration	Session	None
November 23, 2021 10:13:35 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
November 23, 2021 10:20:27 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.51/GcMs.02.51.eqp], EQP File Name: [GcMs.02.51.eqp], EQP Name: [AgilentRecommended]
November 23, 2021 10:20:37 AM	End	Configuration	Session	None
November 23, 2021 10:21:34 AM	End	Configuration	Session	None
November 23, 2021 10:21:52 AM	Start	Qualification	Session	OQ
November 23, 2021 10:21:54 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
November 23, 2021 10:26:40 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1

Page 1 / 7

User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:26:42 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
November 23, 2021 10:26:54 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
November 23, 2021 10:26:56 AM	Start	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
November 23, 2021 10:27:01 AM	End	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
November 23, 2021 10:27:05 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
November 23, 2021 10:27:28 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
November 23, 2021 10:27:31 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
November 23, 2021 10:27:33 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
November 23, 2021 10:27:44 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:27:45 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
November 23, 2021 10:28:26 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:35:24 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:35:29 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:37:44 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:39:20 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
November 23, 2021 10:39:23 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
November 23, 2021 10:39:26 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - EI - Extractor Filament 1 (Qualitative - No setpoints associated)	None
November 23, 2021 10:41:10 AM	End	Execution	Tune EI - 7000D TQ: - Source: - EI - Extractor Filament 1 (Qualitative - No setpoints associated)	Run Count : 1

User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:41:13 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
November 23, 2021 10:41:34 AM	End	Execution	Tune EI - 7000D TQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
November 23, 2021 10:43:42 AM	Start	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
November 23, 2021 10:44:20 AM	Audit	Data	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\ISQ_001.D
November 23, 2021 10:45:10 AM	End	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Run Count : 1
November 23, 2021 10:45:14 AM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_003.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_004.D

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User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_005.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_006.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_007.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_008.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_009.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_010.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_011.D

User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_012.D
November 23, 2021 10:46:50 AM	End	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Run Count : 1
November 23, 2021 10:47:03 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	None
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_001.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_002.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_003.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_004.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_005.D

User Name: jaruwat.channarong
 Hostname: ASBKKWX265

System Id: GM-10
 Print Date: November 23, 2021 1:12:38 PM

ALS_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data \\Agilent\IQ2021\MRP_006.D
November 23, 2021 10:48:02 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Run Count : 1
November 23, 2021 10:48:07 AM	End	Qualification	Session	OQ
November 23, 2021 10:48:07 AM	Start	Reporting	Session	None
November 23, 2021 1:01:43 PM	Audit	AceClosed	Session	None
November 23, 2021 1:03:30 PM	Audit	AceRestarted	Session	None
November 23, 2021 1:03:32 PM	Audit	SessionReloaded	Session	None
November 23, 2021 1:03:37 PM	Start	Qualification	Session	OQ
November 23, 2021 1:11:56 PM	Audit	Reporting	Session	Report Generated : Certificate

QTRAP® 5500 System

Planned Maintenance Procedure



REVIEW BY YYU

APPROVED BY PBU

NEXT CAL. DATE 25/07/22

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Introduction

1

Note: For regulatory and safety information for the mass spectrometer, refer to the *System User Guide*.

The planned maintenance (PM) procedure is designed to help maintain overall system performance.

The PM is not intended to take the place of an Operational Qualification (OQ) nor is it intended to verify the instrument specifications. Separate Installation Qualification (IQ) and OQ services are available. Contact a SCIEX representative.

The procedure must be performed by a trained SCIEX Field Service Employee (FSE).

The procedure has been developed for the QTRAP® 5500 System with the Turbo V™ Ion Source. It does not apply to any other products or processes.

The procedure does not address any customer-specific analytical protocol (performance qualification) or method validation.

Note: If an issue is identified and the system requires repair, then the customer is responsible for the repair at the expense of the customer, except to the extent that the system and the required repairs are covered by a SCIEX warranty or service contract. A separate repair service call must be opened and the repair hours must not be charged against this procedure.

Planned Maintenance Tasks

2

Note: Perform all procedures using the Turbo V™ Ion Source, unless otherwise specified.

Pre-Planned Maintenance

Note: Guideline values are for reference only. The pre-PM test results are not required to meet or exceed these values.

Pre-PM Tasks

Task	Complete	N/A
Ask the customer about system performance since the last visit and record comments. before PM the instrument had low intensity	✓	—
If the customer maintains a log for the system, then review it.	●	○
Review the work to be performed with the customer.	✓	—

Planned Maintenance Tasks

PC Health Check

Task	Complete	N/A
Inspect the status of the RAID 1 hard drives.	✓	—

Vacuum System Tests

Task			Complete
Record the turbo pump operational values.			✓
Parameter	Results		
Temperature (°C)	38		
Current (A)	0.788		
Voltage (V)	97		
Power (W)	77		
Driving frequency (Hz)	1010		
Inspect the vacuum gauge filament using the Analyst® Service Diagnostics (ASD) Software and identify the filament position. If the mass spectrometer is using filament 2, then order a replacement vacuum gauge as a separate service call.	1	<input checked="" type="radio"/>	✓
	2	<input type="radio"/>	

Pre-PM Pressure Test

Pre-PM Pressure Test is Complete		✓
Test	Guideline	Result
Vacuum chamber pressure with CAD gas off	$0.4 \times 10^{-5} \text{ torr} \leq P_{\text{CAD } 0} \leq 1.1 \times 10^{-5} \text{ torr}$	0.4x10-5Torr
Vacuum chamber pressure with CAD gas set to Full	$2.4 \times 10^{-5} \text{ torr} \leq P_{\text{CAD } 12} \leq 4.5 \times 10^{-5} \text{ torr}$	3.2x10-5Torr

Inspect for Contamination

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination .	✓	—

Pre-PM System Tests

Q1 Positive MS Test is Complete: Intensity and Peak Width				✓
<ul style="list-style-type: none">• Test solution: POS PPG, 2e-7 M• Flow rate: 5 µL/min• Scan rate: 10 Da/s• Cycles: 10• MCA: On• Printouts required: Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, with peak intensities, peak width, and mass shift results, complete with method file information.				
Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 1.2 \times 10^6$	4.524e6	0.6 to 0.8	0.545
906.673	$\geq 1.4 \times 10^7$	1.3298e7	0.6 to 0.8	1.424

Q3 Positive MS Test is Complete: Intensity and Peak Width				✓
<ul style="list-style-type: none">• Test solution: POS PPG, 2e-7 M• Flow rate: 5 µL/min• Scan rate: 10 Da/s• Cycles: 10• MCA: On• Printouts required: Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, with peak intensities, peak width, and mass shift results, complete with method file information.				
Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 1.2 \times 10^6$	7.5892e6	0.6 to 0.8	0.8009
906.673	$\geq 1.4 \times 10^7$	2.8102e7	0.6 to 0.8	0.8093

Planned Maintenance Tasks

Q1 Negative MS Test is Complete: Intensity and Peak Width				✓
<ul style="list-style-type: none"> • Test solution: NEG PPG, 3e-5 M • Flow rate: 10 µL/min • Scan rate: 10 Da/s • Cycles: 10 • MCA: On • Printouts required: Spectra for masses 44.998, 411.259, 585.385, 933.636, with peak intensities, peak width, and mass shift results, complete with method file information. 				
<p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.0 \times 10^7$	6.485e6	0.6 to 0.8	0.742

Q3 Negative MS Test is Complete			✓	
<ul style="list-style-type: none">• Test solution: NEG PPG, 3e-5 M• Flow rate: 10 µL/min• Scan rate: 10 Da/s• Cycles: 10• MCA: On• Printouts required: Spectra for masses 44.998, 411.259, 585.385, 933.636, with peak intensities, peak width, and mass shift results, complete with method file information.				
Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	≥ 8.0 × 10 ⁶	1.6727e7	0.6 to 0.8	0.7536

Planned Maintenance

Mass Spectrometer Maintenance

Task	Complete	N/A
Shut down the system and then disconnect the mains supply power cable.	✓	—
If required, replace the roughing pump oil. The recommended interval is every 24 months. Note: If an oil change is not required, then inspect the oil level and top up, if necessary. CAUTION: Potential System Damage. Do not mix different types of oil. Mixing mineral oil with synthetic oil can cause pump failure.	✓	—
If required, replace the roughing pump oil exhaust filter. The recommended interval is every 24 months.	●	○
Confirm that there is no excessive roughing pump oil leakage. Clean up any oil.	✓	—
Make sure that the roughing pump exhaust is properly routed to the ventilation system.	✓	—

Planned Maintenance Tasks

Task	Complete	N/A
Inspect the exhaust system: <ul style="list-style-type: none"> • Make sure that all of the gas fittings at the rear bulkhead are tight. • Make sure that all of the exhaust hoses are free of kinks. • Make sure that all of the hoses at the waste bottle are secure, and there are no signs of leaks. • Make sure that the waste bottle is in an upright position. • Make sure that the exhaust hose is secured to the lab ventilation system. • Confirm that no liquid is trapped in the exhaust lines. 	✓	—
Clean or replace the four air filters in the base of the mass spectrometer chassis.	✓	—
(If applicable) Clean the turbo pump filter screen.	●	○
(If applicable) Verify the operation of the SCIEX-supplied bench cooling fans.	●	○
Clean the curtain plate.	✓	—
Clean the orifice plate.	✓	—
Clean the QJet [®] Ion Guide and IQ0 lens.	✓	—
(If contamination is detected) Clean the Q0 region and the IQ1 lens.	●	○
Inspect the cable connections: <ul style="list-style-type: none"> • Make sure that the power cables for the mass spectrometer, LC system, roughing pump, syringe pump, gas generator, and UPS are securely connected. • Make sure that the communications cables for the GPIB/Ethernet ports, LC connections, and roughing pump are securely connected. 	✓	—

Planned Maintenance Tasks

Task	Complete	N/A
Verify system support functions — gas: <ul style="list-style-type: none"> Confirm the input gas pressures at the regulators are within specifications. Confirm that there is no liquid present in the gas lines. 	✓	—
Verify the expiry date on the battery system for the UPS (sold by SCIEX), and then recommend replacement of the battery tray, if required.	●	○
Start up the system.	✓	—

Turbo V™ Ion Source Maintenance

Task	Complete	N/A
If necessary, replace the electrode in the TurbolonSpray® and APCI Probes.	●	○
With the TurbolonSpray® probe installed, verify that the temperature (TEM) reaches the recommended set point of 500 °C.	✓	—
(If applicable) With the APCI probe installed, verify that the temperature (TEM) reaches the recommended set point of 400 °C.	●	○
Inspect the ion source and, if visible signs of contamination are present, clean the inner surfaces using lint-free wipes and a 50:50 methanol:water solution.	●	○
Note: Remove the corona discharge needle before cleaning.		

Software Maintenance

Task	Complete	N/A
(Obtain customer approval first) Install any applicable Analyst [®] Software HotFixes.	<input checked="" type="radio"/>	<input type="radio"/>
Note: Make sure that the compatible instrument firmware is installed.		

Post-Planned Maintenance

Voltage Tests

Task		Complete
Inspect the RF tuning voltages at the QPS amplifier module and then, if required, tune the coil boxes.		✓
Inspect the detector voltage. Optimize, if required.		✓
Detector voltage	2200	

Post-PM Pressure Test

Post-PM Pressure Test is Complete		✓
Test	Specification	Result
Vacuum chamber pressure with CAD gas off	$0.4 \times 10^{-5} \text{ torr} \leq P_{\text{CAD } 0} \leq 1.1 \times 10^{-5} \text{ torr}$	0.5x10-5Torr
Vacuum chamber pressure with CAD gas set to Full	$2.4 \times 10^{-5} \text{ torr} \leq P_{\text{CAD } 12} \leq 4.5 \times 10^{-5} \text{ torr}$	3.2x10-5Torr

Planned Maintenance Tasks

Inspect for Contamination

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination .	✓	—

Post-PM System Tests

Q1 Positive MS Test is Complete: Intensity and Peak Width			✓	
<ul style="list-style-type: none"> • Test solution: POS PPG, 2e-7 M • Flow rate: 5 µL/min • Scan rate: 10 Da/s • Cycles: 10 • MCA: On • Printouts required: Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, with peak intensities, peak width, and mass shift results, complete with method file information. 				
<p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 1.2 \times 10^6$	1.3348e7	0.6 to 0.8	0.7545
906.673	$\geq 1.4 \times 10^7$	2.6928e7	0.6 to 0.8	0.7295

Planned Maintenance Tasks

Q1 Positive MS Test is Complete: Peak Width for Identified Masses				✓
<ul style="list-style-type: none"> • Test solution: POS PPG, 2e-7 M • Flow rate: 5 µL/min • MCA: On • Printouts required: Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, with peak intensities, peak width, and mass shift results, complete with method file information. 				
<p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>				
Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1,000	50	0.6 to 0.8	
	2,000	100	0.6 to 0.8	

Q3 Positive MS Test is Complete: Intensity and Peak Width				✓
<ul style="list-style-type: none">• Test solution: POS PPG, 2e-7 M• Flow rate: 5 µL/min• Scan rate: 10 Da/s• Cycles: 10• MCA: On• Printouts required: Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, with peak intensities, peak width, and mass shift results, complete with method file information. <p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 1.2 \times 10^6$	2.2112e7	0.6 to 0.8	0.7605
906.673	$\geq 1.4 \times 10^7$	3.8511e7	0.6 to 0.8	0.7631

Planned Maintenance Tasks

Q3 Positive MS Test is Complete: Peak Width for Identified Masses	✓
<ul style="list-style-type: none"> Test solution: POS PPG, 2e-7 M Flow rate: 5 µL/min MCA: On Printouts required: Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, with peak intensities, peak width, and mass shift results, complete with method file information. 	
<div style="border: 1px solid black; padding: 5px;"> Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses. </div>	

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1,000	50	0.6 to 0.8	
	2,000	100	0.6 to 0.8	

Q1 Negative MS Test is Complete: Intensity and Peak Width				✓
<ul style="list-style-type: none">• Test solution: NEG PPG, 3e-5 M• Flow rate: 10 µL/min• Scan rate: 10 Da/s• Cycles: 10• MCA: On• Printouts required: Spectra for masses 44.998, 411.259, 585.385, 933.636, with peak intensities, peak width, and mass shift results, complete with method file information. <p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.0 \times 10^7$	1.0857e7	0.6 to 0.8	0.7315

Planned Maintenance Tasks

Q1 Negative MS Test is Complete: Peak Width for Identified Masses	✓																			
<ul style="list-style-type: none"> Test solution: NEG PPG, 3e-5 M Flow rate: 10 µL/min MCA: On Printouts required: Spectra for masses 44.998, 411.259, 585.385, 933.636, with peak intensities, peak width, and mass shift results, complete with method file information. 																				
<p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 35%;">Mass (Da)</th> <th style="width: 15%;">Scan Rate (Da/s)</th> <th style="width: 15%;">Cycles</th> <th style="width: 20%;">Specification (Da)</th> <th style="width: 15%;">Result (Passed)</th> </tr> </thead> <tbody> <tr> <td rowspan="4">44.998, 411.259, 585.385, 933.636,</td> <td>10</td> <td>10</td> <td>0.6 to 0.8</td> <td rowspan="4" style="text-align: center; vertical-align: middle;">✓</td> </tr> <tr> <td>200</td> <td>50</td> <td>0.6 to 0.8</td> </tr> <tr> <td>1,000</td> <td>50</td> <td>0.6 to 0.8</td> </tr> <tr> <td>2,000</td> <td>100</td> <td>0.6 to 0.8</td> </tr> </tbody> </table>		Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)	44.998, 411.259, 585.385, 933.636,	10	10	0.6 to 0.8	✓	200	50	0.6 to 0.8	1,000	50	0.6 to 0.8	2,000	100	0.6 to 0.8
Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)																
44.998, 411.259, 585.385, 933.636,	10	10	0.6 to 0.8	✓																
	200	50	0.6 to 0.8																	
	1,000	50	0.6 to 0.8																	
	2,000	100	0.6 to 0.8																	

Q3 Negative MS Test is Complete: Intensity and Peak Width				✓
<ul style="list-style-type: none">• Test solution: NEG PPG, 3e-5 M• Flow rate: 10 µL/min• Scan rate: 10 Da/s• Cycles: 10• MCA: On• Printouts required: Spectra for masses 44.998, 411.259, 585.385, 933.636, with peak intensities, peak width, and mass shift results, complete with method file information. <p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>				
Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 8.0 \times 10^6$	1.6292e7	0.6 to 0.8	0.6784

Planned Maintenance Tasks

Q3 Negative MS Test is Complete: Peak Width for Identified Masses	✓																			
<ul style="list-style-type: none"> Test solution: NEG PPG, 3e-5 M Flow rate: 10 µL/min MCA: On Printouts required: Spectra for masses 44.998, 411.259, 585.385, 933.636, with peak intensities, peak width, and mass shift results, complete with method file information. 																				
<p>Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.</p>																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 35%;">Mass (Da)</th> <th style="width: 15%;">Scan Rate (Da/s)</th> <th style="width: 15%;">Cycles</th> <th style="width: 20%;">Specification (Da)</th> <th style="width: 15%;">Result (Passed)</th> </tr> </thead> <tbody> <tr> <td rowspan="4">44.998, 411.259, 585.385, 933.636,</td> <td>10</td> <td>10</td> <td>0.6 to 0.8</td> <td rowspan="4" style="text-align: center; vertical-align: middle;">✓</td> </tr> <tr> <td>200</td> <td>50</td> <td>0.6 to 0.8</td> </tr> <tr> <td>1,000</td> <td>50</td> <td>0.6 to 0.8</td> </tr> <tr> <td>2,000</td> <td>100</td> <td>0.6 to 0.8</td> </tr> </tbody> </table>		Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)	44.998, 411.259, 585.385, 933.636,	10	10	0.6 to 0.8	✓	200	50	0.6 to 0.8	1,000	50	0.6 to 0.8	2,000	100	0.6 to 0.8
Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)																
44.998, 411.259, 585.385, 933.636,	10	10	0.6 to 0.8	✓																
	200	50	0.6 to 0.8																	
	1,000	50	0.6 to 0.8																	
	2,000	100	0.6 to 0.8																	

Reserpine MS/MS Transmission Test is Complete		✓
<ul style="list-style-type: none">• Test solution: Reserpine solution 0.167 pmol/μL• Flow rate: 5 μL/min• Scan rate: 10 Da/s (both MS and MS/MS)• Scan mode: Product Ion (MS2)• Product Of: 609.3 (or as calibrated)• Product Ion: 195.1• Cycles: 10• MCA: On• Printouts required: Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.		
Specification		Result
Transmission efficiency $\frac{\text{Intensity for ion at } m/z \text{ 195.1}}{\text{Intensity for ion at } m/z \text{ 609.3 (or as calibrated)}} \times 100 \geq 10\%$		12.4%

Planned Maintenance Tasks

Positive Enhanced Resolution (ER) Mode Test is Complete: Intensity and Peak Width					✓
<ul style="list-style-type: none"> • Test solution: ES Tuning Solution (1:100 dilution) • Flow rate: 5 µL/min • Cycles: 50 • Fill time: 0.05 ms • MCA: On • Printouts required: Spectra for masses 118.087, 322.049, 622.029, 922.010, with peak intensities, peak width, and mass shift results, complete with method file information. 					
Scan Rate (Da/s)	Mass	Intensity (cps)		Peak Width (Da)	
		Specification	Result	Specification	Result
1,000	118.087	$\geq 7.2 \times 10^6$	8.3000e6	< 0.35	0.1783
	922.010	$\geq 2.8 \times 10^7$	7.2680e7	< 0.35	0.2403
10,000	118.087	$\geq 2.4 \times 10^7$	2.4417e7	< 0.65	0.2846
	922.010	$\geq 6.8 \times 10^7$	1.2675e8	< 0.65	0.5172
20,000	118.087	$\geq 1.6 \times 10^7$	2.2833e7	< 0.75	0.3544
	922.010	$\geq 5.6 \times 10^7$	1.0183e8	< 0.75	0.5708

Positive Enhanced Resolution (ER) Mode Test is Complete: Peak Width					✓
<ul style="list-style-type: none">• Test solution: ES Tuning Solution (1:100 dilution)• Flow rate: 5 µL/min• MCA: On• Printouts required: Spectra for masses 118.087, 322.049, 622.029, 922.010, with peak intensities, peak width, and mass shift results, complete with method file information.					
Scan Rate	Cycles	Fill Time	Mass	Peak Width (Da)	Result
50	50	2.0	118.087	< 0.20	0.0893
			922.010	< 0.11	0.0754
250	50	0.2	118.087	< 0.20	0.1077
			922.010	< 0.20	0.1232

Planned Maintenance Tasks

Negative Enhanced Resolution (ER) Mode Test is Complete: Intensity and Peak Width					✓
<ul style="list-style-type: none"> • Test solution: ES Tuning Solution (1:100 dilution) • Flow rate: 5 µL/min • Cycles: 50 • Fill time: 0.05 ms • MCA: On • Printouts required: Spectra for masses 112.985, 431.982, 601.978, with peak intensities, peak width, and mass shift results, complete with method file information. 					
Scan Rate (Da/s)	Mass	Intensity (cps)		Peak Width (Da)	
		Specification	Result	Specification	Result
1,000	431.982	$\geq 4.4 \times 10^7$	7.3020e7	< 0.35	0.1881
	601.978	$\geq 5.6 \times 10^7$	1.3398e8	< 0.35	0.1656
10,000	431.982	$\geq 1.2 \times 10^8$	1.3442e8	< 0.65	0.3489
	601.978	$\geq 1.6 \times 10^8$	2.9700e8	< 0.65	0.3232
20,000	431.982	$\geq 1.0 \times 10^8$	1.3950e8	< 0.75	0.4569
	601.978	$\geq 1.2 \times 10^8$	3.4900e8	< 0.75	0.4141

Negative Enhanced Resolution (ER) Mode Test is Complete: Peak Width					✓
<ul style="list-style-type: none">• Test solution: ES Tuning Solution (1:100 dilution)• Flow rate: 5 µL/min• MCA: On• Printouts required: Spectra for masses 112.985, 431.982, 601.978, with peak intensities, peak width, and mass shift results, complete with method file information.					
Scan Rate	Cycles	Fill Time	Mass	Peak Width (Da)	Result
50	50	2.0	431.982	< 0.11	0.0740
			601.978	< 0.11	0.0665
250	50	0.05	431.982	< 0.20	0.1331
			601.978	< 0.20	0.1349

Planned Maintenance Tasks

Enhanced Product Ion (EPI) Mode Test is Complete				✓
<ul style="list-style-type: none"> • Test solution: Reserpine solution 0.167 pmol/μL • Flow rate: 5 μL/min • Scan mode: EPI • Cycles: 20 • MCA: On • Printouts required: Spectra for mass 397.2 Da, with peak intensities, peak width, and mass shift results for Q0 trapping ON and Q0 trapping OFF, complete with method file information. 				
Scan Rate	Intensity of 397.2			
	Q0 Trapping Off		Q0 Trapping On	
	Specification	Result	Specification	Result
10,000	$\geq 2.0 \times 10^6$	2.2500e6	$\geq 6.4 \times 10^6$	1.7333e7

MS/MS/MS Mode Test is Complete		✓
<ul style="list-style-type: none">• Test solution: Reserpine solution 0.167 pmol/μL• Flow rate: 5 μL/min• Scan mode: MS3• Scan rate: 1000 Da/s• Cycles: 20• MCA: On• Printouts required: The full scan for Fragmentation Off and Fragmentation On, spectra for masses 236 and 365, with peak intensities, peak width, and mass shift results, complete with method file information.		
Fragmentation	Specification	Result
Off	Spectrum contains mass 397.2 Da only	✓
On	Intensity of mass 236 Da or 365 Da $\geq 1.6 \times 10^6$.	4.4080e7

Planned Maintenance Tasks

Post-PM Tasks

Task	Complete	N/A
Delete any unnecessary files.	✓	—
Back up the Analyst Data folder.	✓	—
(If applicable) Defragment the hard drive.	○	●
If the customer has a Software Support Plan, then perform the Software Health Check: <ul style="list-style-type: none">• (Obtain customer approval first) Install any compatible HotFixes and updates for SCIEX add-on software.	○	●

StatusScope® Remote Monitoring Service Tasks

Task	Complete	N/A
<p>Note: Installation of the StatusScope® Remote Monitoring Service is available only to warranty and eligible contract customers. Refer to sciex.com/instrument-service-and-support/statusscope-remote-monitoring for a list of eligible contracts.</p> <p>If the StatusScope® Remote Monitoring Service is not installed, then perform these tasks:</p> <ul style="list-style-type: none"> • If the customer does not want the StatusScope® Remote Monitoring Service installed, then skip the remaining steps in this section. • If the customer wants the StatusScope® Remote Monitoring Service installed, then complete the steps in this section. 	<input type="radio"/>	<input checked="" type="radio"/>
<p>Verify the connection to the server for the StatusScope® Remote Monitoring Service.</p> <p>Note: Use the StatusScopePortCheck.exe. The utility is included with the StatusScope® installer.</p>	<input type="radio"/>	<input checked="" type="radio"/>
<p>Install the agent for the StatusScope® Remote Monitoring Service.</p>	<input type="radio"/>	<input checked="" type="radio"/>
<p>Ask the customer to log on to SCIEX Now™ to verify that the instrument is connected to the server for the StatusScope® Remote Monitoring Service.</p> <p>Note: The instrument is shown under the account of the Primary Contact.</p>	<input type="radio"/>	<input checked="" type="radio"/>

Planned Maintenance Tasks

Wrap-up

Task	Complete	N/A
Review the work performed with the customer.	✓	—
Record the test results in this document and then attach all of the test data.	✓	—
Review the routine maintenance schedule and the procedures with the customer.	✓	—
Complete this document: <ul style="list-style-type: none">• Review the test results with the customer.• Provide the customer with the completed document and the test data.• If an electronic copy of the document is supplied to the customer, then save a copy on the Service drive.	✓	—

Signoff

3

Organization	ALS Laboratory Group (Thailand) Co.,Ltd		
Mass spectrometer serial number	AU25591101	Service request number	WO-00824927
FSE name	Nitinai Phachai	Date (yyyy-mm-dd)	2022-01-26
FSE signature			

Signoff

Comments and Exceptions

After PM the instrument working Normal.

Inspect for Contamination

A

Perform a Q1 and Q3 charging test to determine whether front end contamination is present.

1. Run the **Pos PPG** method for 10 minutes, monitoring the Total Ion Count (TIC) for degradation of the signal or a decrease in sensitivity.
2. Change the polarity to Negative, and then scan for one minute.
3. Change the polarity to Positive, and then make sure that the **IS** parameter returns to the original value.
4. Run the method.

If the signal sensitivity is restored temporarily but the Total Ion Count (TIC) again degrades by more than 5% over a 10 minute run, then a possible front-end contamination is indicated.

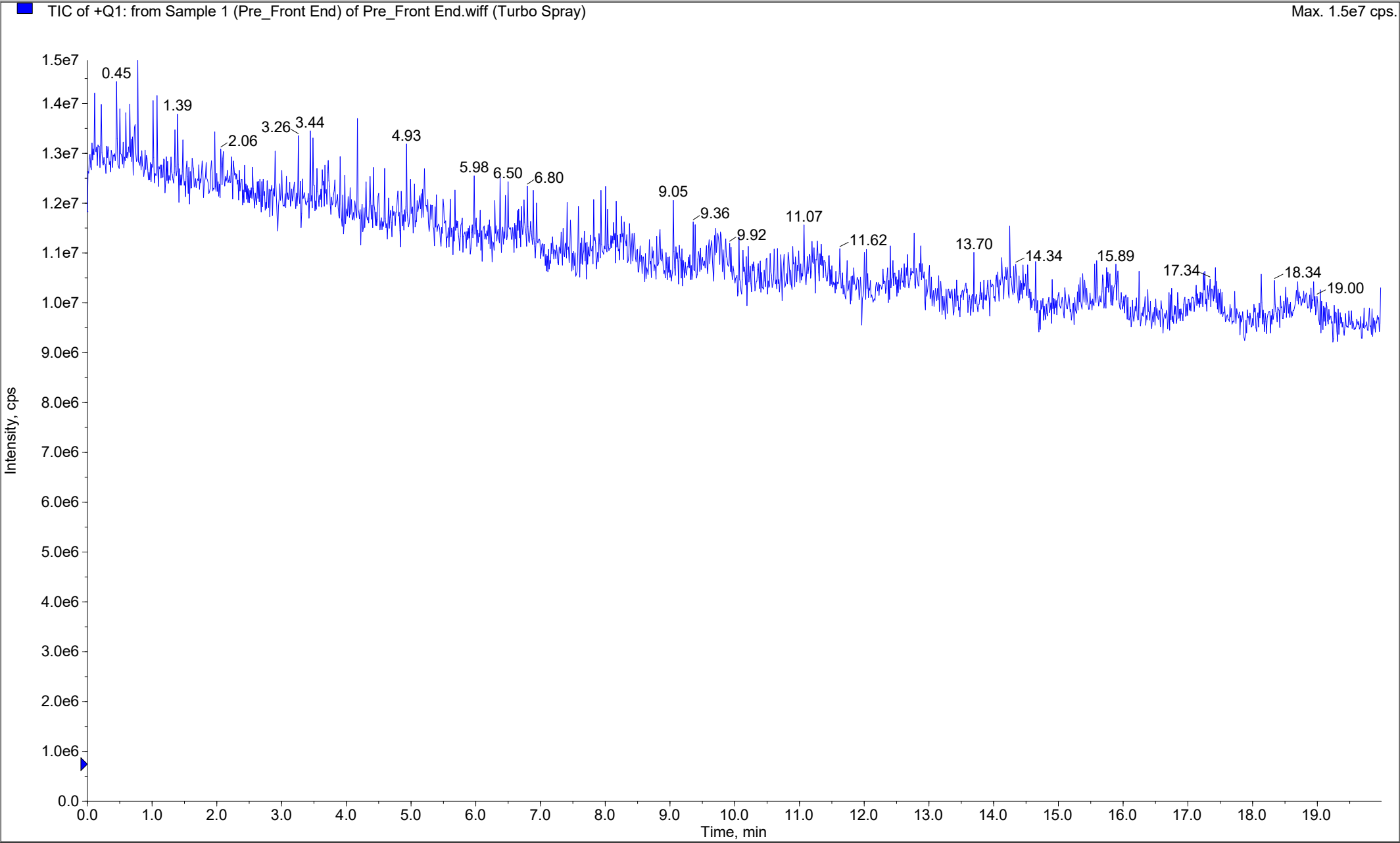
5. Repeat the test in Negative polarity using the Q1 Neg PPG method.

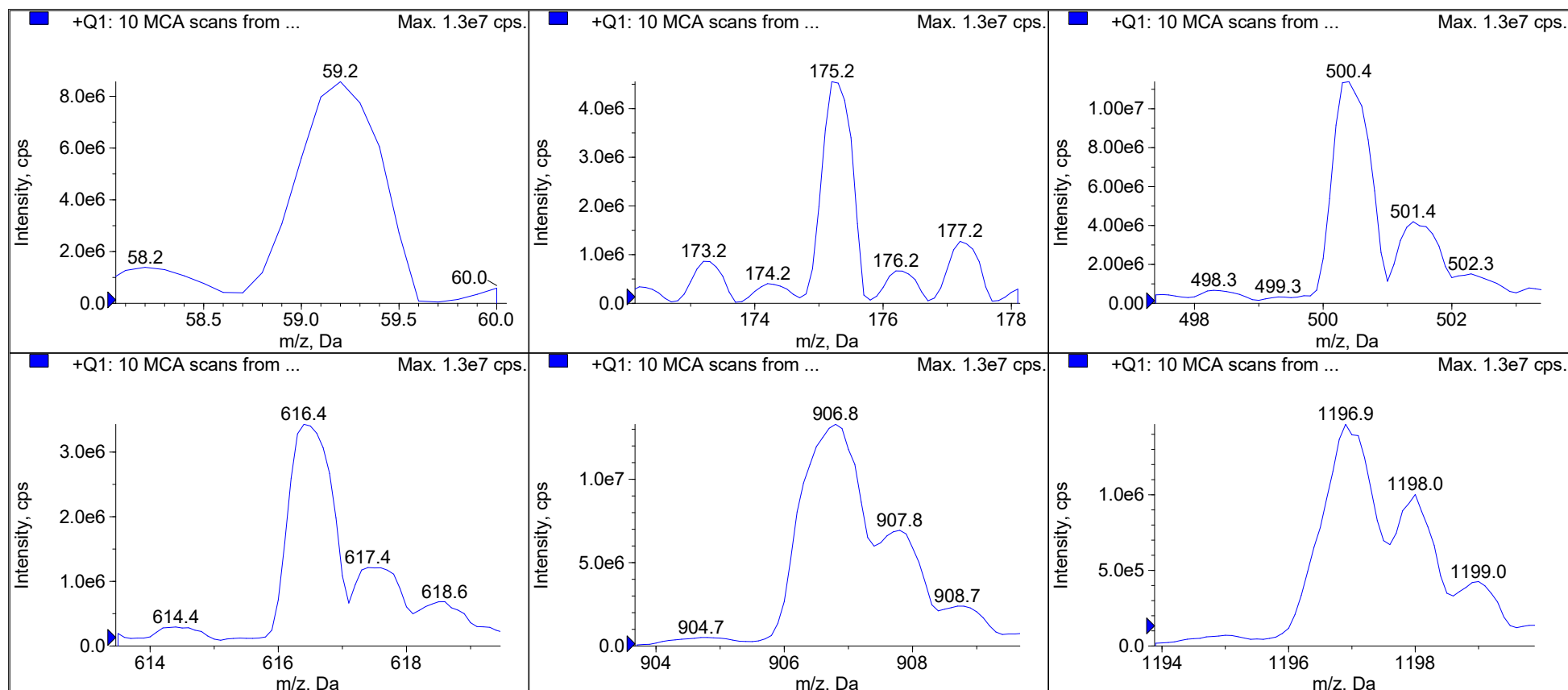
Guidelines for Cleaning the Front End

If charging tests indicate that cleaning is necessary, then clean the front-end components, including the QJet[®] Ion Guide, IQ0 lens, Q0 quadrupole, and IQ1 lens.

Removing the ion optics is considered a repair activity. FSEs must open a separate service repair call.

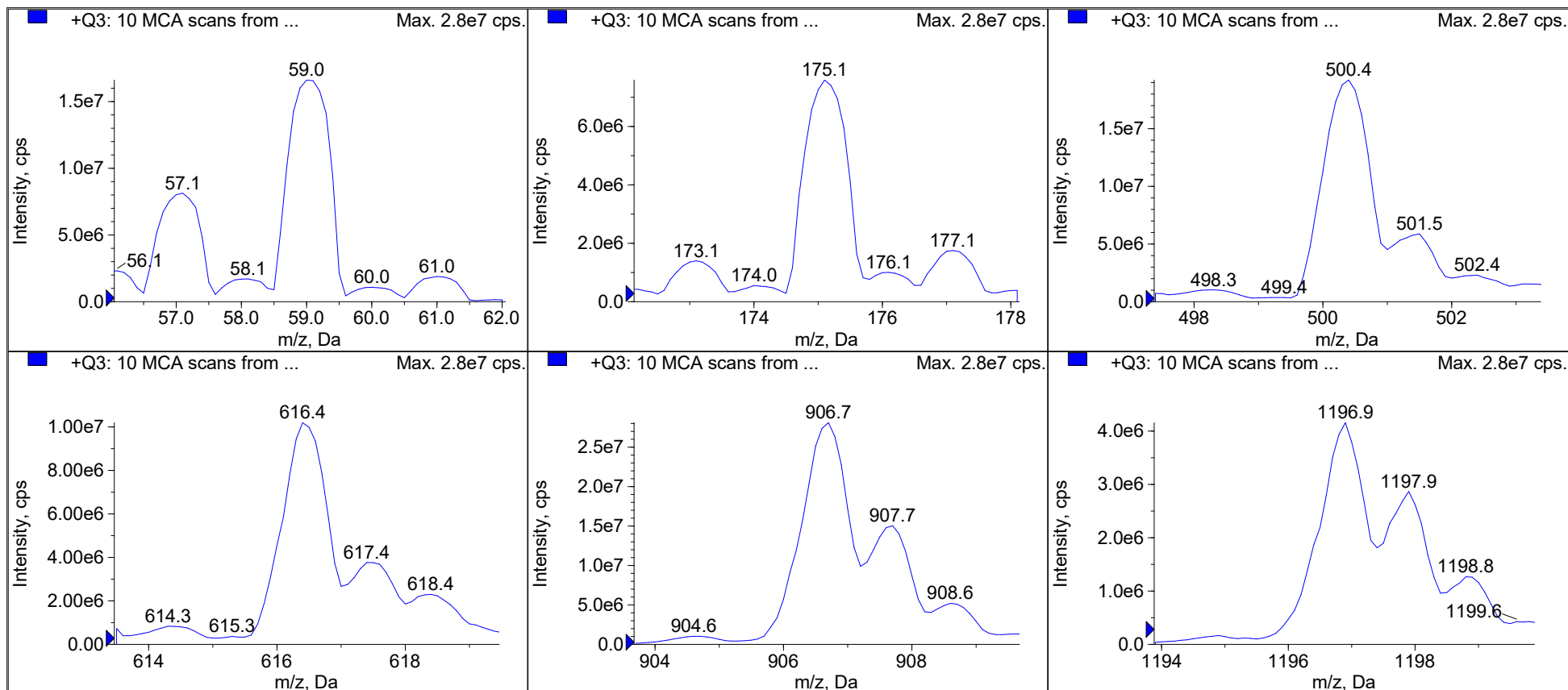
Note: This procedure does not provide troubleshooting for all technical root causes of signal degradation or charging effect. Signal degradation might also result from a contaminated TurbolonSpray[®] Probe or electrode, method parameters that are not optimized, or other factors.





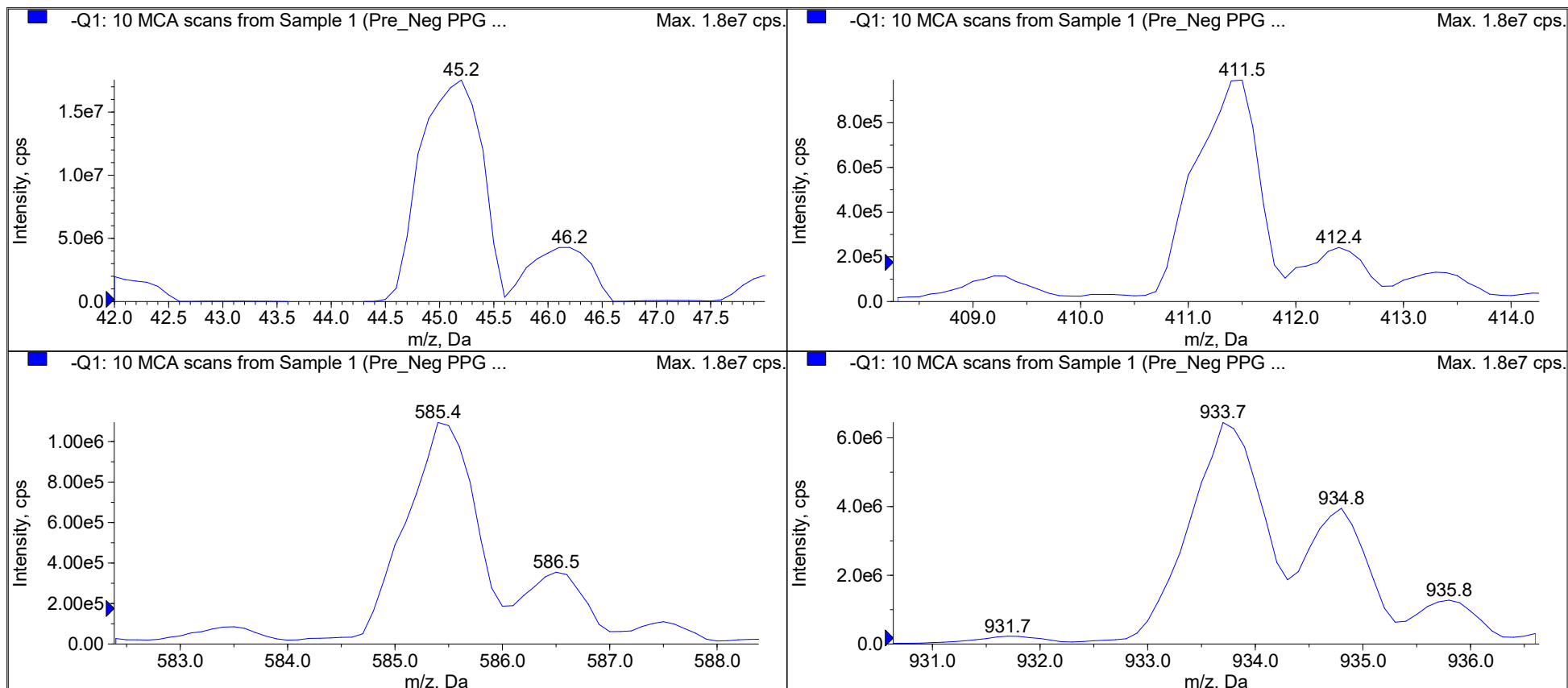
Peak List for "+Q1: 10 MCA scans from Sample 1 (Pre_POS_Q1) of Pre_POS_Q1.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.2044	8.5657e6	0.5053	-0.1544
2	175.1330	175.2920	4.5524e6	0.5454	-0.1590
3	500.3800	500.4362	1.1391e7	0.6942	-0.0562
4	616.4640	616.5072	3.4299e6	0.8173	-0.0432
5	906.6730	906.7258	1.3298e7	1.1424	-0.0528
6	1196.8830	1196.9656	1.4661e6	1.0110	-0.0826



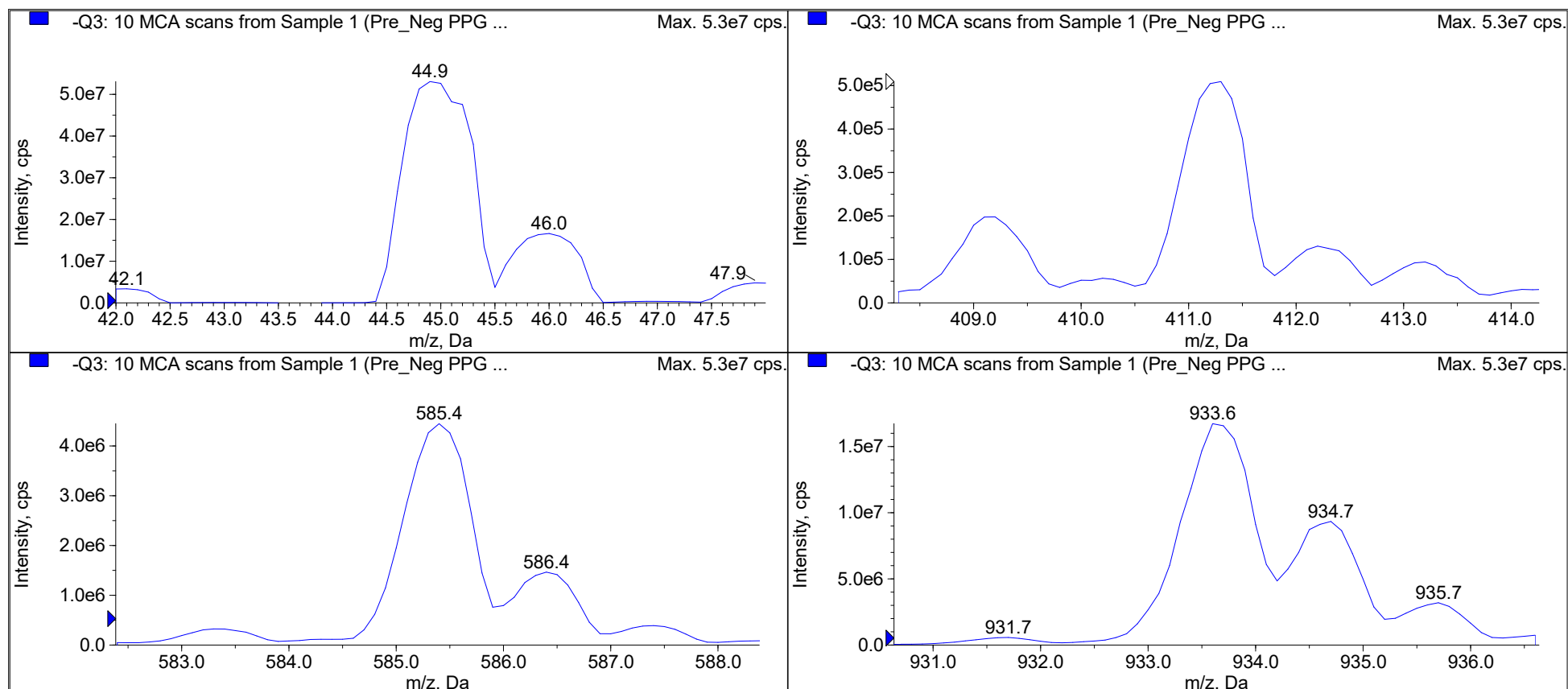
Peak List for "+Q3: 10 MCA scans from Sample 1 (Pre_POS_Q3) of Pre_POS_Q3.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0424	1.6610e7	0.7550	7.5556e-3
2	175.1330	175.1199	7.5892e6	0.8009	0.0131
3	500.3800	500.3700	1.9215e7	0.8267	0.0100
4	616.4640	616.4496	1.0195e7	0.7942	0.0144
5	906.6730	906.6681	2.8102e7	0.8093	4.9185e-3
6	1196.8830	1196.8844	4.1576e6	0.8160	-1.3975e-3



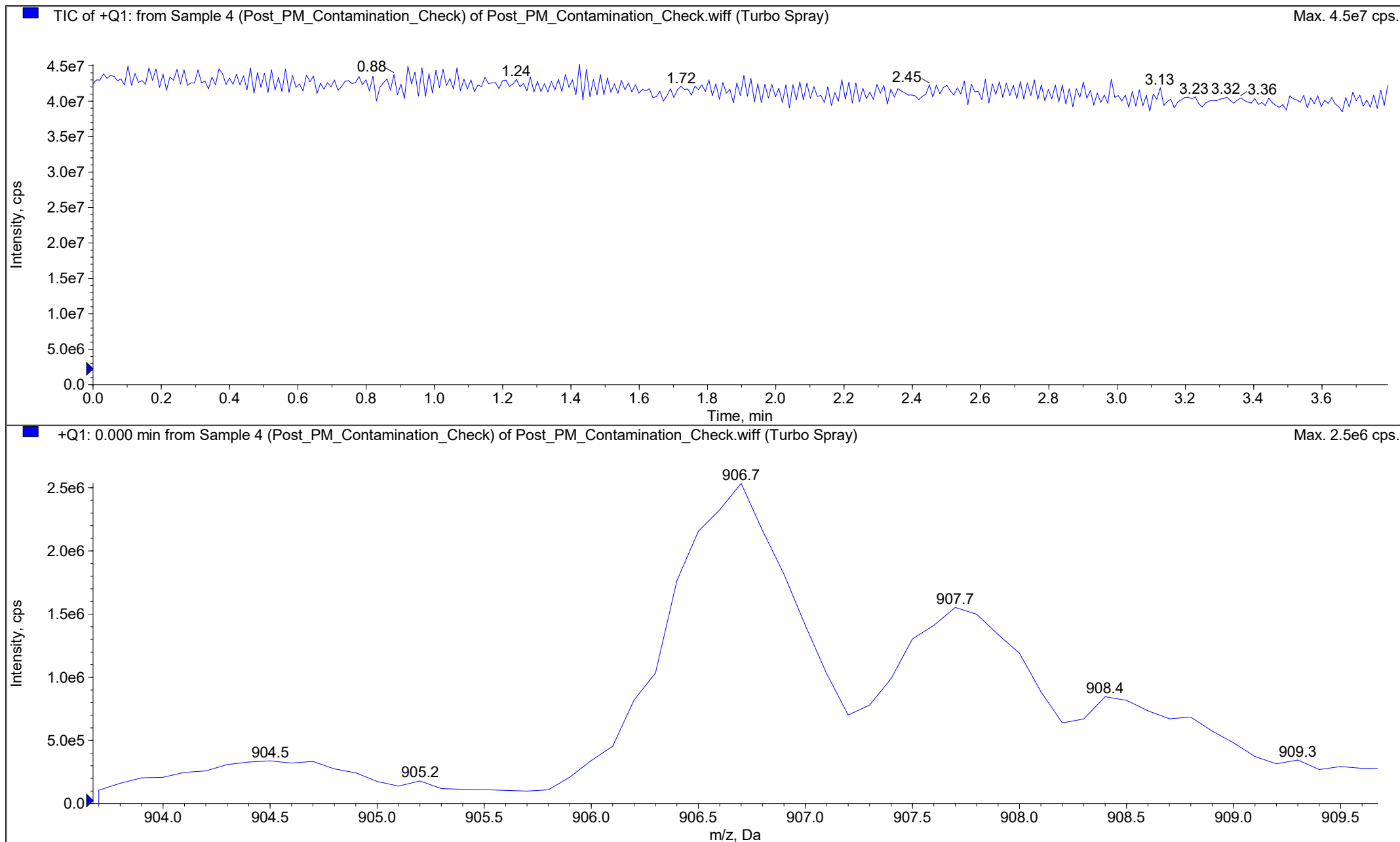
Peak List for "-Q1: 10 MCA scans from Sample 1 (Pre_Neg PPG Q1) of Pre_Neg PPG Q1.wiff (Turbo Spray)"

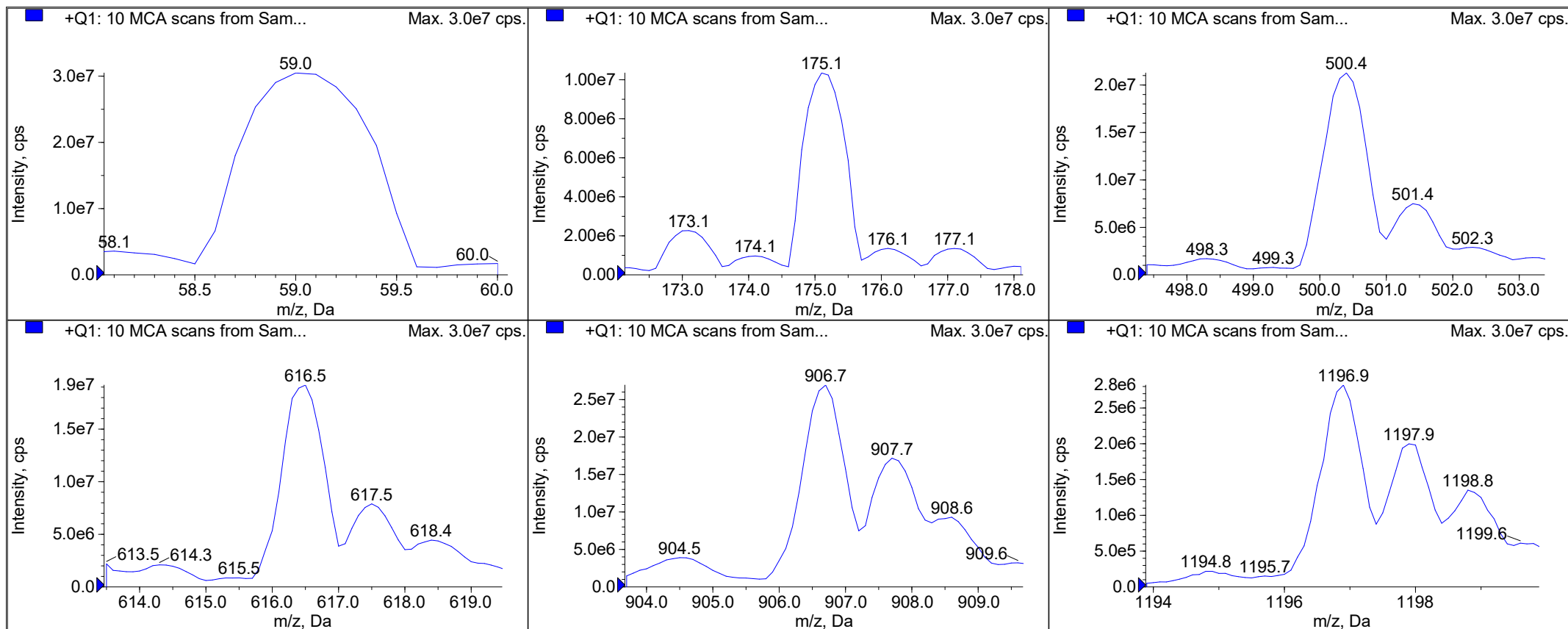
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.1112	1.7536e7	0.6880	-0.1132
2	411.2590	411.3740	9.9110e5	0.7174	-0.1150
3	585.3850	585.4521	1.0945e6	0.7372	-0.0671
4	933.6360	933.7504	6.4485e6	0.7742	-0.1144



Peak List for "-Q3: 10 MCA scans from Sample 1 (Pre_Neg PPG Q3) of Pre_Neg PPG Q3.wiff (Turbo Spray)"

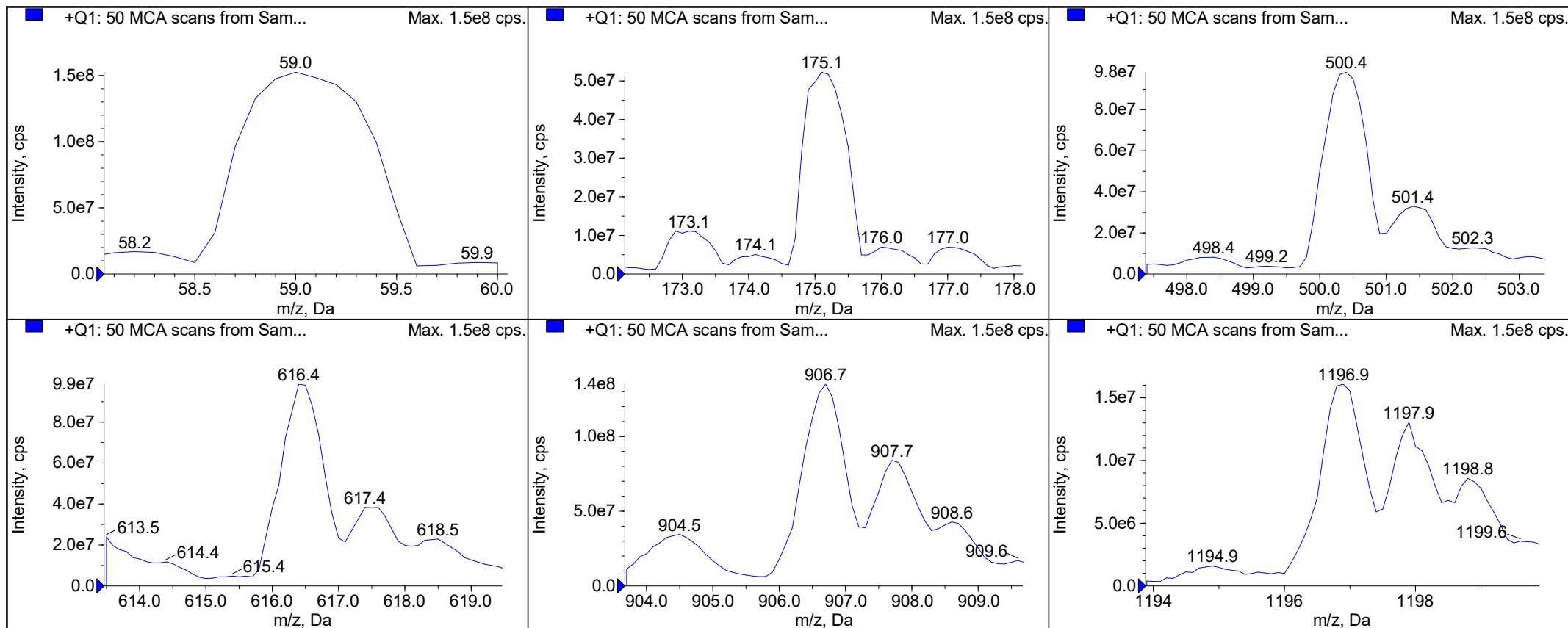
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9817	5.3064e7	0.7482	0.0163
2	411.2590	n/a	n/a	n/a	n/a
3	585.3850	585.3950	4.4474e6	0.7050	-9.9992e-3
4	933.6360	933.6598	1.6727e7	0.7536	-0.0238





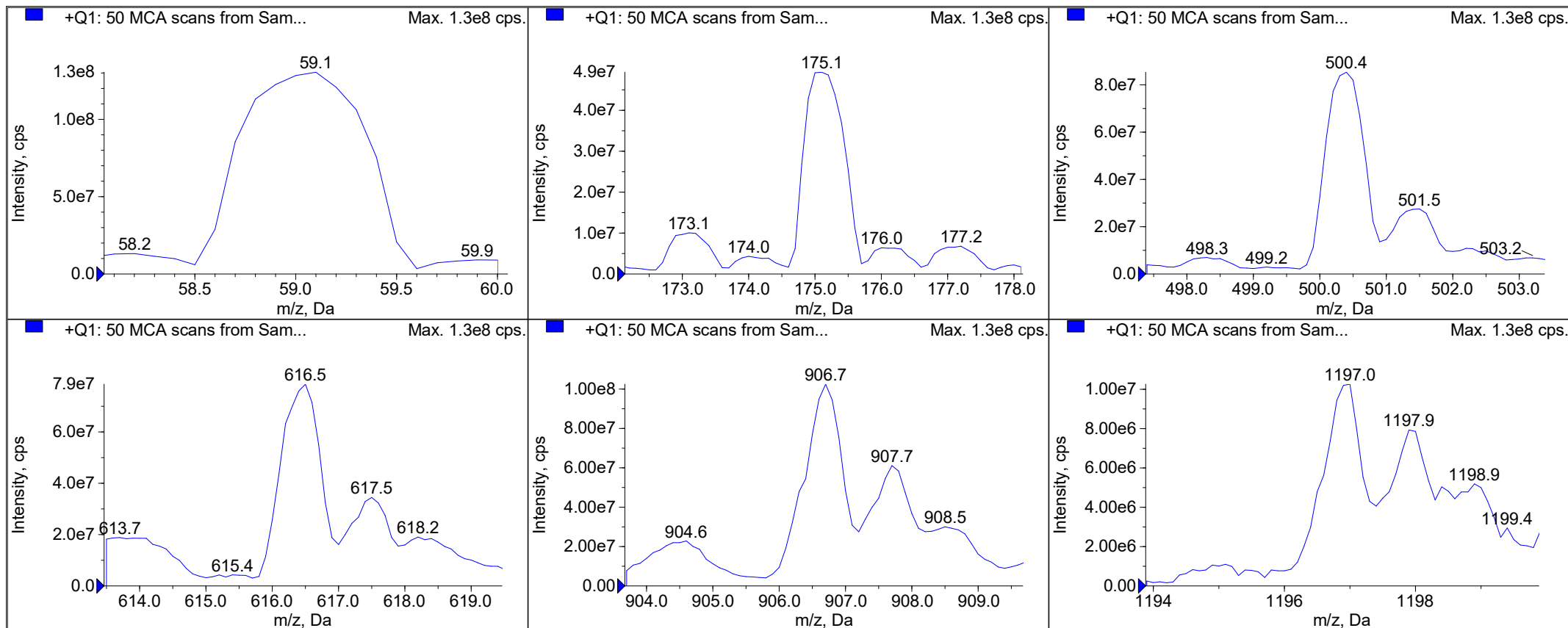
Peak List for "+Q1: 10 MCA scans from Sample 1 (Post_PM_+Q1_POS_PPG_10MCA_10DA) of Post_PM_+Q1_POS_PPG_10MCA_10DA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0542	3.0478e7	0.7662	-4.1886e-3
2	175.1330	175.1346	1.3348e7	0.7545	-2.1420e-3
3	500.3800	500.3862	2.1269e7	0.7555	-6.1843e-3
4	616.4640	616.4683	1.9188e7	0.7296	-4.3250e-3
5	906.6730	906.6761	2.6928e7	0.7295	-3.1387e-3
6	1196.8830	1196.8830	2.8198e6	0.7475	1.8240e-5



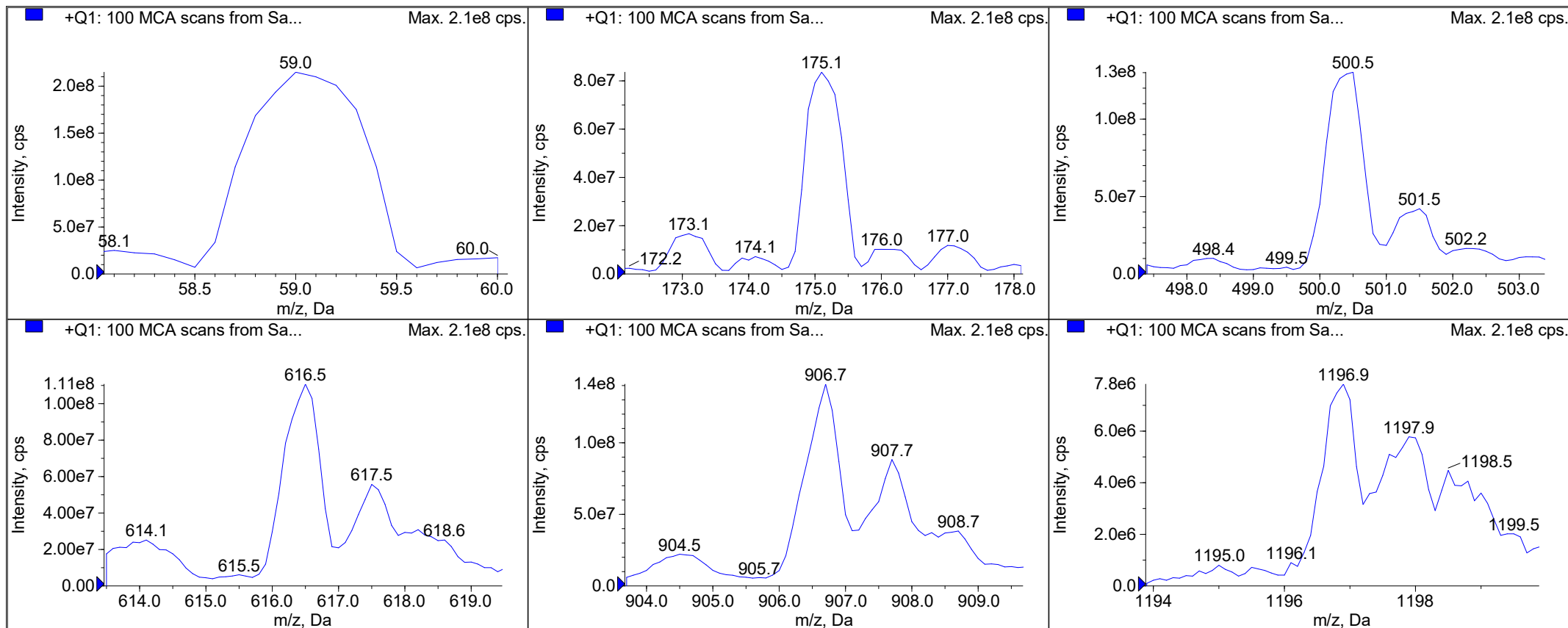
Peak List for "+Q1: 50 MCA scans from Sample 1 (Post_PM_+Q1_POS_PPG_50MCA_200DA) of Post_PM_+Q1_POS_PPG_50MCA_200DA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0489	1.5253e8	0.7765	1.1463e-3
2	175.1330	175.1401	5.2260e7	0.7702	-7.0851e-3
3	500.3800	500.3863	9.8250e7	0.7575	-6.2812e-3
4	616.4640	616.4594	9.8524e7	0.7227	4.6082e-3
5	906.6730	906.6822	1.3501e8	0.7430	-9.2499e-3
6	1196.8830	1196.8891	1.6084e7	0.7622	-6.1368e-3



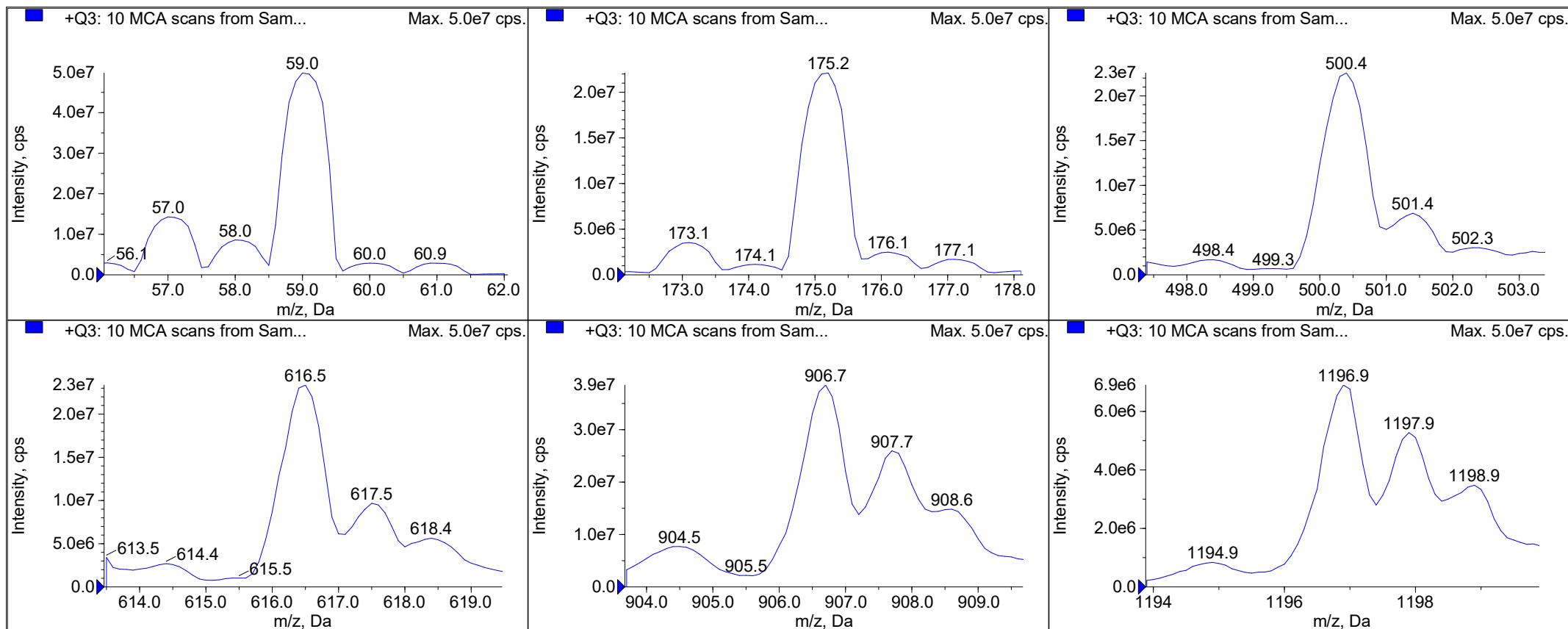
Peak List for "+Q1: 50 MCA scans from Sample 1 (Post_PM_+Q1_POS_PPG_50MCA_1000DA) of Post_PM_+Q1_POS_PPG_50MCA_1000DA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0352	1.3050e8	0.7546	0.0148
2	175.1330	175.1280	4.9310e7	0.7164	4.9746e-3
3	500.3800	500.3711	8.5350e7	0.6753	8.9274e-3
4	616.4640	616.4328	7.8610e7	0.6927	0.0312
5	906.6730	906.6931	1.0248e8	0.6382	-0.0201
6	1196.8830	1196.9088	1.0260e7	0.6920	-0.0258



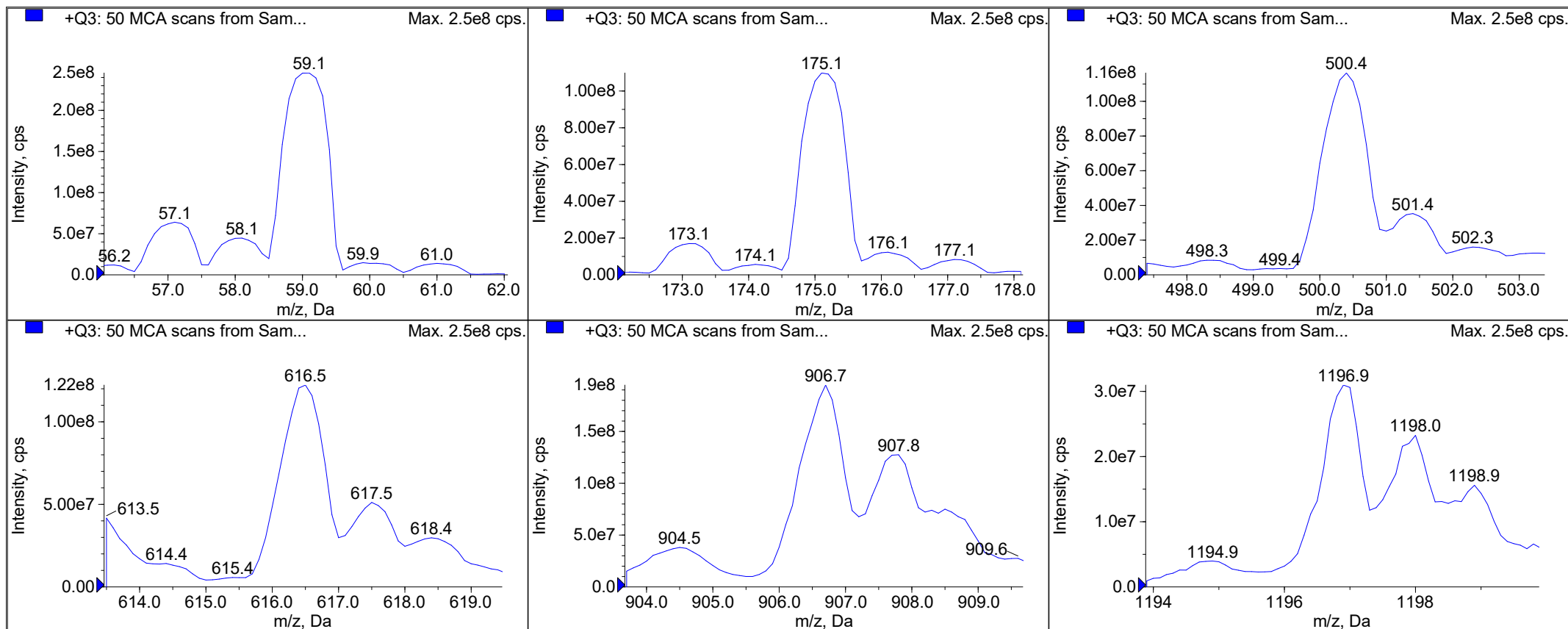
Peak List for "+Q1: 100 MCA scans from Sample 3 (Post_PM_+Q1_POS_PPG_100MCA_2000DA) of Post_PM_+Q1_POS_PPG_100MCA_2000DA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0544	2.1486e8	0.7155	-4.4414e-3
2	175.1330	175.1299	8.3580e7	0.6369	3.0701e-3
3	500.3800	500.3675	1.3028e8	0.6350	0.0125
4	616.4640	616.4556	1.1070e8	0.6433	8.3562e-3
5	906.6730	906.6704	1.4094e8	0.6076	2.6086e-3
6	1196.8830	1196.8531	7.8200e6	0.6231	0.0299



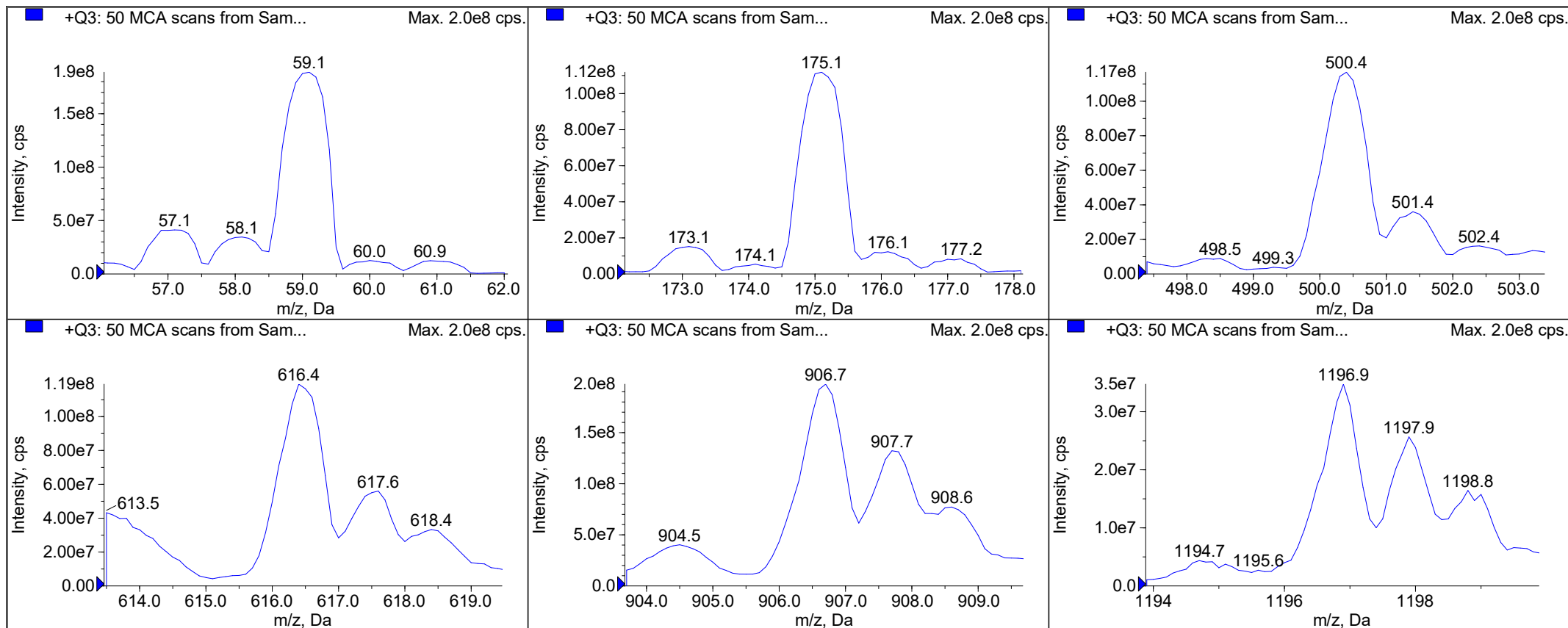
Peak List for "+Q3: 10 MCA scans from Sample 1 (Post_PM_+Q3_POS_PPG_10Da_10MCA) of Post_PM_+Q3_POS_PPG_10Da_10MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0424	4.9788e7	0.7386	7.6262e-3
2	175.1330	175.1344	2.2112e7	0.7605	-1.3715e-3
3	500.3800	500.3769	2.2565e7	0.7796	3.1388e-3
4	616.4640	616.4696	2.3362e7	0.7607	-5.5757e-3
5	906.6730	906.6751	3.8511e7	0.7631	-2.0994e-3
6	1196.8830	1196.8867	6.9013e6	0.7627	-3.7371e-3



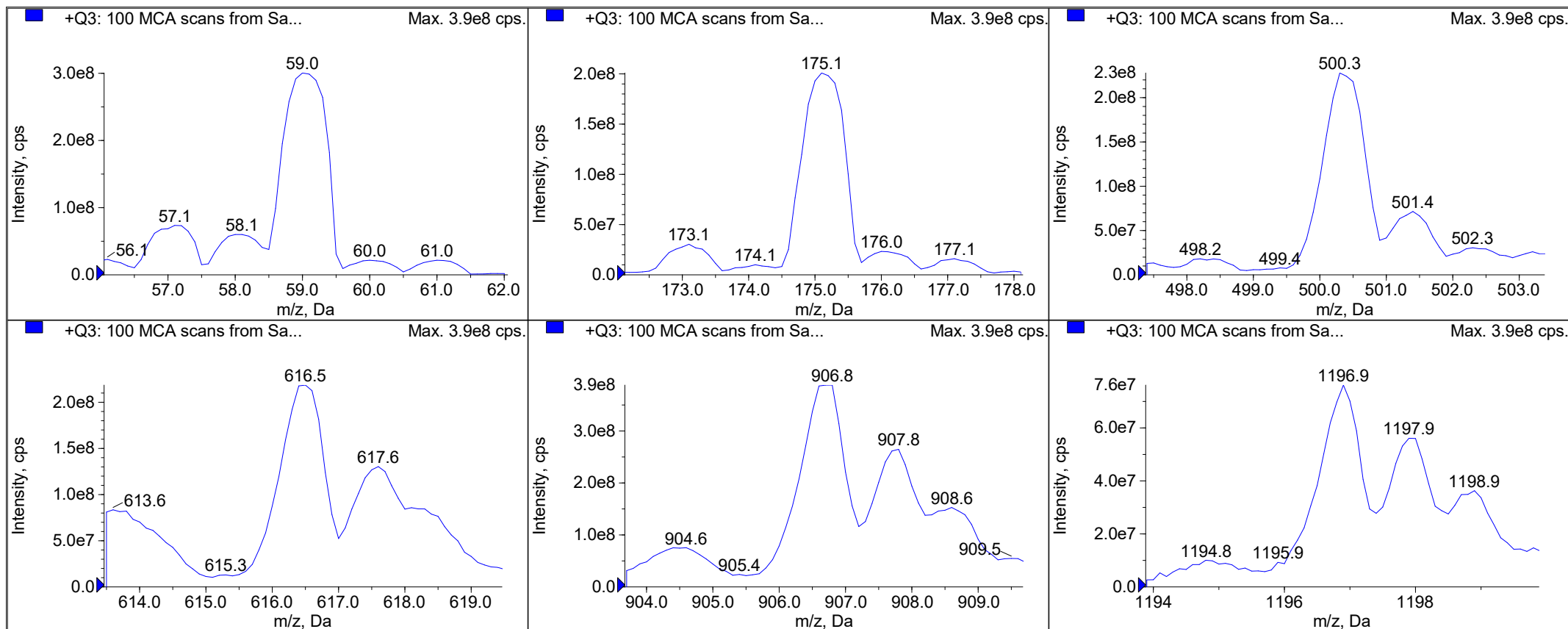
Peak List for "+Q3: 50 MCA scans from Sample 1 (Post_PM_+Q3_POS_PPG_200Da_50MCA) of Post_PM_+Q3_POS_PPG_200Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0484	2.4548e8	0.7669	1.6492e-3
2	175.1330	175.1253	1.0981e8	0.7532	7.6817e-3
3	500.3800	500.3810	1.1633e8	0.7782	-9.6343e-4
4	616.4640	616.4698	1.2224e8	0.7787	-5.7748e-3
5	906.6730	906.6564	1.9470e8	0.7729	0.0166
6	1196.8830	1196.8925	3.0970e7	0.6829	-9.4505e-3



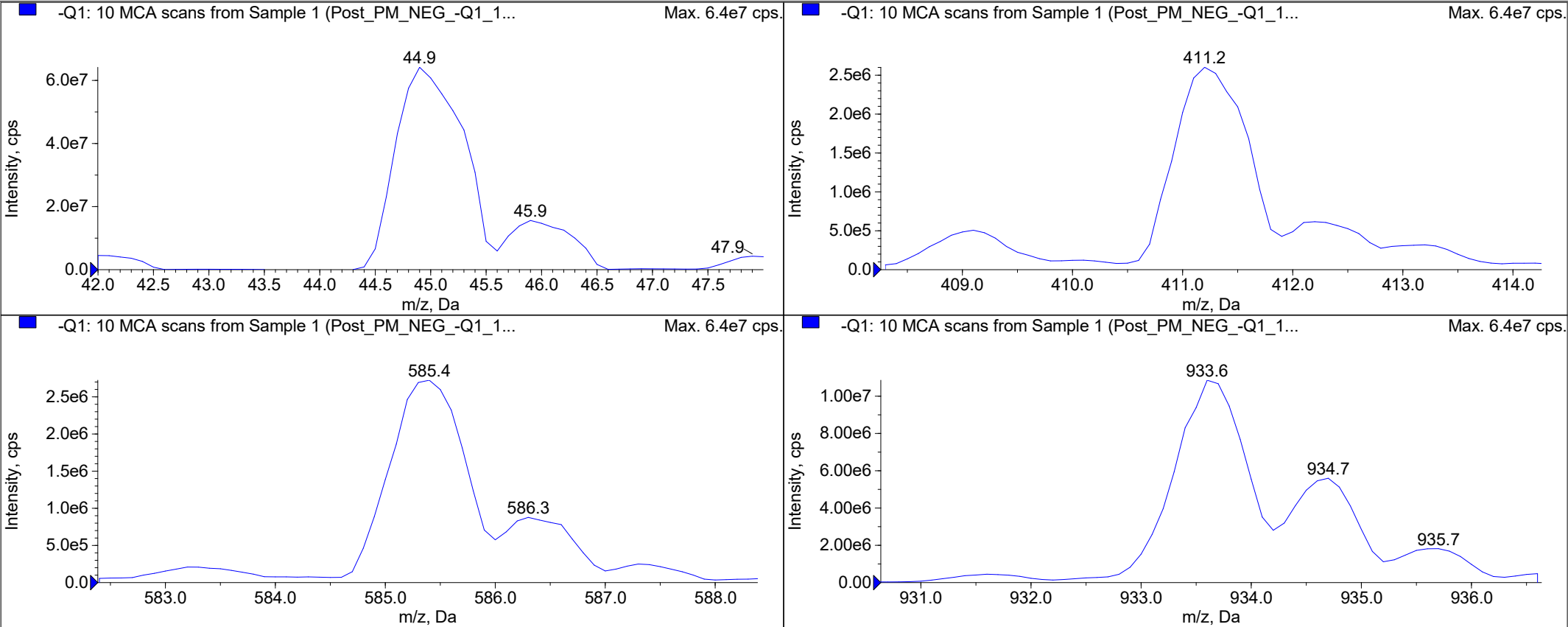
Peak List for "+Q3: 50 MCA scans from Sample 1 (Post_PM_+Q3_POS_PPG_1000Da_50MCA) of Post_PM_+Q3_POS_PPG_1000Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0543	1.8886e8	0.7625	-4.3365e-3
2	175.1330	175.1042	1.1183e8	0.7506	0.0288
3	500.3800	500.3878	1.1677e8	0.7518	-7.7957e-3
4	616.4640	616.4491	1.1915e8	0.7731	0.0149
5	906.6730	906.6761	1.9740e8	0.7660	-3.1444e-3
6	1196.8830	1196.8770	3.4740e7	0.6942	6.0311e-3



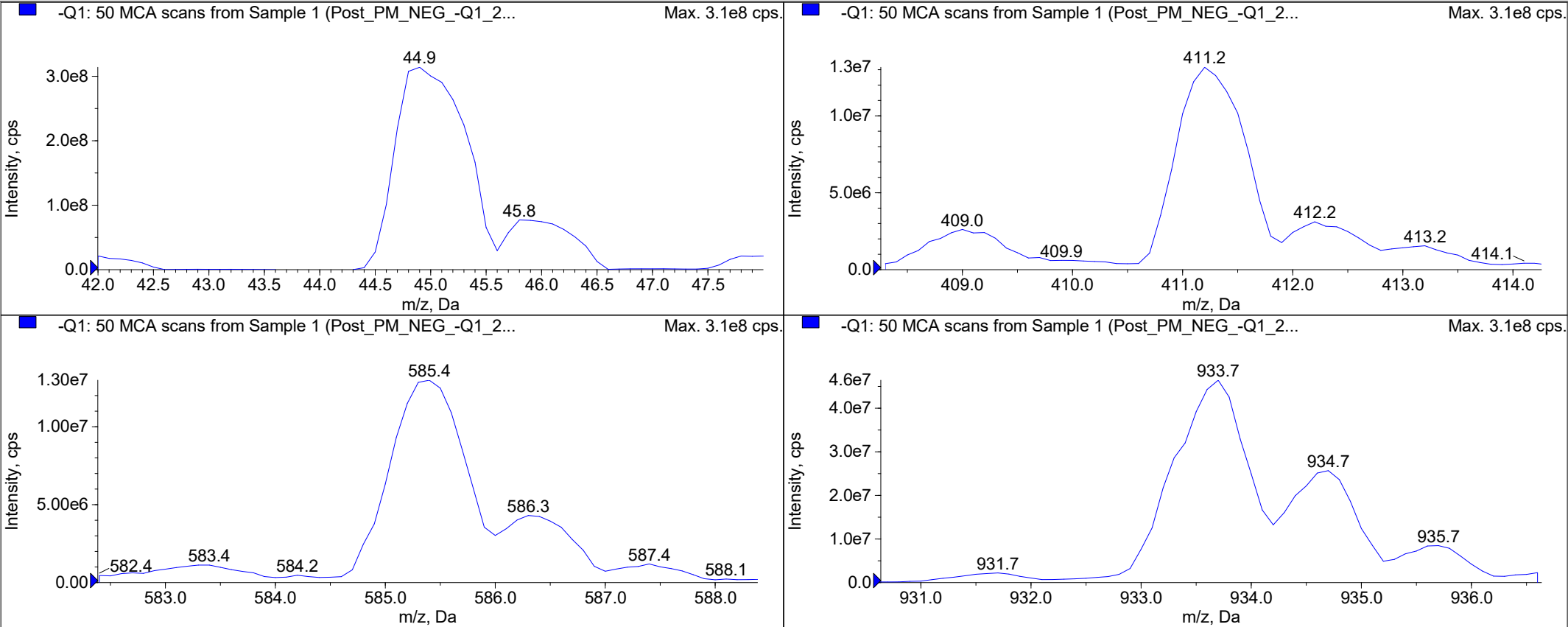
Peak List for "+Q3: 100 MCA scans from Sample 1 (Post_PM_+Q3_POS_PPG_2000Da_100MCA) of Post_PM_+Q3_POS_PPG_2000Da_100MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0462	3.0048e8	0.7678	3.8137e-3
2	175.1330	175.1335	2.0090e8	0.7452	-4.8050e-4
3	500.3800	500.3759	2.2784e8	0.7150	4.1013e-3
4	616.4640	616.4684	2.1862e8	0.7643	-4.3992e-3
5	906.6730	906.6793	3.8830e8	0.7677	-6.3220e-3
6	1196.8830	1196.8782	7.6180e7	0.7249	4.8176e-3



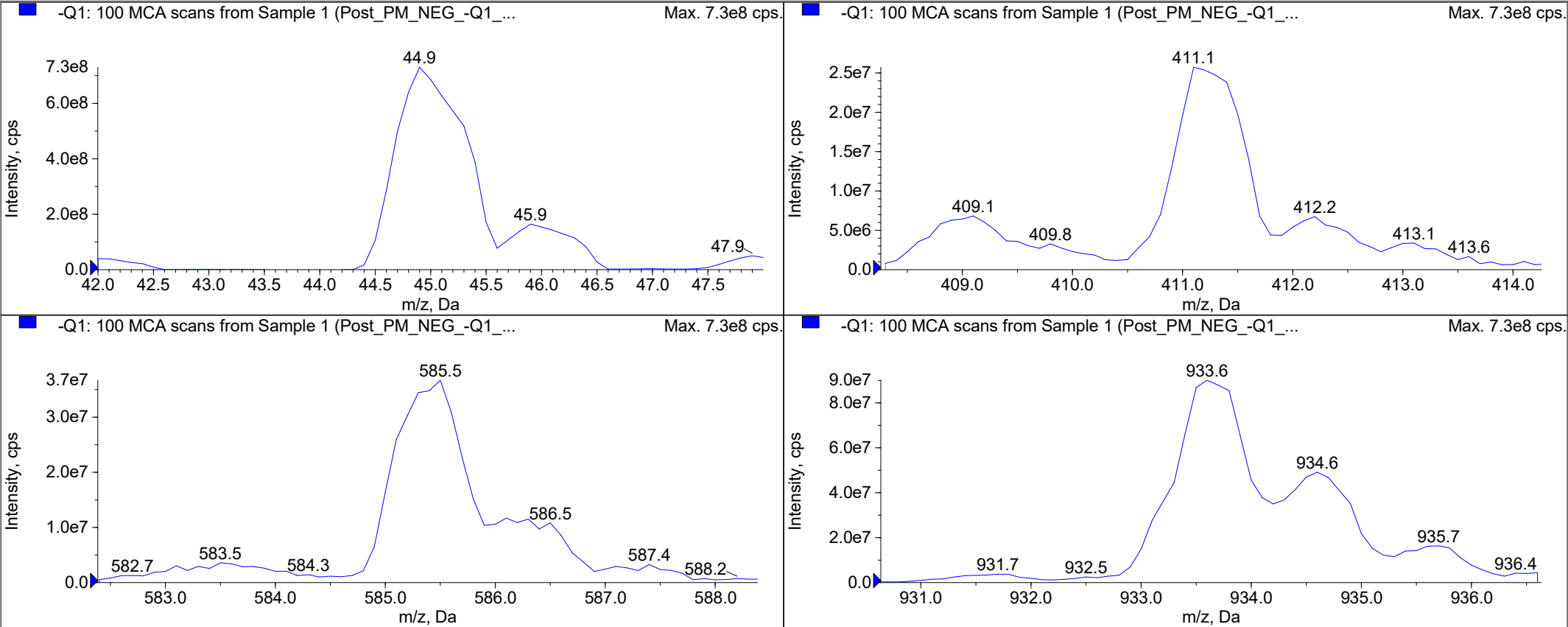
Peak List for "-Q1: 10 MCA scans from Sample 1 (Post_PM_NEG_-Q1_10Da_10MCA) of Post_PM_NEG_-Q1_10Da_10MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9874	6.4165e7	0.7463	0.0106
2	411.2590	411.2635	2.6022e6	0.7778	-4.5431e-3
3	585.3850	585.3908	2.7241e6	0.7831	-5.7765e-3
4	933.6360	933.6381	1.0857e7	0.7315	-2.0672e-3



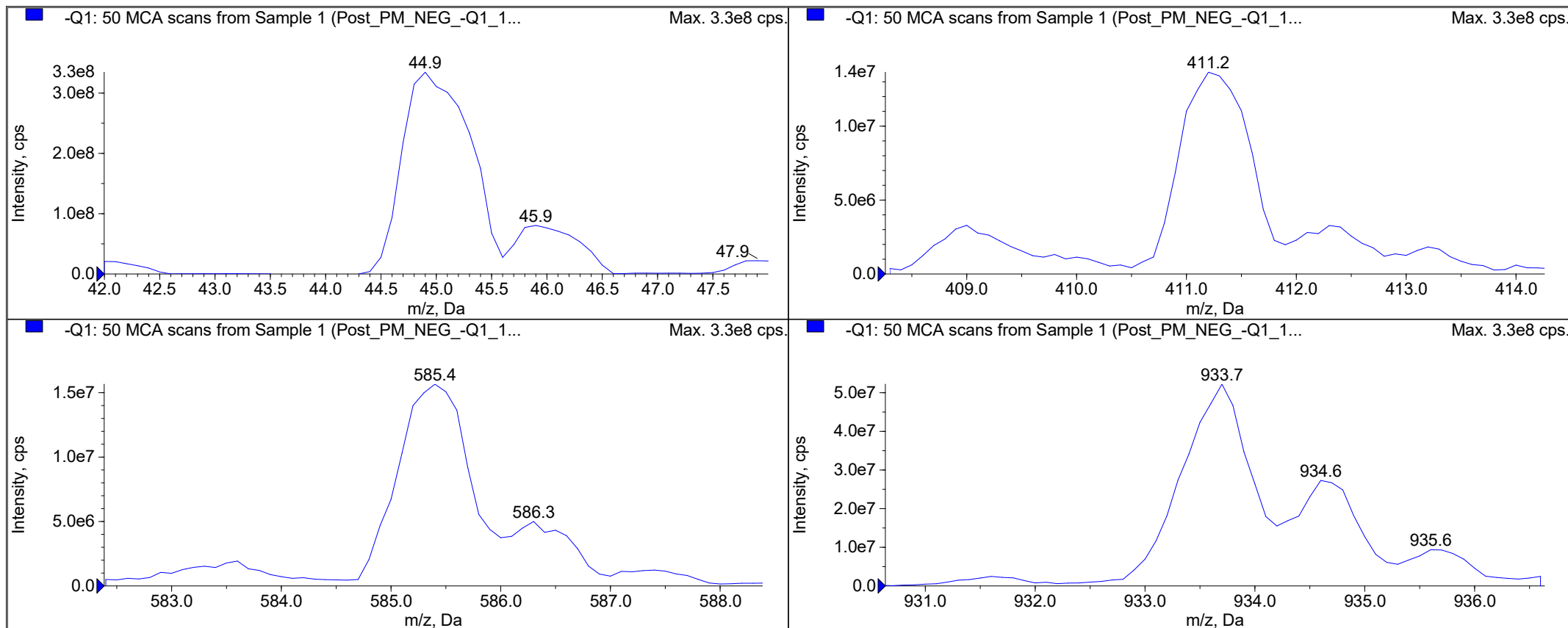
Peak List for "-Q1: 50 MCA scans from Sample 1 (Post_PM_NEG_-Q1_200Da_50MCA) of Post_PM_NEG_-Q1_200Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9930	3.1397e8	0.7626	5.0043e-3
2	411.2590	411.2578	1.3156e7	0.7309	1.1898e-3
3	585.3850	585.3881	1.2986e7	0.7763	-3.1045e-3
4	933.6360	933.6457	4.6426e7	0.7995	-9.6603e-3



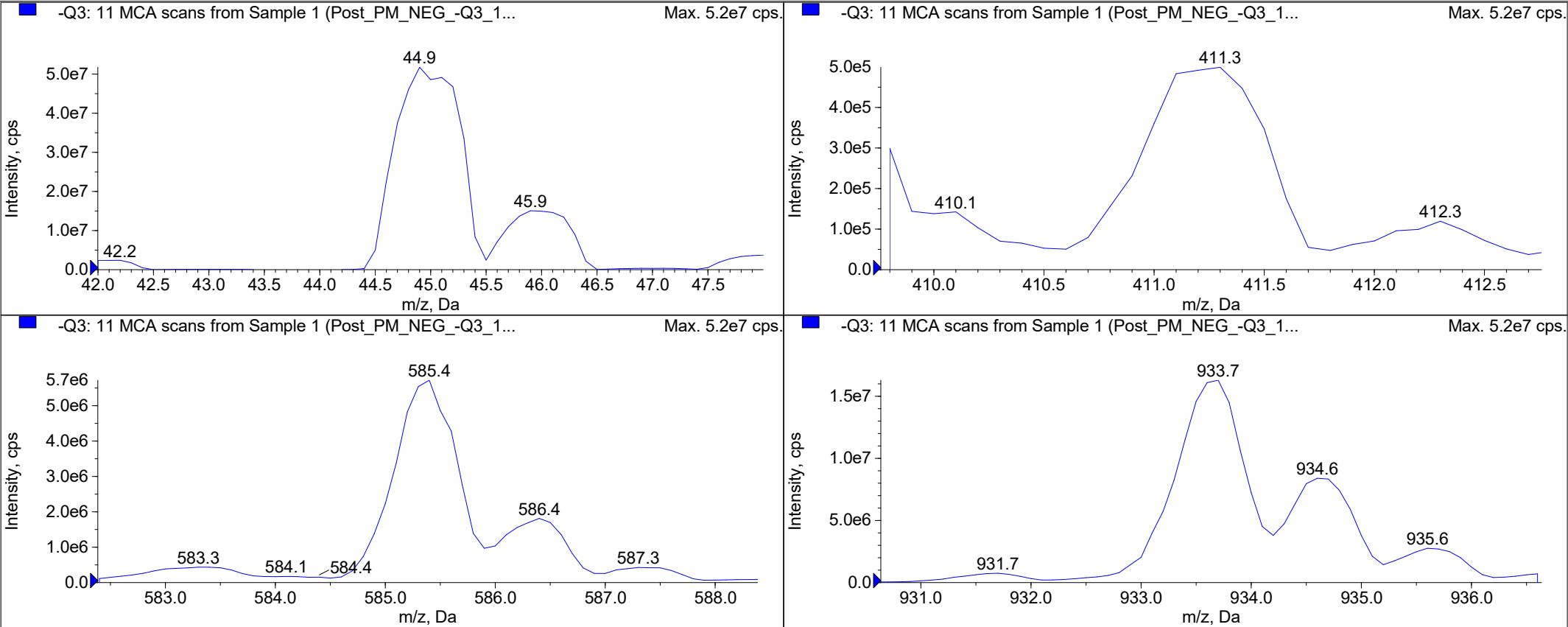
Peak List for "-Q1: 100 MCA scans from Sample 1 (Post_PM_NEG_-Q1_200Da_100MCA) of Post_PM_NEG_-Q1_200Da_100MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9951	7.3026e8	0.7731	2.8718e-3
2	411.2590	411.2516	2.5720e7	0.7177	7.3683e-3
3	585.3850	585.3926	3.6700e7	0.7370	-7.5899e-3
4	933.6360	933.6482	9.0080e7	0.7052	-0.0122



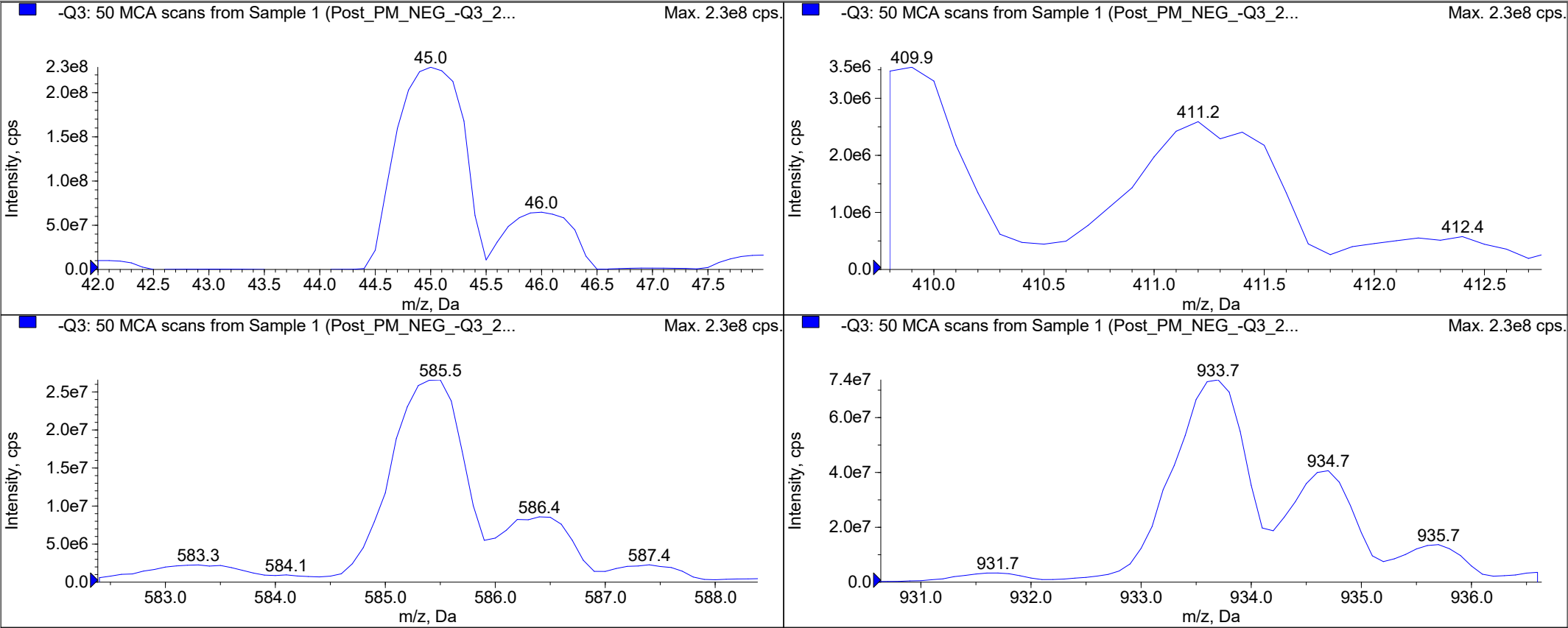
Peak List for "-Q1: 50 MCA scans from Sample 1 (Post_PM_NEG_-Q1_100Da_50MCA) of Post_PM_NEG_-Q1_100Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9964	3.3460e8	0.7481	1.5996e-3
2	411.2590	411.2623	1.3650e7	0.7375	-3.2573e-3
3	585.3850	585.3895	1.5660e7	0.7062	-4.4818e-3
4	933.6360	933.6566	5.2210e7	0.7172	-0.0206



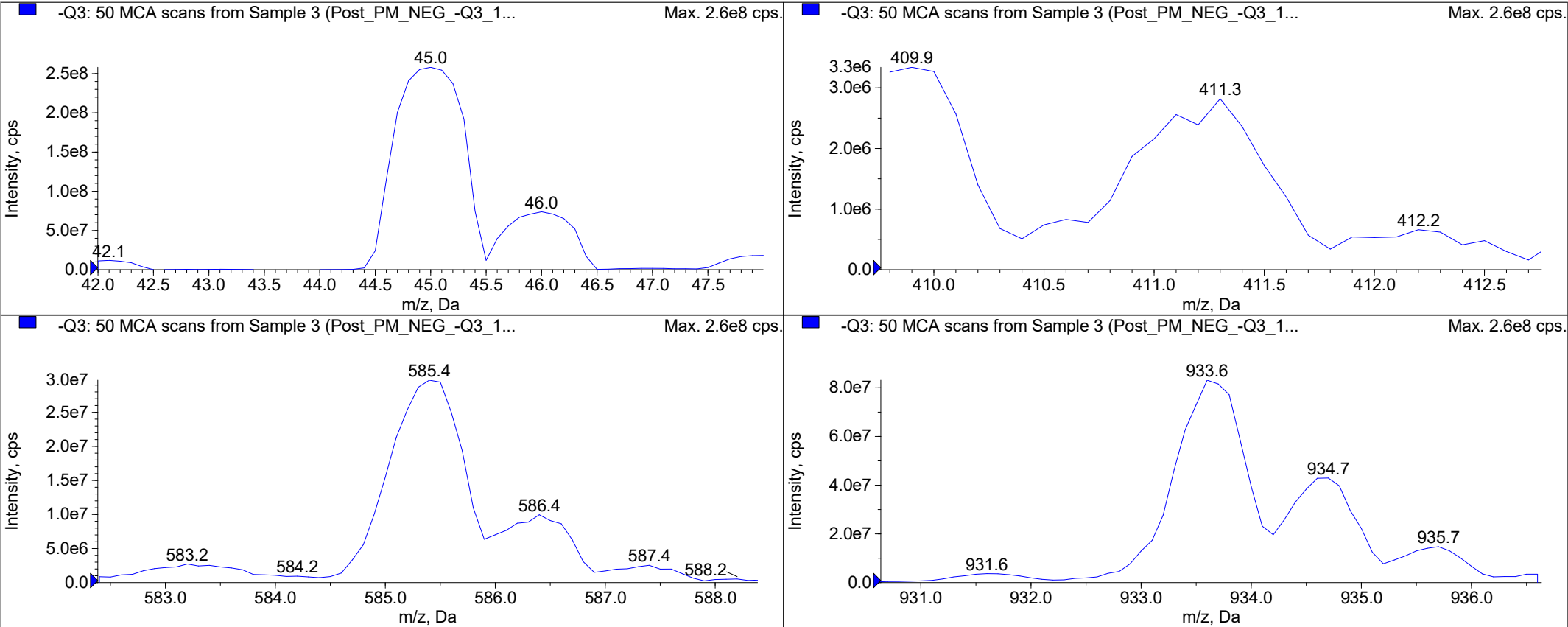
Peak List for "-Q3: 11 MCA scans from Sample 1 (Post_PM_NEG_-Q3_10Da_10MCA) of Post_PM_NEG_-Q3_10Da_10MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9903	5.1741e7	0.7085	7.6833e-3
2	411.2590	411.2426	4.9900e5	0.6426	0.0164
3	585.3850	585.3709	5.7198e6	0.6389	0.0141
4	933.6360	933.6424	1.6292e7	0.6784	-6.3502e-3



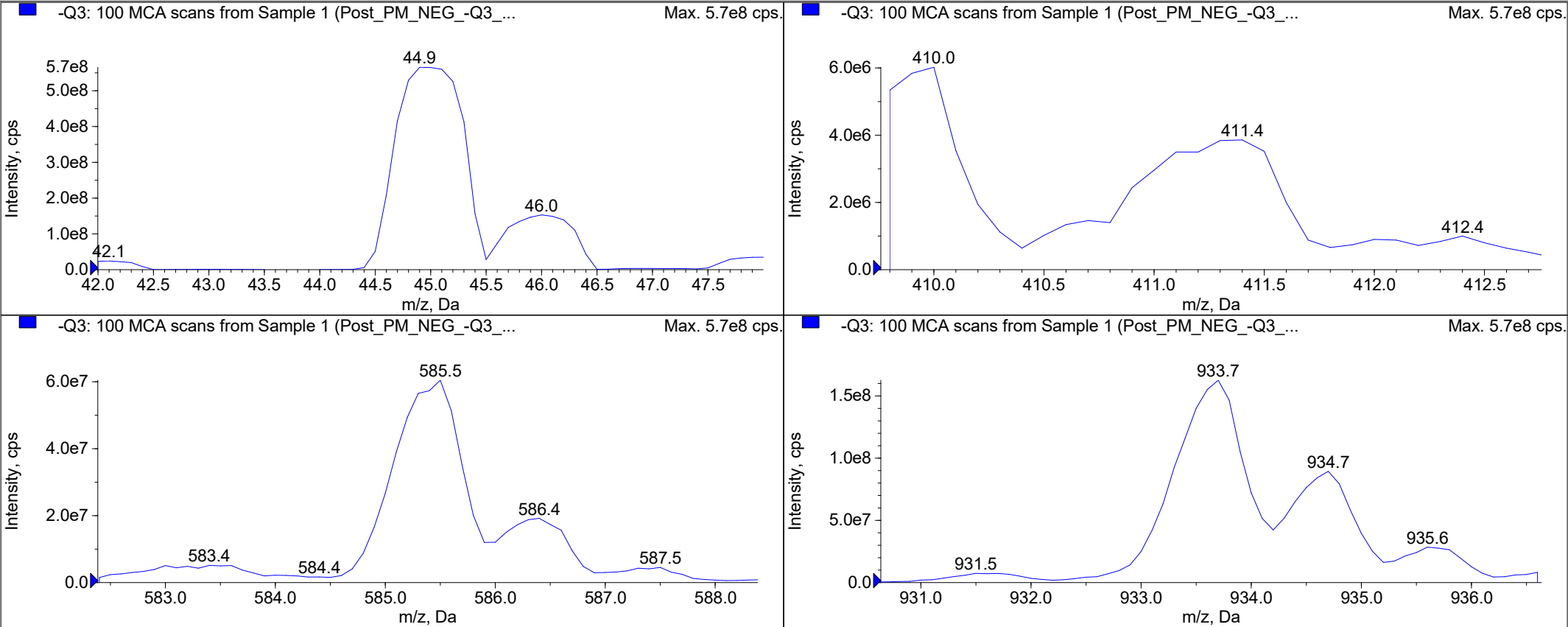
Peak List for "-Q3: 50 MCA scans from Sample 1 (Post_PM_NEG_-Q3_200Da_50MCA) of Post_PM_NEG_-Q3_200Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0073	2.2872e8	0.7172	-9.3376e-3
2	411.2590	411.2504	2.5900e6	0.7470	8.6329e-3
3	585.3850	585.3958	2.6578e7	0.7324	-0.0108
4	933.6360	933.6434	7.3734e7	0.7562	-7.4450e-3



Peak List for "-Q3: 50 MCA scans from Sample 3 (Post_PM_NEG_-Q3_1000Da_50MCA) of Post_PM_NEG_-Q3_1000Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9955	2.5810e8	0.7370	2.4676e-3
2	411.2590	411.2035	2.8200e6	0.7226	0.0555
3	585.3850	585.3888	2.9720e7	0.7651	-3.7796e-3
4	933.6360	933.6385	8.3120e7	0.7145	-2.4892e-3

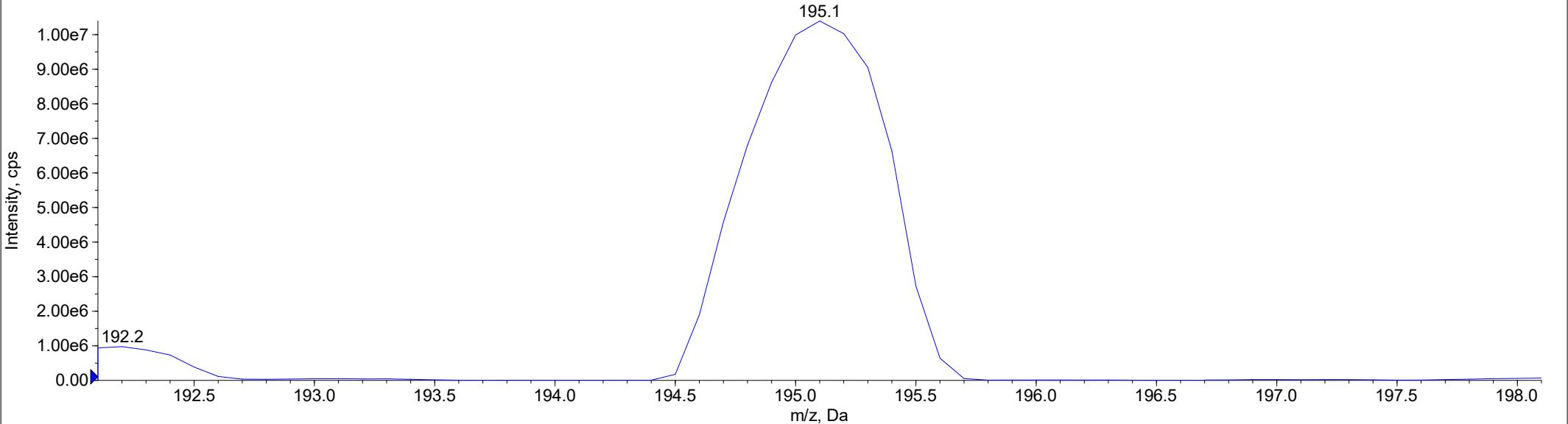


Peak List for "-Q3: 100 MCA scans from Sample 1 (Post_PM_NEG_-Q3_2000Da_100MCA) of Post_PM_NEG_-Q3_2000Da_100MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9987	5.6554e8	0.7150	-7.3555e-4
2	411.2590	411.3071	3.8600e6	0.7553	-0.0481
3	585.3850	585.3967	6.0460e7	0.7027	-0.0117
4	933.6360	933.6348	1.6266e8	0.7104	1.1769e-3

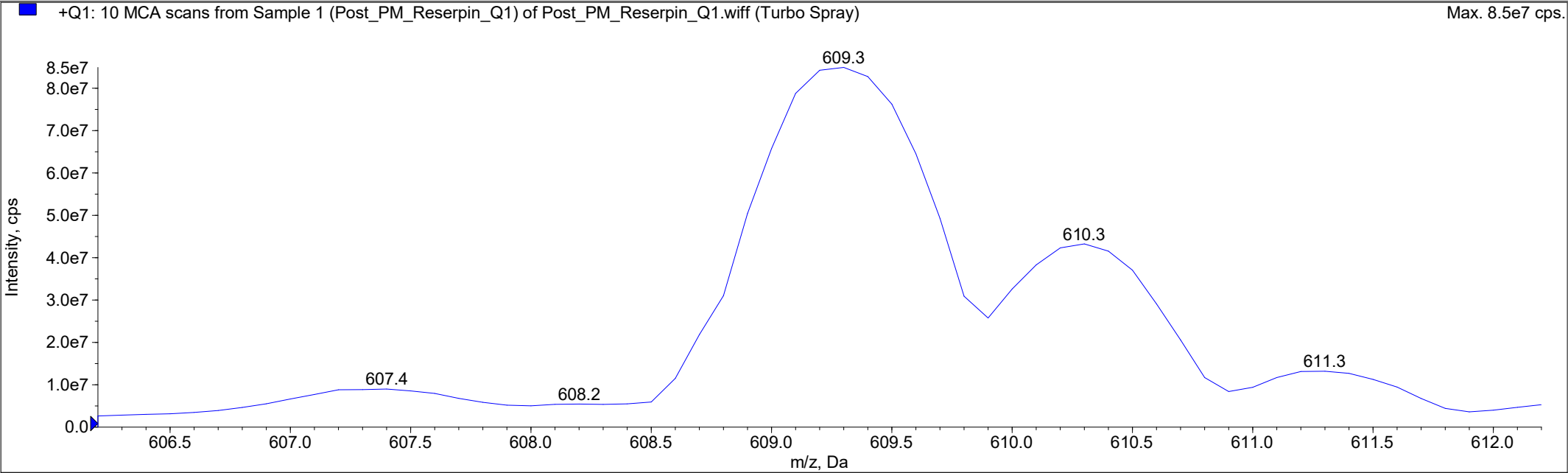
+MS2 (609.30): 10 MCA scans from Sample 1 (Post_PM_Reserpin_MSMS) of Post_PM_Reserpin_MSMS.wiff (Turbo Spray)

Max. 1.0e7 cps.



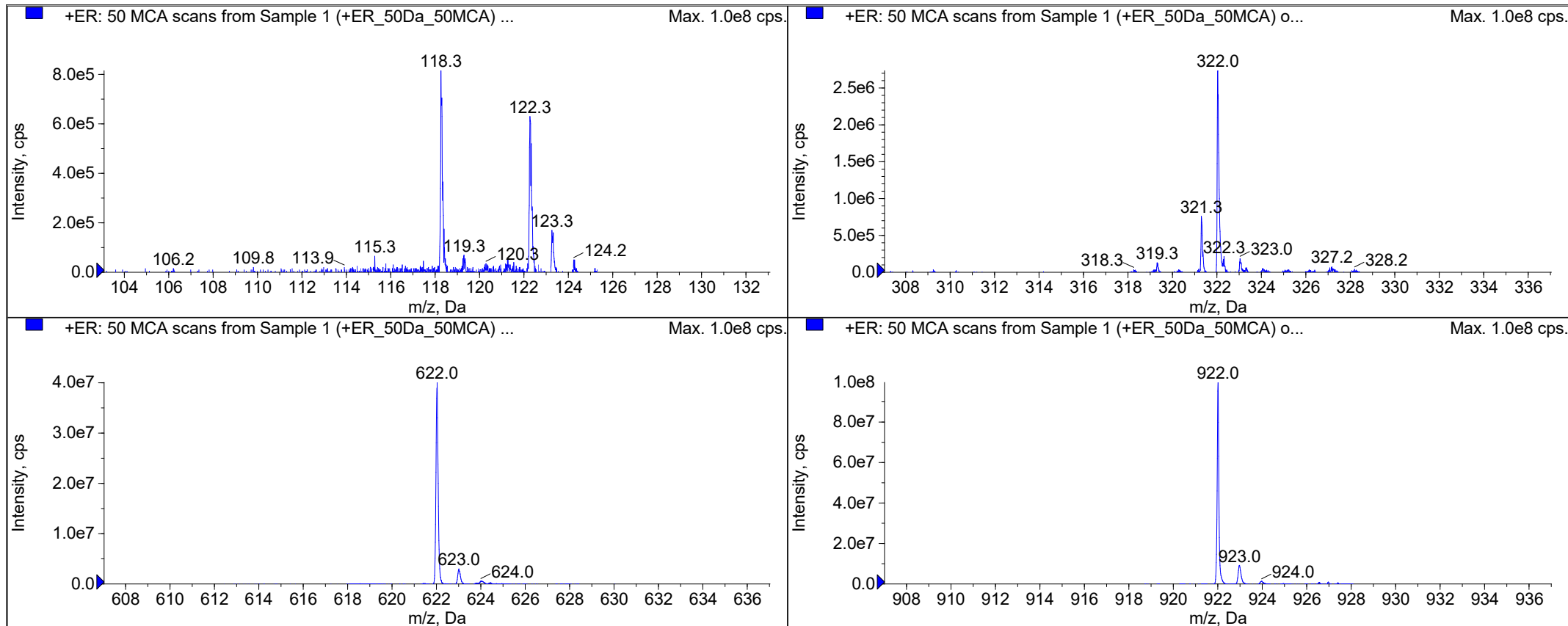
Peak List for "+MS2 (609.30): 10 MCA scans from Sample 1 (Post_PM_Reserpin_MSMS) of Post_PM_Reserpin_MSMS.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	195.1000	195.1016	1.0396e7	0.7093	-1.6489e-3
2	236.3000	n/a	n/a	n/a	n/a
3	365.4000	n/a	n/a	n/a	n/a
4	397.2000	n/a	n/a	n/a	n/a
5	609.2810	n/a	n/a	n/a	n/a



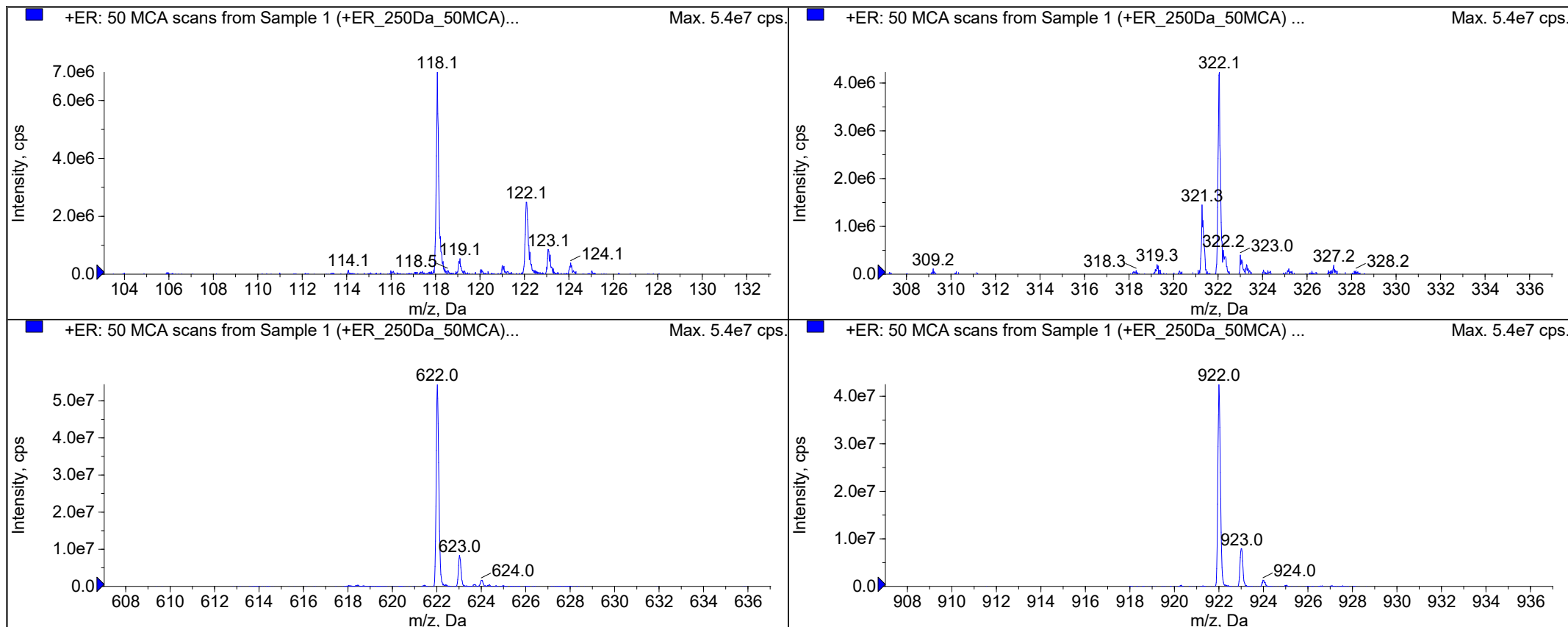
Peak List for "+Q1: 10 MCA scans from Sample 1 (Post_PM_Reserpin_Q1) of Post_PM_Reserpin_Q1.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	195.1000	n/a	n/a	n/a	n/a
2	236.3000	n/a	n/a	n/a	n/a
3	365.4000	n/a	n/a	n/a	n/a
4	397.2000	n/a	n/a	n/a	n/a
5	609.2810	609.2942	8.4918e7	0.8782	-0.0132



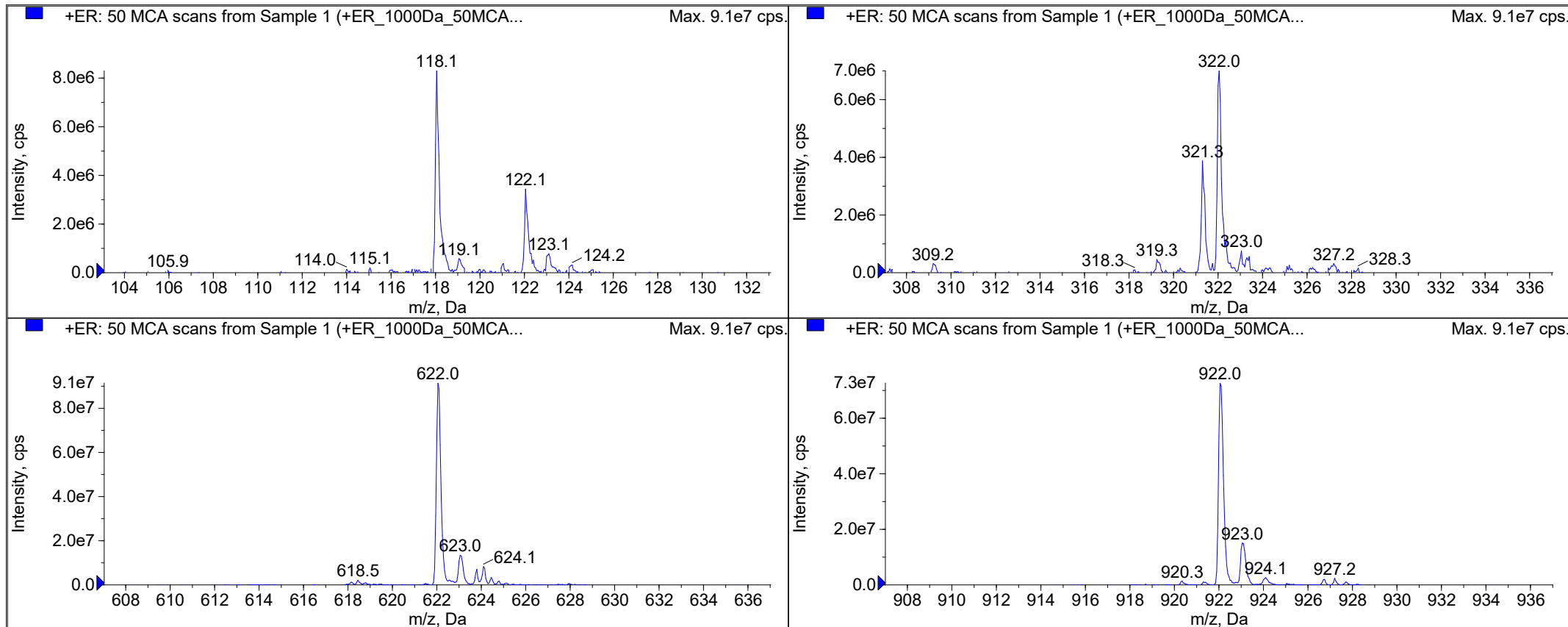
Peak List for "+ER: 50 MCA scans from Sample 1 (+ER_50Da_50MCA) of +ER_50Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	118.0870	118.2823	8.1500e5	0.0893	-0.1953
2	322.0490	322.0458	2.7350e6	0.0848	3.2224e-3
3	622.0290	622.0258	4.0080e7	0.1043	3.1677e-3
4	922.0100	922.0100	9.9610e7	0.0754	3.4039e-6



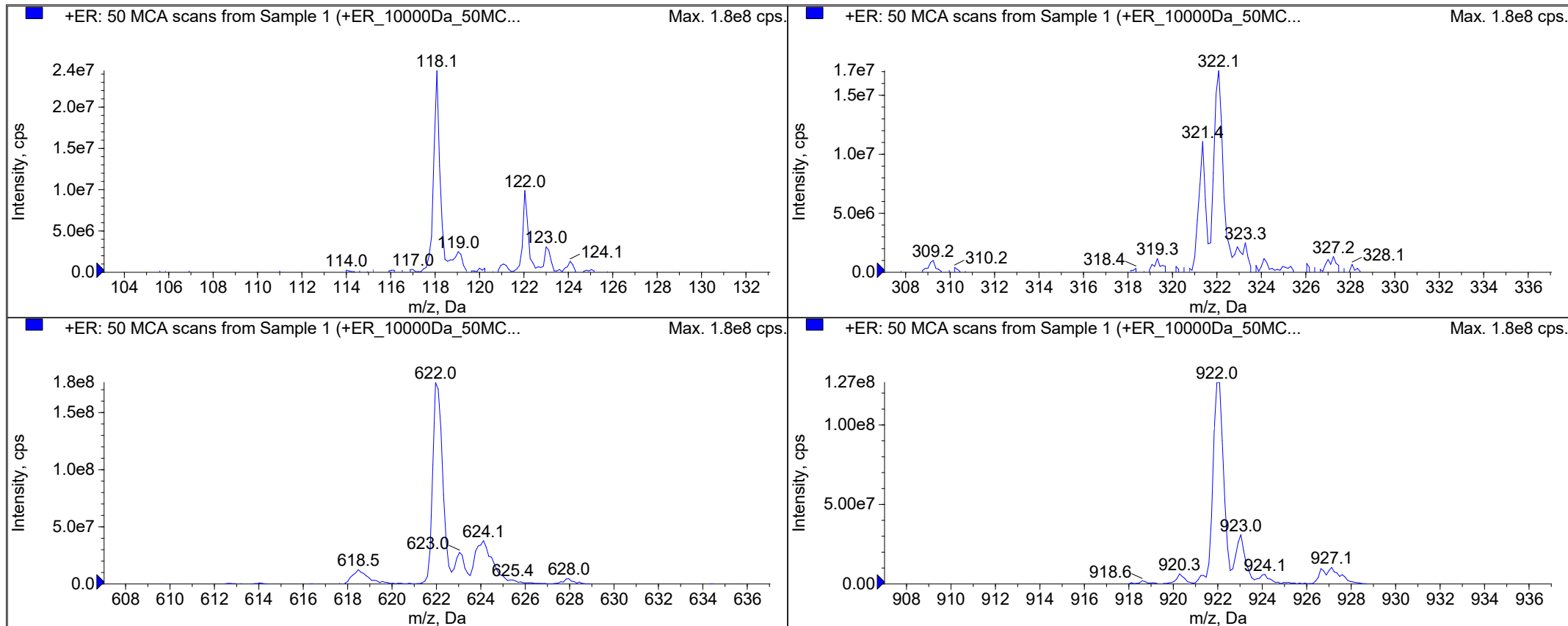
Peak List for "+ER: 50 MCA scans from Sample 1 (+ER_250Da_50MCA) of +ER_250Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	118.0870	118.0857	6.9750e6	0.1077	1.3319e-3
2	322.0490	322.0488	4.2250e6	0.1148	1.8138e-4
3	622.0290	622.0273	5.4388e7	0.1266	1.6578e-3
4	922.0100	922.0066	4.2488e7	0.1232	3.4307e-3



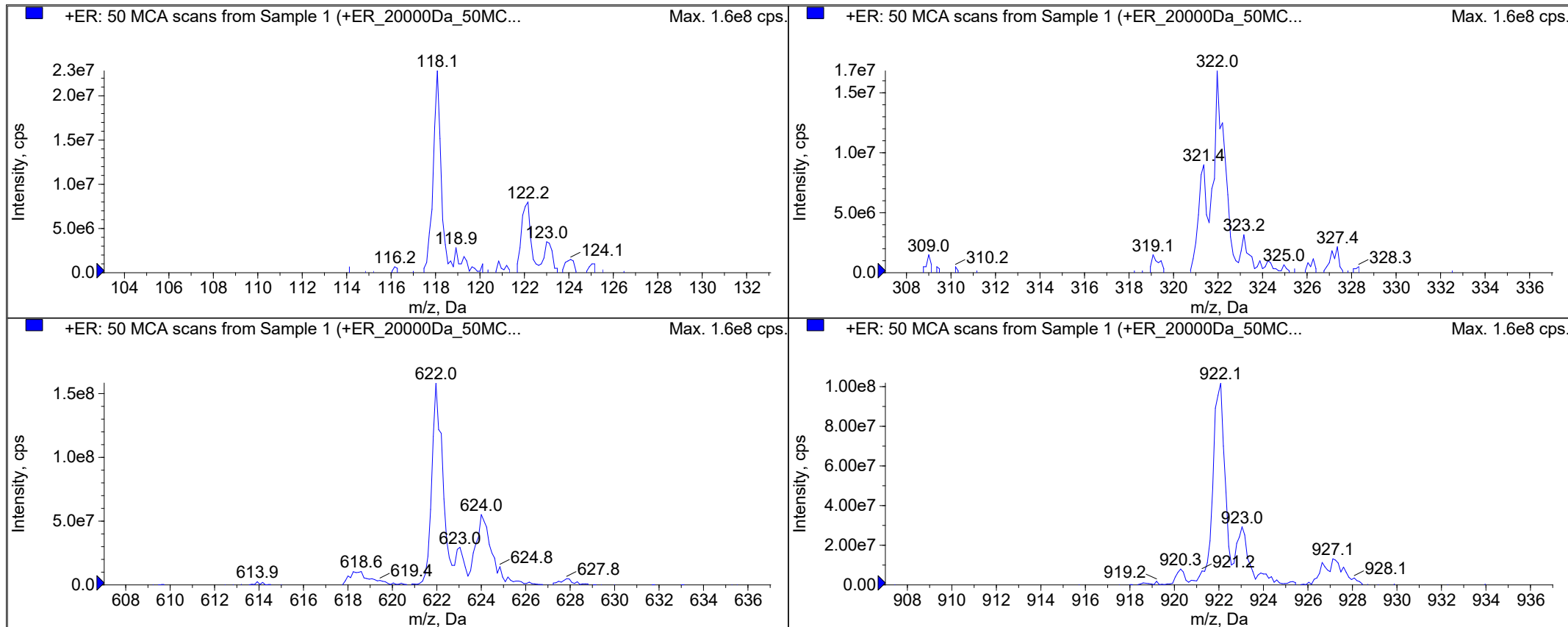
Peak List for "+ER: 50 MCA scans from Sample 1 (+ER_1000Da_50MCA) of +ER_1000Da_50MCAwiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	118.0870	118.0694	8.3000e6	0.1783	0.0176
2	322.0490	322.0532	7.0000e6	0.1848	-4.2488e-3
3	622.0290	622.0738	9.1460e7	0.2164	-0.0448
4	922.0100	922.0867	7.2680e7	0.2403	-0.0767



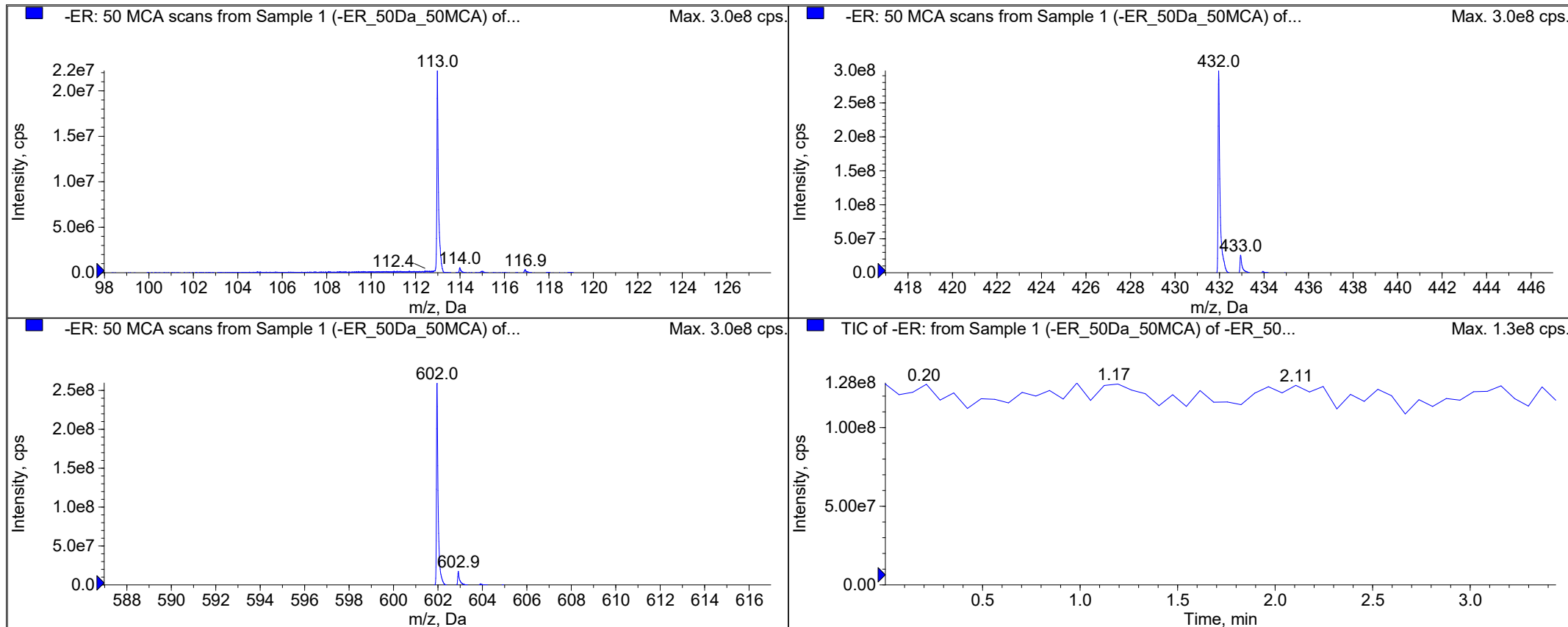
Peak List for "+ER: 50 MCA scans from Sample 1 (+ER_10000Da_50MCA) of +ER_10000Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	118.0870	118.0612	2.4417e7	0.2846	0.0258
2	322.0490	322.0661	1.7083e7	0.4370	-0.0171
3	622.0290	622.0428	1.7642e8	0.4858	-0.0138
4	922.0100	922.0135	1.2675e8	0.5172	-3.4661e-3



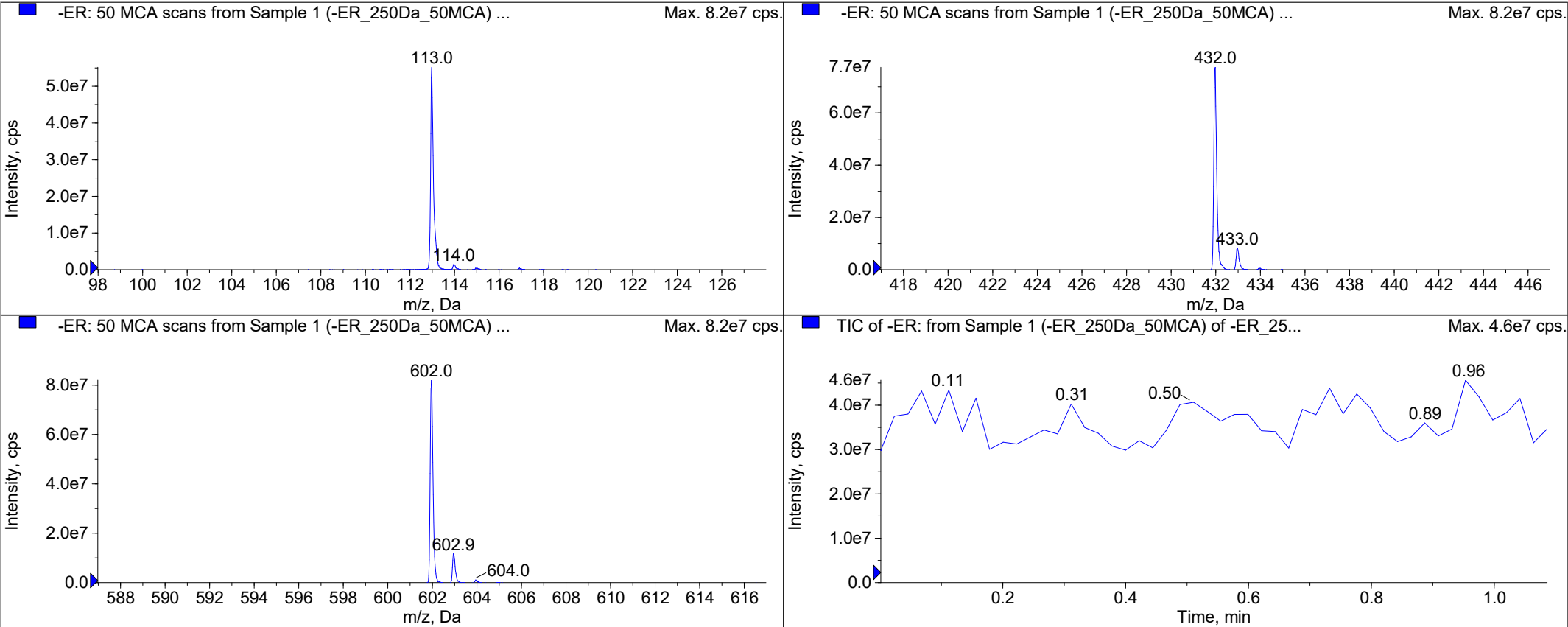
Peak List for "+ER: 50 MCA scans from Sample 1 (+ER_20000Da_50MCA) of +ER_20000Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	118.0870	118.0721	2.2833e7	0.3544	0.0149
2	322.0490	322.0649	1.6833e7	0.5156	-0.0159
3	622.0290	622.0113	1.5833e8	0.5305	0.0177
4	922.0100	921.9999	1.0183e8	0.5708	0.0101



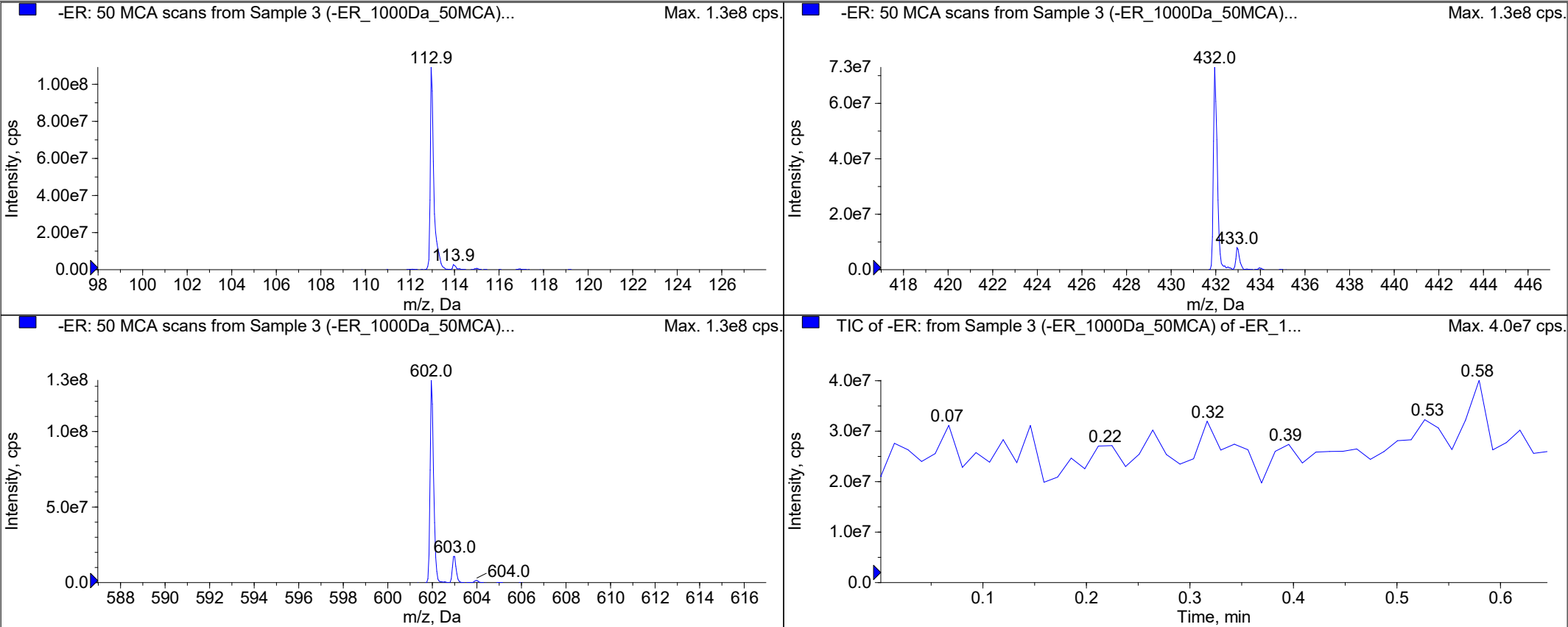
Peak List for "-ER: 50 MCA scans from Sample 1 (-ER_50Da_50MCA) of -ER_50Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	112.9850	112.9857	2.2205e7	0.0594	-7.4699e-4
2	431.9820	431.9655	2.9723e8	0.0740	0.0165
3	601.9780	601.9612	2.5957e8	0.0665	0.0168



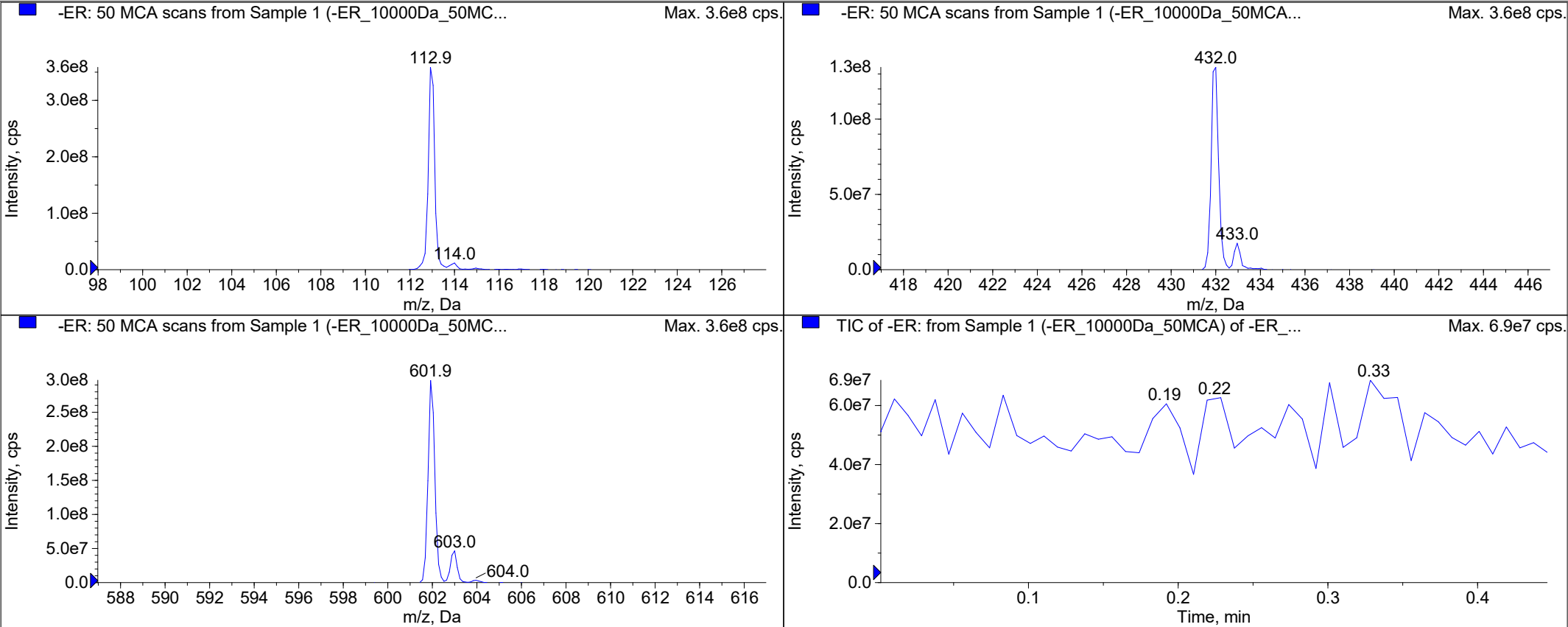
Peak List for "-ER: 50 MCA scans from Sample 1 (-ER_250Da_50MCA) of -ER_250Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	112.9850	112.9836	5.5175e7	0.1200	1.4367e-3
2	431.9820	431.9702	7.7463e7	0.1331	0.0118
3	601.9780	601.9614	8.2000e7	0.1349	0.0166



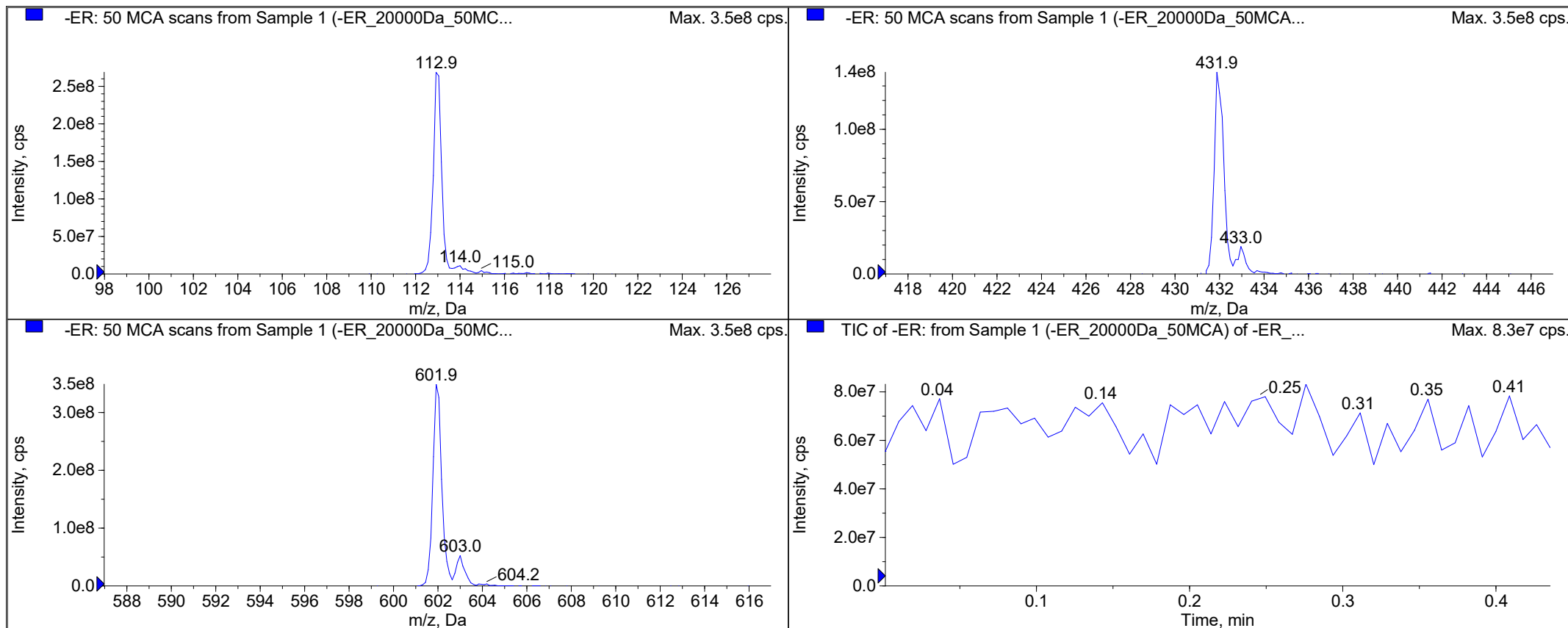
Peak List for "-ER: 50 MCA scans from Sample 3 (-ER_1000Da_50MCA) of -ER_1000Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	112.9850	112.9849	1.0916e8	0.1607	5.1373e-5
2	431.9820	431.9746	7.3020e7	0.1881	7.3774e-3
3	601.9780	601.9745	1.3398e8	0.1656	3.5160e-3



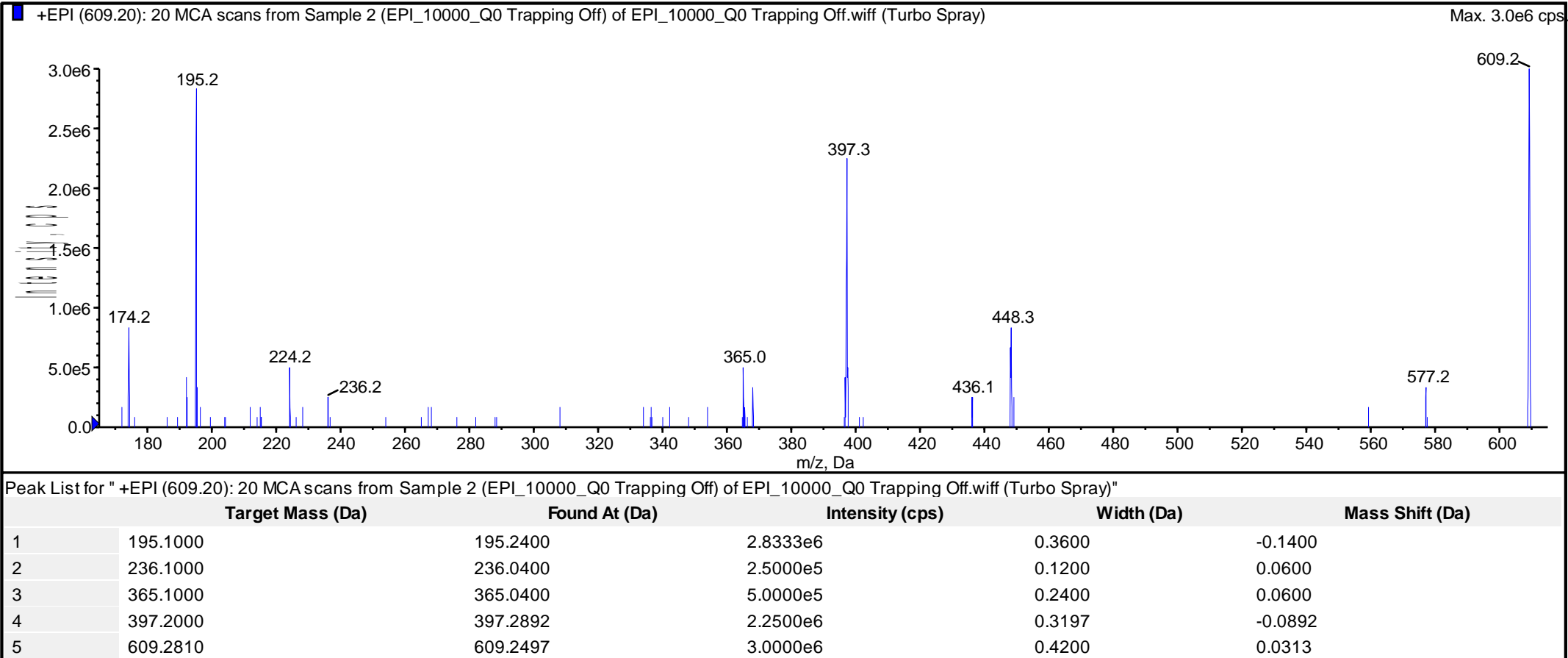
Peak List for "-ER: 50 MCA scans from Sample 1 (-ER_10000Da_50MCA) of -ER_10000Da_50MCA.wiff (Turbo Spray)"

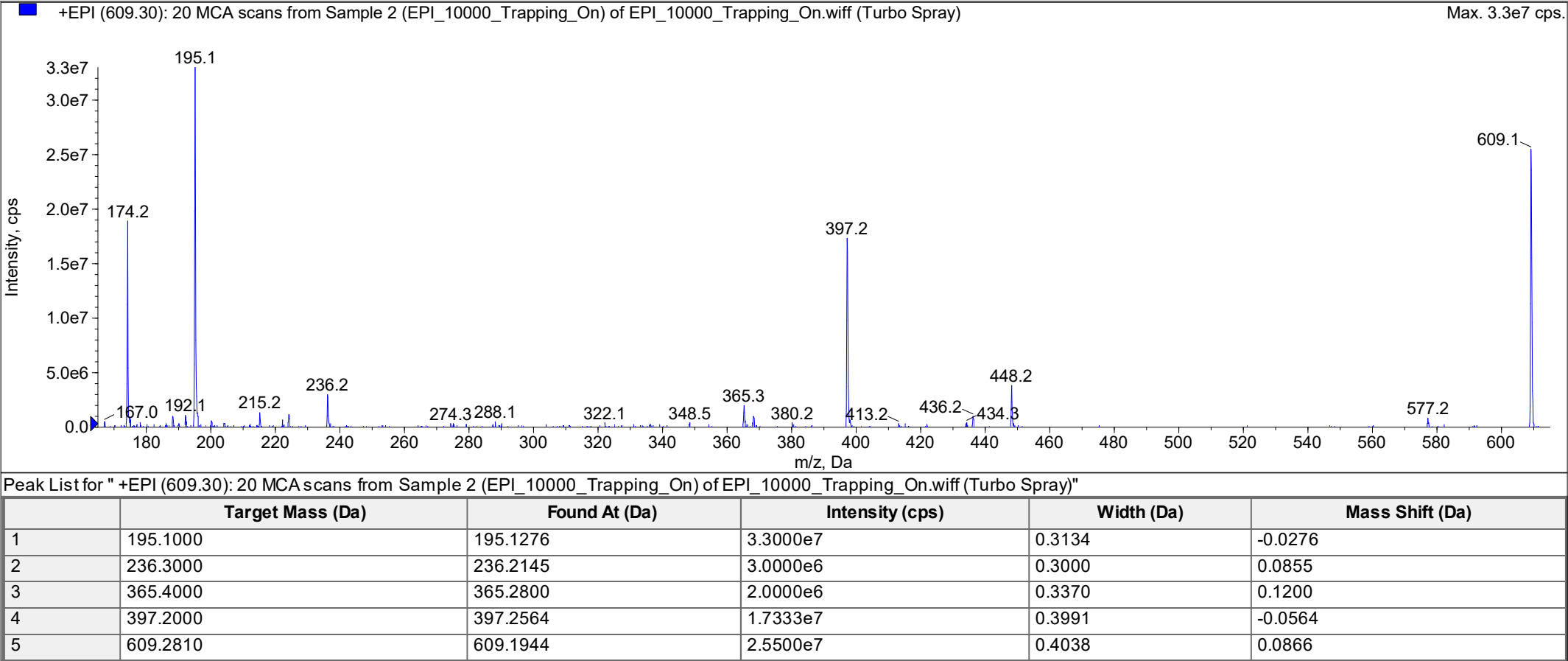
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	112.9850	112.9741	3.5867e8	0.2939	0.0109
2	431.9820	431.9495	1.3442e8	0.3489	0.0325
3	601.9780	601.9679	2.9700e8	0.3232	0.0101

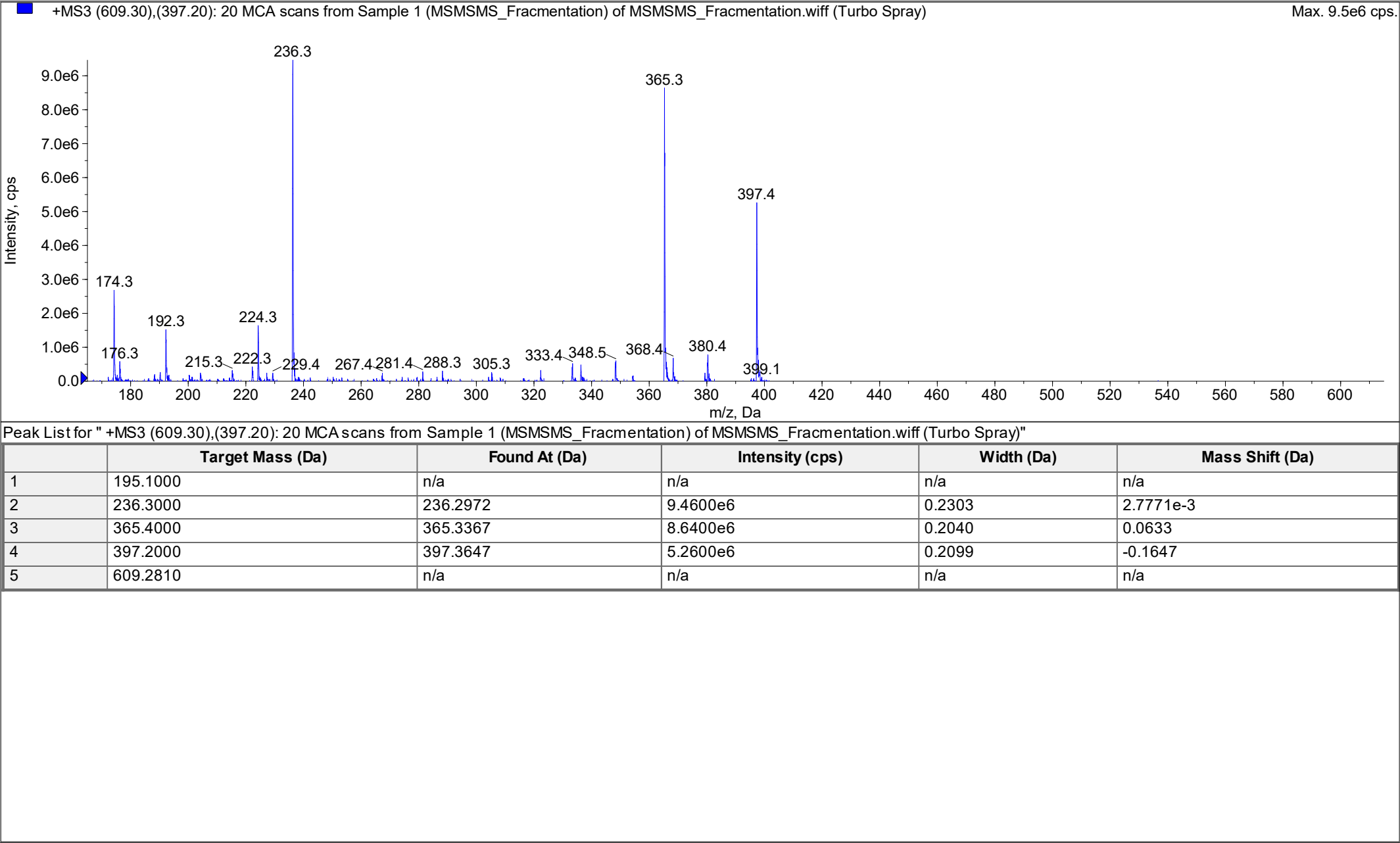


Peak List for "-ER: 50 MCA scans from Sample 1 (-ER_20000Da_50MCA) of -ER_20000Da_50MCA.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	112.9850	112.9885	2.6883e8	0.3755	-3.4532e-3
2	431.9820	431.9747	1.3950e8	0.4569	7.3002e-3
3	601.9780	601.9582	3.4900e8	0.4141	0.0198

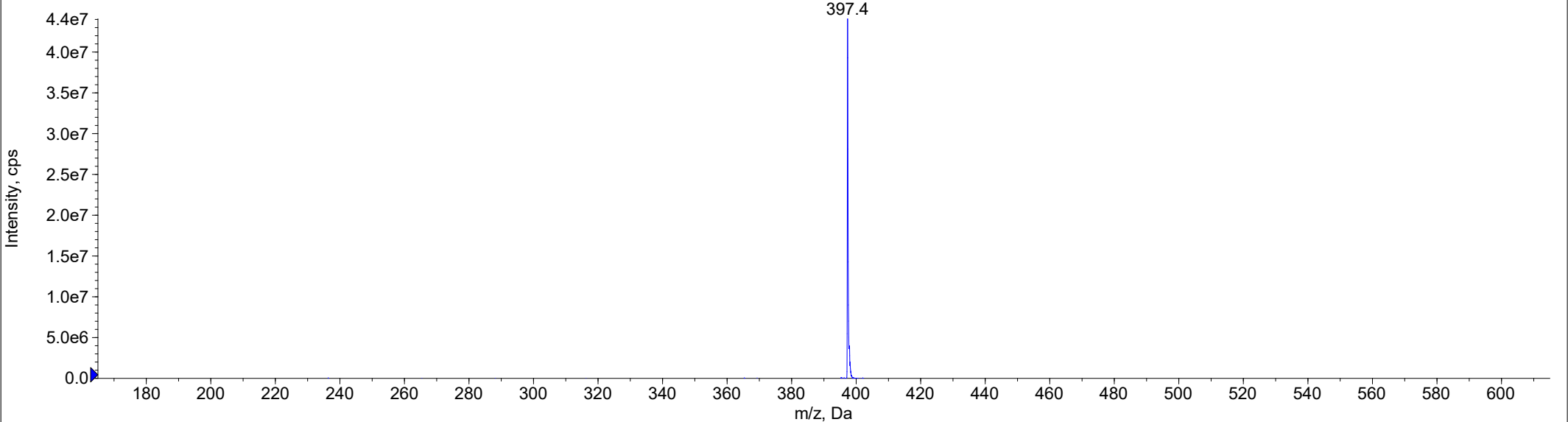






+MS3 (609.30),(397.20): 20 MCA scans from Sample 1 (MSMSMS_No_Fracmentation) of MSMSMS_No_Fracmentation.wiff (Turbo Spray)

Max. 4.4e7 cps.



Peak List for "+MS3 (609.30),(397.20): 20 MCA scans from Sample 1 (MSMSMS_No_Fracmentation) of MSMSMS_No_Fracmentation.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	195.1000	n/a	n/a	n/a	n/a
2	236.3000	n/a	n/a	n/a	n/a
3	365.4000	n/a	n/a	n/a	n/a
4	397.2000	397.3623	4.4080e7	0.2359	-0.1623
5	609.2810	n/a	n/a	n/a	n/a

Certificate of Conformance

Product Identification

Name: ES Tuning Mix

Part number: 4405243

Lot Specific Information

Lot number: M108766

Manufacture date: 2021-08-27

Description: Constituent Concentrations (weight to volume) and Purity/Grades

COMPONENT	% GRAVIMETRIC CONCENTRATION	% PURITY and/or GRADE
Betaine (CAS No.:107-43-7)	<0.01	99.9%
Trifluoroacetic Acid Ammonium Salt (CAS.:3336-58-1)	<0.01	99.9%
Hexamethoxyphosphazene (CAS No. 957-13-1)	<0.01	99.0%
Hexakis(2,2-Difluoroethoxy) Phosphazene (CAS No.: 186817-57-2)	<0.01	99.0%
Hexakis(1H, 1H, 3H-Tetrafluoropropoxy)Phosphazene (CAS No.: 58943-98-9)	<0.01	99.0%
Hexakis(1H, 1H, 5H-Octafluoropentoxy)Phosphazene (CAS No.: 16059-16-8)	<0.01	98.0%
Hexakis(1H, 1H, 7H-Dodecafluoroheptoxy)Phosphazene (CAS No.: 3830-74-84)	<0.01	97.0%
Hexakis(1H, 1H, 9H-Perfluorononyloxy)Phosphazene (CAS No.: 186043-67-4)	<0.01	96.0%
Tris (heptafluoropropyl)-S-Triazine (CAS No.:915-76-4)	<0.01	98.0%
Acetonitrile (CAS No.: 75-05-8)	95.0	HPLC Grade 99.9%
DI Water (CAS No.:7732-18-5)	5.0	De-ionized

Traceability:

This standard has been produced gravimetrically using ISO9001 quality procedures. NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is µg/ml +/- 0.5% uncertainty based upon balance and Class A volumetric glassware. High-performance liquid chromatography mass spectroscopy was used to evaluate system performance.

Quality Assurance Statement:

The information on this certificate has been reviewed and accurately reflects the manufacturing and analysis data for the product lot specified above.

Quality Assurance Associate:



Date:

2021-09-29

Support

Technical Support call 1 800-952-4716 or 877-740-2129 or E-mail: Support@sciex.com

This certificate may be obtained at: <http://sciex.com/certificates-of-analysis>

Certificate of Analysis

Product Identification

Standards Chemical Kit with Low/High Concentration PPGs

Part number: 4406127

Lot Specific Information

Lot number: M108777

Manufacture date: 2021-10-13

Expiration date: 2022-06-13

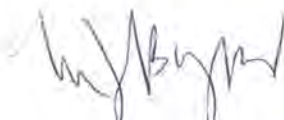
Bottle Part Number	Lot Number	Component	Concentration (+/- <2%)
4405227	M108814	POS PPG 1E-4M	100 µM
4405229	M107617	POS PPG 1E-5M	10 µM
4405231	M107654	POS PPG 2E-6M	2 µM
4405233	M107649	POS PPG 2E-7M	0.2 µM
4405234	M107552	NEG PPG 3E-4M	300 µM
4405235	M110545	NEG PPG 3E-5M	30 µM
4405236	M108780	RESERPINE 1 µM	1 µM
4405237	M110528	RESERPINE 0.167 µM	0.167 µM
4405238	M107647	RESERPINE 0.0167 µM	0.0167 µM
4405247	M106602	RENIN - RESERPINE MIX (1 pmol/µL Renin + 400 fmol/µL Reserpine)	1 µM - 0.4 µM

Quality Assurance Statement:

These standards have been manufactured using ISO9001 procedures. Concentrations are calculated gravimetrically, and balances are calibrated to NIST traceable standards in accordance with our ISO procedures. Purity from interferences is verified through mass spectrometric analysis. Solvents are minimum HPLC grade.

The information on this certificate has been reviewed and accurately reflects manufacturing and analysis data for the product lot specified.

Quality Assurance Associate:



Date:

2021-10-13

Support

Technical Support call 1 800-952-4716 or 877-740-2129 or E-mail: Support@sciex.com

This certificate may be obtained at: <http://sciex.com/coa>

Record of Completion

Nitinai Phachai

4500/5500/6500 Series LC/MS Systems Training Program

4/25/2013 13:25:32 PM



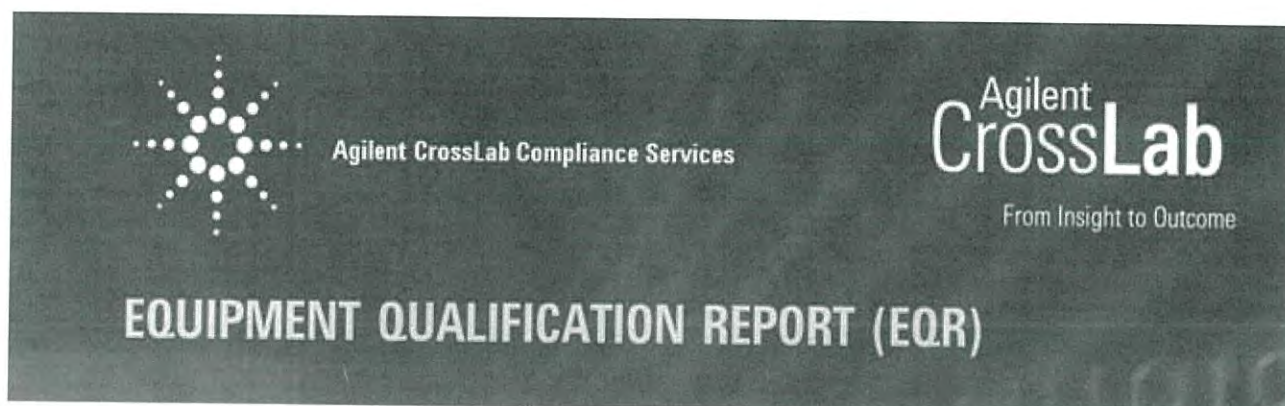
AB SCIEX confirms that the above-named engineer has been trained and is eligible to receive continuing training on installation, repair, maintenance, qualification, and has the ability to train customers on operation of the instruments listed in this record. Through the course of employment with AB SCIEX or by an AB SCIEX Authorized Dealer, this engineer has access to the latest AB SCIEX product information, service tools, and spare parts.

This record is being issued on the date noted above, and remains valid provided that the above-named engineer remains employed by AB SCIEX or by one of AB SCIEX authorized dealers. Please feel free to contact CustomerCare@absciex.com to confirm the ongoing validity of this certificate at any time.



Joe Lepore

Head of Global Service Training



Agilent CrossLab Compliance

Qualification Type:	ICPMS-OQ
System ID:	JP15471169
EQP Name:	AgilentRecommended
EQP Revision:	ICPMS.02.50
EQP Publish Date:	March 2020
Date:	September 30, 2021 4:07:18 PM
Report Type:	Report
Org. Name:	ALS Laboratory Group (Thailand) Co.,Ltd.
Org. Location:	104 Phattanakarn 40, Suan Luang, Bangkok 10250.

REVIEW BY	Supakorn M.
APPROVED BY	Sauntan N.
NEXT CAL. DATE	29 March 2023

Date: September 30, 2021 4:07:18 PM
System ID: JP15471169

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Test Summary

Purpose

This section includes a status for each scheduled test and the overall qualification. For each test that is run, (1) the status is automatically determined based on pre-defined limits, and (2) the total number of times the test was run is displayed. For detailed results and specifications for a test, refer to the test results in this EQR.

Details

Test	Status	Runs
Autosampler Check : SPS4	Pass	1
Integrated Sample Introduction System (ISIS) Check : ISIS3	Pass	1
Autotune : G8403A	Pass	1
Background (No Gas Mode) : G8403A	Pass	1
Background (Gas Modes) : G8403A	Pass	1
20-Minute Stability (No Gas Mode) : G8403A	Pass	1

Overall Qualification Status

Pass

Service Details

Purpose

This section includes local contact and delivery details for this service.

General Details

Service Order No./Request: 6004837154
EQP Name: AgilentRecommended
EQP Revision: ICPMS.02.50
Report Type: Report

Organization Details

Name: ALS Laboratory Group (Thailand) Co.,Ltd.
Location: 104 Phattanakarn 40, Suan Luang, Bangkok 10250.

Local Contact Details

Name: Chatchanai Komarakul.
Job Title: Manager
Qualification Location: Laboratory

Operator Details

Name: Panthep Kurasathain
Job Title: Field Service Engineer.

Data Acquisition Details

Acquisition Software Name: MassHunter
Acquisition Software Revision: C.01.04

Customer Data System (CDS): IcpMs: MassHunter

Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

Manufacturer	Agilent Technologies
Name	7900
Model Number	G8403A
Installed Options	#100H: Standard Package with Hydrogen option
Detector Type	SQ
Nebulizer	Mira Mist (G3161)
Spray Chamber	Quartz
Torch	Quartz
Sampling Cone	Ni
Skimmer Cone	Ni
Serial Number	JP15471169
Firmware Revision	C.01.04

ISIS 1

Manufacturer	Agilent Technologies
Name	ISIS3
Model Number	G8411A
Type	Peristaltic pump system
Serial Number	JP15510227

Autosampler 1

Manufacturer	Agilent Technologies
Name	SPS4
Model Number	G8410A
Serial Number	AU15430722

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G3292A
Serial Number	3U1610713

Calculation Formulas

Purpose

This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

For a description of calculations for ICP-MS tests performed by the MassHunter software, refer to the MassHunter application and documentation.

Protocol Details

Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ICPMS.02.50	20-Minute Stability (No Gas Mode)
ICPMS.02.50	Autosampler Check
ICPMS.02.50	Autotune
ICPMS.02.50	Background (Gas Modes)
ICPMS.02.50	Background (No Gas Mode)
ICPMS.02.50	Integrated Sample Introduction System (ISIS) Check

Autosampler Check

Purpose

This test demonstrates that the autosampler module is correctly installed and connected. It does not test module performance.

Setpoint

Results

Criteria	Observed Result	Expected Result	Status
After the self test, is probe in the home position?	Yes	Yes	Pass
As commanded, is the probe positioned at vial 2?	Yes	Yes	Pass

Setpoint Status:

Pass

Runs: 1

Overall Autosampler Check Test Status

Pass

Integrated Sample Introduction System (ISIS) Check

Purpose

This test demonstrates that the ISIS module is correctly installed and connected. It does not test module performance.

Setpoint

Results

Criteria	Observed Result	Expected Result	Status
As commanded, does the pump rotate?	Yes	Yes	Pass
As commanded, do the valves load and inject?	Yes	Yes	Pass

Setpoint Status:

Pass

Runs: 1

Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Autotune

Purpose

This test uses traceable checkout standards to run a software-executed autotune in all modes. The tune report provides values for peak width, mass axis, sensitivity, oxide species, and doubly-charged species tests.

Setpoint

Results

Peakwidth Mass 7	0.719	AMU
Agilent Recommended:	>= 0.65	
	<= 0.80	
Status:	Pass	
Peakwidth Mass 89	0.750	AMU
Agilent Recommended:	>= 0.65	
	<= 0.80	
Status:	Pass	
Peakwidth Mass 205	0.713	AMU
Agilent Recommended:	>= 0.65	
	<= 0.80	
Status:	Pass	
Mass Axis 7	7.05	AMU
Agilent Recommended:	>= 6.9	
	<= 7.1	
Status:	Pass	
Mass Axis 89	88.95	AMU
Agilent Recommended:	>= 88.9	
	<= 89.1	
Status:	Pass	
Mass Axis 205	205.00	AMU
Agilent Recommended:	>= 204.9	
	<= 205.1	
Status:	Pass	

Mass 7 Sensitivity No Gas

94.28

Mcps/ppm

Agilent Recommended:

>=

25.5

Status:

Pass

Mass 89 Sensitivity No Gas

307.15

Mcps/ppm

Agilent Recommended:

>=

127.5

Status:

Pass

Mass 205 Sensitivity No Gas

203.77

Mcps/ppm

Agilent Recommended:

>=

76.5

Status:

Pass

Mass 59 Sensitivity He

28.38

Mcps/ppm

Agilent Recommended:

>=

23.8

Status:

Pass

Mass 89 Sensitivity H2

129.27

Mcps/ppm

Agilent Recommended:

>=

68

Status:

Pass

Oxide Ratio 156/140

1.047

%

Agilent Recommended:

<=

1.38

Status:

Pass

Doubly Charged Species Ratio 70/140

1.482

%

Agilent Recommended:

<=

2.3

Status:

Pass

Setpoint Status:

Pass

Runs: 1

Overall Autotune Test Status

Pass

Background (No Gas Mode)

Purpose

This test examines the background of the ICP-MS in no gas mode by monitoring ions during a blank run.

Setpoint

Conditions

Masses:	7	AMU
	89	AMU
	205	AMU

Measurements and Results

Masses (AMU):	7	89	205	
Measured Value:	3.200	3.300	9.900	cps
Agilent Recommended:	<= 6.9	<= 4.6	<= 11.5	
Status:	Pass	Pass	Pass	

Setpoint Status:	Pass	Runs:	1
------------------	------	-------	---

Overall Background (No Gas Mode) Test Status

Pass

Background (Gas Mode)

Purpose

This test examines the background of the ICP-MS in the various gas modes by monitoring ions during a blank run.

Setpoint Gas Mode: Helium

Conditions

Mass: 78 AMU
Integration Time: 1.0 sec
Cycles: 20

Measurements and Results

Mass (AMU): 78
Measured Value: 42.8500 cps
Agilent Recommended: ≤ 115
Status: Pass

Setpoint Status: Pass

Runs: 1

Setpoint Gas Mode: Hydrogen

Conditions

Mass: 78 AMU
Integration Time: 1.0 sec
Cycles: 20

Measurements and Results

Mass (AMU): 78
Measured Value: 2.1500 cps
Agilent Recommended: ≤ 4.6
Status: Pass

Setpoint Status: Pass

Runs: 1

Overall Background (Gas Mode) Test Status

Pass

20-Minute Stability (No Gas Mode)

Purpose

This test monitors the abundance of ions present in the checkout standard over a 20-minute period to verify that the signal is stable. The %RSD of the abundance of given ions is calculated internally by the software and compared to the limit.

Setpoint

Conditions

Mode:	Spectrum	
Masses:	7, 9, 59, 89, 140, 205	
Integration Time:	9.99	sec
Peak Pattern:	3	points/peak
Repetitions:	20	
Sweeps/Replicates:	100	

Measurements and Results

Masses (AMU):	7	89	205	
Stability RSD:	0.96400	0.51495	0.73011	%
Agilent Recommended:	<= 2.3	<= 2.3	<= 2.3	
Status:	Pass	Pass	Pass	

Setpoint Status:	Pass	Runs:	1
------------------	------	-------	---

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	Certificate of System Qualification	18
EQR	General	Operator's training certificate and qualifications	19
EQR	General	Certificate of Qualification for ACE	20
EQR	General	Certificate of Qualification for ACE	21
EQR	General	Tune reports	22
EQR	General	Test Report	25
EQR	General	Test Report	27
EQR	General	Test Report	29

General

Document Name: Certificate of System Qualification



Agilent Technologies

Agilent Compliance Engine Self Qualification

Date: September 14, 2021 4:59:15 PM

Drive Serial #: ACA025C9

Platform Revision:

ACE 3.11

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithms challenged during the process. There is not a one-to-one relationship between algorithms and OQ program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Dissolution	6	Conforms
Emission Spectroscopy	3	Conforms
Gas Chromatography - GCMS	17	Conforms
Gas Chromatography	29	Conforms
Gel Permeation Chromatography	9	Conforms
ICP-MS	6	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LCMS	8	Conforms
Microfluidics	18	Conforms
Sample Preparation - Gas Chromatography	9	Conforms
Sample Preparation - Liquid Chromatography	8	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	6	Conforms
UV-Vis Spectrophotometer	13	Conforms

Overall Qualification Status

Conforms

Date: September 30, 2021 4:07:18 PM
System ID: JP15471169

General

Document Name: Operator's training certificate and qualifications



Certificate of Completion

Learner Name: Panthep Kurasathain

Title Of Course: AN-CE-ICPMS-2-038-A:Agilent 7900 ICPMS FSE update training

Completion Date: June 7, 2014

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name:

Certificate of Qualification for ACE



Certificate of Completion

Learner Name: Panthep Kurasathain

Title Of Course: AN-CE-SS-II-030-A: ACE 3.X User Update Training

Completion Date: July 7, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name:

Certificate of Qualification for ACE



Certificate of Completion

Learner Name: Panthep Kurasathain

Title Of Course: AN-CE-ICPMS-2-035-B: CrossLab Compliance Hardware Specific Delivery for Agilent ICP-MS Systems

Completion Date: October 31, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

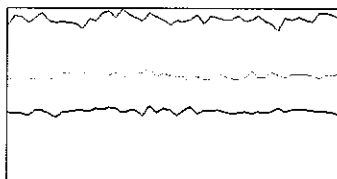
Document Name: Tune reports

Tune Report

Operator Name Supakwan Mak
 Acq/Data Batch C:\Agilent\ICPMS\11\UserTune_7900.b
 Acq. Date-Time 2021-09-30 14:44:08
 Report Comment OQ 30 Sep 2021
 Instrument Name GB403A JP15471169

[No Gas]

Sensitivity



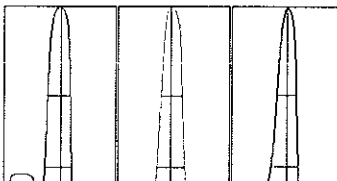
Mass	Range	Count	RSD%	Background
7	10000	9428	2.630	3.200
89	50000	30716	2.825	3.300
205	60000	20377	3.319	9.900

Sampling Period [sec] 0.311
 Integration Time [sec] 0.1

Oxide/Doubly Charged Ratio

Oxide 156 / 140 1.047 %
 Doubly Charged 70 / 140 1.482 %

Resolution/Axis



Mass	Peak Height	Axis	W-50%	W-10%
7	9474.89	7.05	0.62	0.719
89	30716.43	88.95	0.59	0.750
205	20596.12	205.00	0.52	0.713

Integration Time [sec] 0.1
 Acquisition Time [sec] 22.74
 Y Axis Linear

Tune Parameters

Plasma Parameters

Plasma Mode	---	Nebulizer Gas	1.00 L/min	Makeup Gas	0.10 L/min
RF Power	1550 W	Option Gas	---	Auxiliary Gas	0.90 L/min
RF Matching	1.10 V	Nebulizer Pump	0.10 rps	Plasma Gas	15.0 L/min
Sample Depth	9.0 mm	S/C Temp	2 °C		

Lens Parameters

Extract 1	0.0 V	Omega Lens	9.1 V	Deflect	13.6 V
Extract 2	-205.0 V	Cell Entrance	-30 V	Plate Bias	-35 V
Omega Bias	-90 V	Cell Exit	-50 V		

Cell Parameters

Use Gas	No	3rd Gas Flow	---	Energy Discrimination	5.0 V
He Flow	0.0 mL/min	OctP Bias	-8.0 V		

Document Name:

Tune reports

Tune Report

H2 Flow 0.0 mL/min

OctP RF 190 V

QP Parameters

Mass Gain 124

Axis Gain 0.9990

QP Bias -3.0 V

Mass Offset 125

Axis Offset 0.01

Hardware Settings

Torch

Torch H -0.3 mm

Torch V 0.1 mm

EM

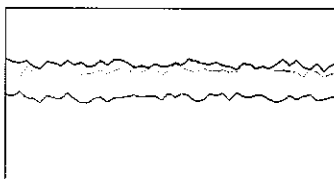
Discriminator 4.0 mV

Analog HV 2247 V

Pulse HV 1318 V

[H2]

Sensitivity



Mass	Range	Count	RSD%	Background
59	5000	2453	3.423	0.400
89	20000	12927	2.822	0.200
205	20000	13635	2.445	8.701

Sampling Period [sec] 0.31

Integration Time [sec] 0.1

Oxide/Doubly Charged Ratio

Oxide 156 / 140 0.804 %

Doubly Charged 70 / 140 1.020 %

Tune Parameters

Plasma Parameters

Plasma Mode ---

Nebulizer Gas 1.00 L/min

Makeup Gas 0.10 L/min

RF Power 1550 W

Option Gas ---

Auxiliary Gas 0.90 L/min

RF Matching 1.10 V

Nebulizer Pump 0.10 rps

Plasma Gas 15.0 L/min

Sample Depth 9.0 mm

S/C Temp 2 °C

Lens Parameters

Extract 1 0.0 V

Omega Lens 9.0 V

Deflect 6.0 V

Extract 2 -210.0 V

Cell Entrance -30 V

Plate Bias -100 V

Omega Bias -105 V

Cell Exit -90 V

Cell Parameters

Use Gas Yes

3rd Gas Flow ---

Energy Discrimination 3.5 V

He Flow 0.0 mL/min

OctP Bias -22.0 V

H2 Flow 5.0 mL/min

OctP RF 200 V

QP Parameters

Mass Gain 124

Axis Gain 0.9990

QP Bias -18.5 V

Mass Offset 125

Axis Offset 0.01

Hardware Settings

Torch

Torch H -0.3 mm

Torch V 0.1 mm

2 of 3

2021-09-30 2:44 PM

Document Name:

Tune reports

Tune Report

EM

Discriminator

4.0 mV

Analog HV

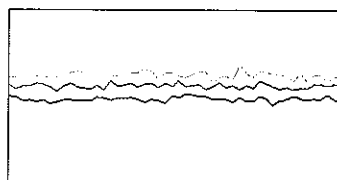
2247 V

Pulse HV

1318 V

[He]

Sensitivity



Mass	Range	Count	RSD%	Background
59	5000	2838	2.592	6.000
89	5000	3149	3.359	5.200
205	20000	9837	2.895	4.201

Sampling Period [sec] 0.31

Integration Time [sec] 0.1

Oxide/Doubly Charged Ratio

Oxide 156 / 140 0.498 %

Doubly Charged 70 / 140 0.788 %

Tune Parameters

Plasma Parameters

Plasma Mode	---	Nebulizer Gas	1.00 L/min	Makeup Gas	0.10 L/min
RF Power	1550 W	Option Gas	---	Auxiliary Gas	0.90 L/min
RF Matching	1.10 V	Nebulizer Pump	0.10 rps	Plasma Gas	15.0 L/min
Sample Depth	9.0 mm	S/C Temp	2 °C		

Lens Parameters

Extract 1	0.0 V	Omega Lens	9.2 V	Deflect	12.4 V
Extract 2	-225.0 V	Cell Entrance	-30 V	Plate Bias	-100 V
Omega Bias	-105 V	Cell Exit	-50 V		

Cell Parameters

Use Gas	Yes	3rd Gas Flow	---	Energy Discrimination	3.5 V
He Flow	3.8 mL/min	OctP Bias	-8.0 V		
H2 Flow	0.0 mL/min	OctP RF	200 V		

QP Parameters

Mass Gain	124	Axis Gain	0.9990	QP Bias	-4.5 V
Mass Offset	125	Axis Offset	0.01		

Hardware Settings

Torch

Torch H	-0.3 mm	Torch V	0.1 mm
---------	---------	---------	--------

EM

Discriminator

4.0 mV

Analog HV

2247 V

Pulse HV

1318 V

General

Document Name: Test Report

Batch Summary Report

Batch Folder: C:\Batch2021\BG He.b\
Analysis File: BG He.batch.bin
Tune Step: #1 He

	Rjct	Acq. Date-Time	Data File	Sample Name	Type	Level	Dilution
1		2021-09-30 14:21:47	BG He.d	BG He	Sample		1.0000

Document Name:

Test Report

Batch Summary Report

Analyte Table

		78 [He1]
	Sample Name	CPS
1	BG He	42.8500

Page 2 / 2

2021-09-30 14:23:40

General

Document Name:

Test Report

Batch Summary Report

Batch Folder: D:\Agilent Service\CQ 30 Sep 2021\BG H2 new.b\
Analysis File: BG H2 new.batch.bin
Tune Step: #1 H2

	Rict	Acq. Date-Time	Data File	Sample Name	Type	Level	Dilution
1		2021-09-30 15:08:58	BG H2.d	BG H2	Sample		1.0000

Document Name:

Test Report

Batch Summary Report

Analyte Table

		78 [H2]
	Sample Name	CPS
1	BG H2	2.1500

General

Document Name: Test Report

Batch Summary Report

Batch Folder: D:\Agilent Service\OQ 30 Sep 2021\20 Min.b\
Analysis File: 20 Min.batch.bin
Tune Step: #1 No Gas

	Rect	Acq. Date-Time	Data File	Sample Name	Type	Level	Dilution
1		2021-09-30 15:17:44	20 Min.d	20 Min	Sample		1.0000

Document Name:

Test Report

Batch Summary Report

Analyte Table

		7 [No Gas]	9 [No Gas]	59 [No Gas]	89 [No Gas]	140 [No Gas]	205 [No Gas]
Sample Name		CPS RSD	CPS RSD	CPS RSD	CPS RSD	CPS RSD	CPS RSD
1	20 Min	0.96400	7.02464	0.46857	0.51495	0.61014	0.73011

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Panthep Kurasathain
Logged On User Name:	panthep_kurasathain@agilent.com
Signature Creation Date:	September 30, 2021
Reason for Signature:	Executed protocol and published this original version of document

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

Warranty

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User Name: panthep_kurasathain
 Hostname: ASBKKWX315

System Id: JP15471169
 Print Date: September 30, 2021 4:07:22 PM

ALS OQHW 7900 30Sep21 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 30, 2021 3:50:07 PM	Audit	SessionCreated	Session	None
September 30, 2021 3:50:07 PM	Start	Configuration	Session	None
September 30, 2021 3:50:07 PM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
September 30, 2021 3:52:52 PM	Audit	EqpLoaded	Session	EQP details for primary technique [lcpMs] - File path: [ProtocolPacks/lcpMs/Configurations/02.50/lcpMs.02.50.eqp], EQP File Name: [lcpMs.02.50.eqp], EQP Name: [AgilentRecommended]
September 30, 2021 3:52:54 PM	End	Configuration	Session	None
September 30, 2021 3:52:57 PM	Start	Qualification	Session	OQ
September 30, 2021 3:52:57 PM	Start	Execution	Autosampler Check : SPS4: Autosampler Check	None
September 30, 2021 3:53:03 PM	End	Execution	Autosampler Check : SPS4: Autosampler Check	Run Count : 1
September 30, 2021 3:53:04 PM	Start	Execution	Integrated Sample Introduction System (ISIS) Check : ISIS3: Integrated Sample Introduction System (ISIS) Check	None
September 30, 2021 3:53:08 PM	End	Execution	Integrated Sample Introduction System (ISIS) Check : ISIS3: Integrated Sample Introduction System (ISIS) Check	Run Count : 1

User Name: panthep_kurasathain
 Hostname: ASBKKWX315

System Id: JP15471169
 Print Date: September 30, 2021 4:07:22 PM

ALS OQHW 7900 30Sep21 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 30, 2021 3:53:10 PM	Start	Execution	Autotune : G8403A: Autotune 1	None
September 30, 2021 3:55:08 PM	End	Execution	Autotune : G8403A: Autotune 1	Run Count : 1
September 30, 2021 3:55:12 PM	Start	Execution	Background (No Gas Mode) : G8403A: No Gas Mode Background 1	None
September 30, 2021 3:55:40 PM	End	Execution	Background (No Gas Mode) : G8403A: No Gas Mode Background 1	Run Count : 1
September 30, 2021 3:55:43 PM	Start	Execution	Background (Gas Modes) : G8403A: Gas Mode Background :Helium	None
September 30, 2021 3:56:17 PM	End	Execution	Background (Gas Modes) : G8403A: Gas Mode Background :Helium	Run Count : 1
September 30, 2021 3:56:19 PM	Start	Execution	Background (Gas Modes) : G8403A: Gas Mode Background :Hydrogen	None
September 30, 2021 3:56:38 PM	End	Execution	Background (Gas Modes) : G8403A: Gas Mode Background :Hydrogen	Run Count : 1
September 30, 2021 3:56:41 PM	Start	Execution	20-Minute Stability (No Gas Mode) : G8403A: 20-Minute Stability (No Gas Mode) 1	None
September 30, 2021 3:57:22 PM	End	Execution	20-Minute Stability (No Gas Mode) : G8403A: 20-Minute Stability (No Gas Mode) 1	Run Count : 1
September 30, 2021 3:57:24 PM	End	Qualification	Session	OQ
September 30, 2021 3:57:24 PM	Start	Reporting	Session	None

User Name: panthep_kurasathain
Hostname: ASBKKWX315

System Id: JP15471169
Print Date: September 30, 2021 4:07:22 PM

ALS OQHW 7900 30Sep21 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 30, 2021 4:03:07 PM	Audit	Reporting	Session	Report Generated : Certificate
September 30, 2021 4:03:17 PM	Audit	Reporting	Session	Report Generated : Report
September 30, 2021 4:03:59 PM	Start	Qualification	Session	OQ
September 30, 2021 4:04:08 PM	End	Qualification	Session	OQ
September 30, 2021 4:04:08 PM	Start	Reporting	Session	None
September 30, 2021 4:04:26 PM	Audit	Reporting	Session	Report Generated : Certificate
September 30, 2021 4:04:36 PM	Audit	Reporting	Session	Report Generated : Report

Certificate No. T220730

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Certificate of Calibration

Equipment : HEATING BLOCK

Manufacturer : Environmental Express

Model : SC 196

Serial No. : 6974CECW3285

Customer Code : BKK_EL0054


ID No. : T5306A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250

Customer Location : Acid Digestion Lab

Date of Receipt : 30 March 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By :  / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 12 APR 2022

REVIEW BY	Tattaporn C.
APPROVED BY	Sangtong N.
NEXT CAL. DATE	7/10/23

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. T220730

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Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 7 April 2022
Environment : Temperature : 21.8-23.1 °C
Line Voltage : 221.6-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20.

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN221-TN230	T210008	08 June 2022
TC	TYPE T	TN231-TN240	T210008	08 June 2022
DATA LOGGER	34970A	T149	T210008	08 June 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 25 Minute At 95 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment

(X) after adjustment

Approved By. 



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

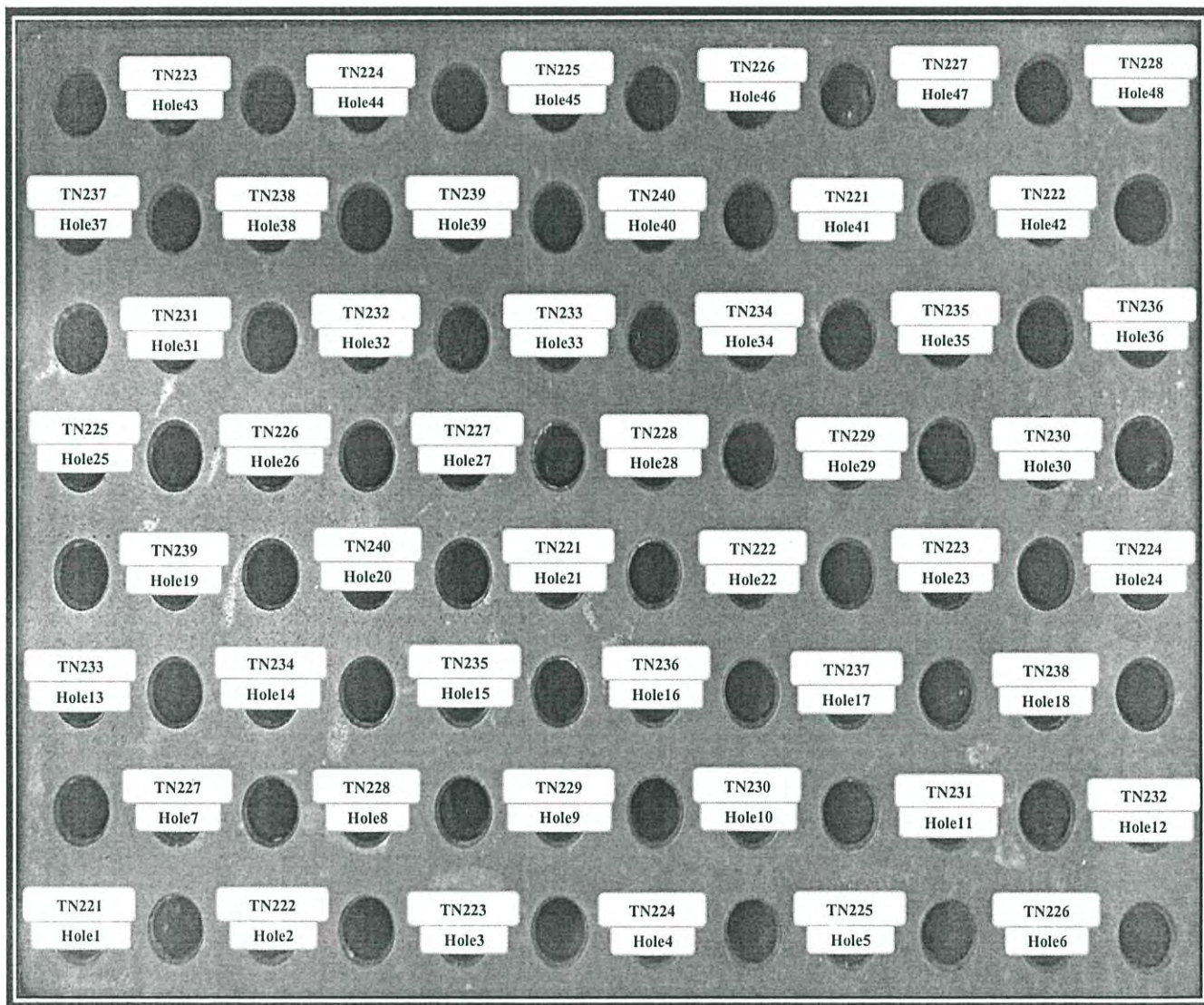
Website : www.scieco.co.th

E-Mail : calibrate@scg.co.th

Certificate No. T220730

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Calibration Report



FRONT CONTROL

Approved By. _____

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (° C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	93.60	93.82	94.05	94.20	94.36	94.26
95	Min	93.07	93.26	93.51	93.66	93.82	93.71
	Average	93.33	93.54	93.78	93.93	94.09	93.98
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
	Max	94.59	94.79	94.63	94.55	94.82	95.00
	Min	94.05	94.25	94.08	93.97	94.26	94.44
	Average	94.32	94.52	94.36	94.26	94.54	94.72
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
	Max	95.03	94.54	94.78	94.84	95.06	94.73
	Min	94.46	93.98	94.20	94.28	94.49	94.18
	Average	94.74	94.26	94.49	94.56	94.78	94.45
R4 Hole19-Hole24		TN239	TN240	TN221	TN222	TN223	TN224
	Max	94.89	94.82	95.73	95.85	95.73	96.10
	Min	94.33	94.26	95.51	95.62	95.51	95.85
	Average	94.61	94.54	95.62	95.73	95.62	95.97
R5 Hole25-Hole30		TN225	TN226	TN227	TN228	TN229	TN230
	Max	96.28	96.39	96.37	96.54	96.19	96.04
	Min	96.01	96.10	96.02	96.20	95.89	95.71
	Average	96.15	96.24	96.20	96.37	96.04	95.88
R6 Hole31-Hole36		TN231	TN232	TN233	TN234	TN235	TN236
	Max	96.84	96.97	97.03	96.48	96.33	95.76
	Min	96.53	96.65	96.71	96.08	95.98	95.43
	Average	96.68	96.81	96.87	96.28	96.16	95.60
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
	Max	96.46	96.15	96.19	96.06	96.95	97.09
	Min	96.13	95.84	95.85	95.72	96.64	96.78
	Average	96.30	95.99	96.02	95.89	96.80	96.93
R8 Hole43-Hole48		TN223	TN224	TN225	TN226	TN227	TN228
	Max	96.91	96.58	96.13	96.19	96.34	96.19
	Min	96.55	96.21	95.80	95.87	96.03	95.88
	Average	96.73	96.40	95.96	96.03	96.18	96.03

Approved By. _____



Certificate No. T220730

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Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (° C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	104.47	104.65	104.79	105.31	105.47	105.46
105	Min	104.15	104.27	104.45	104.98	105.14	105.20
	Average	104.31	104.46	104.62	105.15	105.31	105.33
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
	Max	105.55	105.73	105.65	105.84	105.97	106.07
	Min	105.28	105.43	105.35	105.52	105.68	105.83
	Average	105.42	105.58	105.50	105.68	105.82	105.95
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
	Max	106.14	106.06	105.81	106.05	105.81	105.87
	Min	105.85	105.81	105.55	105.80	105.53	105.64
	Average	106.00	105.94	105.68	105.92	105.67	105.75
R4 Hole19-Hole24		TN239	TN240	TN221	TN222	TN223	TN224
	Max	105.86	105.60	104.44	104.51	104.28	104.78
	Min	105.61	105.37	104.27	104.35	104.12	104.61
	Average	105.74	105.48	104.35	104.43	104.20	104.69
R5 Hole25-Hole30		TN225	TN226	TN227	TN228	TN229	TN230
	Max	104.94	104.93	104.97	105.08	104.68	104.69
	Min	104.77	104.75	104.76	104.90	104.51	104.49
	Average	104.85	104.84	104.86	104.99	104.60	104.59
R6 Hole31-Hole36		TN231	TN232	TN233	TN234	TN235	TN236
	Max	105.44	105.45	105.61	104.95	104.84	104.42
	Min	105.27	105.27	105.44	104.76	104.66	104.25
	Average	105.36	105.36	105.53	104.86	104.75	104.33
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
	Max	105.17	104.70	104.59	104.51	105.22	105.53
	Min	105.00	104.53	104.41	104.35	105.04	105.37
	Average	105.08	104.62	104.50	104.43	105.13	105.45
R8 Hole43-Hole48		TN223	TN224	TN225	TN226	TN227	TN228
	Max	105.61	105.45	105.10	104.77	104.87	105.02
	Min	105.44	105.28	104.92	104.60	104.70	104.85
	Average	105.53	105.37	105.01	104.69	104.79	104.93

Approved By. _____



Certificate No. T220730

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Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (\pm °C)	Uncertainty (\pm °C)
	Min , Max	Average		
100.0	100.0 , 100.4	100.1	0.29	0.83
105.0	105.0 , 105.4	105.1	0.20	0.79

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

 Approved By. 

REVIEW BY	Sudarati N.
APPROVED BY	Sudarati N.
NEXT CAL. DATE	5/06/2023

Maintenance Protocol

Atomic Fluorescence Spectrometer
mercur DUO /
mercur DUO plus

Serial-No.: R170A0143 Customer-No.: 104-002
Date: 6/06/2022 Carried out by: Mr. Srichan Fah-on.

Maintenance with following Operational Qualification (OQ)
(requires a separate OQ protocol)



Company	บริษัท 1010105 จำกัด (มหาชน) ๑๐๑
User	สุวิทย์ งามเลิศ
Department	Lab
Street	104 ถนนพหลโยธิน 40 แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร
Zip Code, City	กรุงเทพมหานคร เขตจตุจักร 10250
Country	ประเทศไทย
Phone	
Fax	
E-mail	

Maintenance works basic unit

tightness visual check inside the Mercur	<input checked="" type="checkbox"/>
visual check if gold-traps are broken	<input checked="" type="checkbox"/>
visual check if spectrometer is contaminated	<input checked="" type="checkbox"/>
visual check of the fluorescence cell	<input checked="" type="checkbox"/>
visual check of the absorption cell, incl. window	<input checked="" type="checkbox"/>
reactor cleaning	<input checked="" type="checkbox"/>
check pump-hose, if necessary change it	<input checked="" type="checkbox"/>
check swivel drive (SEV)	<input checked="" type="checkbox"/>
check drying-hose, output gas-liquid-separator	<input checked="" type="checkbox"/>
test Bubble-Sensor	<input checked="" type="checkbox"/>
check gas flows	<input checked="" type="checkbox"/>
check volume flows, reagents	<input checked="" type="checkbox"/>
recording stray light values	<input checked="" type="checkbox"/>
measurement with 30 ng/l	<input checked="" type="checkbox"/>

Maintenance works Autosampler

Serial No.: 52 1102 250

lubricate the dosing-winding (Teflon-grease-spray)	<input checked="" type="checkbox"/>
clean the dosing cylinder, if necessary exchange it	<input checked="" type="checkbox"/>
lubricate the winding system of the height drive with some drops of oil	<input checked="" type="checkbox"/>
check the toothed belt	<input checked="" type="checkbox"/>
check the position of the mechanical stopper (height: 13mm)	<input checked="" type="checkbox"/>
check the pump rate of mixing pump (<14s AS52, typ.7s/<20s AS52S, typ.10s)	<input checked="" type="checkbox"/>
check the pump rate of washing cup	<input checked="" type="checkbox"/>
check the electrical hose connections for good contact	<input checked="" type="checkbox"/>
check the connectors of the magnetic valves	<input checked="" type="checkbox"/>
check the dosing hose for buckling, if necessary exchange it	<input checked="" type="checkbox"/>

Device parameter	nominal value	actual value
visual check general tightness inside the Mercur	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
visual check Goldtraps <i>(Goldtraps 2 / NG)</i>	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
visual check spectrometer		
Fluorescence cell	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
Absorption cell, incl. window	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
lens	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
Swivel drive (SEV)	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check pump hoses	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check hoses and hose connectors	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check and clean reactor	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check drying hose output Gas-liquid-separator	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check bubble-sensor	o.k.: <input checked="" type="checkbox"/>	not o.k.: <input type="checkbox"/>
Check gasflow		
Argon pressure valve 4	1.2 – 1.5 bar	<i>1.5 bar</i>
Valve 1	10 NI/h or 0.166 NL/min	<i>0.166</i>
Valve 2	50 NI/h or 0.833 NL/min	<i>0.831</i>
Valve 3	5 NI/h or 0.083 NL/min	<i>0.084</i>
Valve 4	10 NI/h or 0.166 NL/min	<i>0.167</i>
Check liquidflow		
Acid	2.5ml/min ± 1 ml	<i>2.5 ml/min.</i>
Red.-agent	2.5ml/min ± 1 ml	<i>2.5 ml/min.</i>
Sample	10ml/min ± 2 ml	<i>10 ml/min.</i>
Adventitious light - values	(V)	from file
100	<i>0</i>	<i>0</i>
200	<i>0</i>	<i>0</i>
300	<i>0</i>	<i>0</i>
350	<i>0</i>	<i>1</i>
400	<i>1</i>	<i>3</i>
450	<i>4</i>	<i>7</i>
500	<i>9</i>	<i>17</i>
550	<i>19</i>	<i>36</i>
575	<i>26</i>	<i>51</i>
600	<i>36</i>	<i>91.</i>

Device parameter	nominal value	actual value
Analytical parameters Fluorescence cell		
Conditions.: max.conc.: 10µg/L PMT-voltage: <u>369</u>V		
Blank-solution		Int <u>0.0003</u>
without enrichment / FBR 30 ng/L	Int > 0.0015 RSD < 3 %	Int ₁ <u>0.0058</u> RSD..... <u>1.07</u>%
Conditions.: max.conc.: 1.7µg/L PMT-voltage: <u>352</u>V		
Blank-solution		Int..... <u>0.0040</u>
with enrichment / FBR 30 ng/L	Int > 0.008 RSD < 3 %	Int ₂ <u>0.0244</u> RSD..... <u>0.87</u>%
Fok.- factor (Int ₂ / Int ₁)	> 3.5	<u>4.206</u> ,
Analytical parameters Absorption cell		
Blank-solution		Ext..... <u>0.0010</u>
without enrichment / FBR 100 ng/L	Ext. > 0.0012 RSD < 5 %	Ext..... <u>0.0048</u> RSD..... <u>3.92</u>%
Comments		

Mr. Srichai Pak-on

Signature Technician

Bangkok, 6/06/2022.

Place, Date (DD/MM/YYYY)

สตีเฟน งามป้อม

Signature Customer

6/06/2022

Place, Date (DD/MM/YYYY)